Notice of Intention
To Commence Large Mining Operations

American Sands Energy Corp

March~~September~~ 20~~1~~54

Green River Resources, Inc.

Bruin Point Mine

UDOGM M&RP M/007/0040

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

Prepared in part by:

URS Corporation
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and

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URS

March 17, 2015

Paul B. Baker
Mineral Program Manager
Utah Division of Oil Gas and Mining
PO Box 145801
Salt Lake City, UT 84114-5801

Subject: Response to Second Review of Notice of Intention to Commence Large Mining Operations, Green River Resources, GRR, M/007/0040, Carbon County, Utah

Dear Mr. Baker:

Attached please find two (2) copies of the revised document "Notice of Intention to Commence Large Mining Operations. Green River Resources, Bruin Point Mine UDOGM No. M/007/0040." Green River Resources amd its consultant URS have been meeting with Mr. Wayne Western of your staff over the last few months to facilitate a comprehensive submittal and understands that the permit to be consistent with the Division's requirements.

Please note that information pertaining to the cultural survey is confidential and has already been submitted. The Ground Discharge permit and Construction Permit have been submitted to Utah Department of Environmental Quality and should be obtained from their web page. A draft copy of the Groundwater Discharge permit is being submitted for review purposes only. The Air Approval Order remains under development and will be provided in the future as the NOI is being processed.

Please contact William Gibbs (801.277.7888, wgibbs@americansandsenergy.com) with any questions regarding this NOI.

Thank you for your attention and continued assistance.

Regards,

Amber Withers

Amber Withers
Enclosures

cc: Western, W. (UDOGM)

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Comment #	Sheet/Page/ Map/Table #	Comments	Initials	Review Action	Sheet/Page/ Map/Table #
1	Appendix G	*From the April 16, 2014, review: The raw laboratory data found in Appendix G was extremely confusing to interpret. The analytical results presented in Tables 1 and 2 were reportedly for three samples of processed ore and one sample of raw tar sands. The analytical reports provided by America West Laboratories only reported results for three samples: 1A, B, C; 2 A, B, C; 3A, B, C. All were identified as "processed sands" on the Chain of Custody document. There was no analysis report for the raw tar sands sample. Furthermore, on Tables 1 and 2, samples were titled 001A, 003A, 005A, 007A, which were not the same identifier numbers on the lab reports. On top of that, none of the detected concentrations found in the lab reports matched the data that was presented in Tables 1 and 2.* *Please clarify these laboratory analytical data results.* The tabulated data in Tables 1 and 2 provided in the Appendix G is still not coinciding with the lab analytical reports. The data results for each analyte in the lab reports do not match the data in the tables. Lab data for the raw tar sands sample was still not provided in Appendix G. Sample Lab ID 2A, B+C is missing from the tables.	aa	A new summary of the data is developed and included in Appendix G.	Appendix G Analytical Data
2	Figure 1	*From the April 16, 2014, review: The use of the terms "permit area" and "project area" is confusing and difficult to apply to the regulations. As shown on several of the figures, the permit area is sometimes outside the project area and the project area is sometimes outside of the permit area.* The Division recognizes its lack of clarity with the comment in the previous review. To reduce confusion, please use terms as used and defined in the R647 rules to identify surface and underground areas to be affected by the operation. Disturbed Area means surface land disturbed by mining operations. Land Affected means the surface and subsurface of an area within the state where mining operations are being or will be conducted …. The term permit boundary and survey boundary are not defined in the regulations and do not define areas where conduct mining and reclamation operations may be conducted. Specifically the Division wants the areas where surface disturbance will occur (bonded area) shown as disturbed areas. The areas where mining will occur, both surface disturbance and underground mining, should be categorized as land affected.	whw	Figure 1 has been modified to show the Lease Boundary line and the Survey Boundary line. Figure 5 has benn updated to show the lease boundary and the Disturbed Area (showing surface disturbance). The Land Affected is shown on Figure 14 (showing all disturbace including the underground workings. The text throughout the NOI has been revised to reflect the 'Land Affected' and 'Disturbed Area', Lease boundary and Survey boundary terminology.	Figure 1, Figure 5 and Figure 14

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3	Figure 12 109.1, pg. 44	Please overlay the disturbed areas with the watershed boundary line. The statement in paragraph 1 that the disturbance area does not extend into the headwaters of the Range Creek Canyon watershed is not accurate based on Figure 12. The majority of the disturbance area is mapped within the Range Creek Canon watershed; only the southwest corner of the disturbance area is located in the Grassy Trail Creek watershed.	aa	Text has been updated to match the Groundwater Discharge permit. The disturbances will be located in the Grassy Trail Creek and Range Creek watersheds. Range Creek and North Spring are located outside of the Disturbed Area but within the Affected Area Figure 5. North Spring is located near the northern boundary of the affected area, outside of the disturbed area and approximately 500 feet southeast of the proposed dry materials storage area. North Spring is fenced, piped, and flows into a stock pond before continuing to Range Creek through a culvert. The condition of the spring is noted as being highly disturbed as a result of overgrazing (JBR, 2014; Calkin, 1990).	109.1, pg. 51
R647-4-105 - Maps, Drawings & Photographs					
4	Figure 2	Please show the access route to the site from Nine Mile Canyon.	whw	This is shown on figure 2, will update legend to say access from Nine Mile Canyon.	Figure 2
5	Map 1	In the legend please show the line type that represents affected area. Also note that the affected area shown on Map 1 is different than the affected area shown on Figure 5.	whw	Legend lines have been updated. The updated site plant has been added to Figure 5, with a blown up inset showing the detail.	Figure 5, Appendix G Map 1
6	Map 1	The Division recommends that the pad be restored to a more natural topography than leaving the area flat.	whw	More grading to a natural topography has been updated.	Appendix G Map 1
7	Map 2	The contours in the tailings stockpile do not correspond with the contours outside the tailings stock pile. For example contours in the year1 area have a maximum height of 10,150 feet, but that contour blends into contour 9860 fee. The contour marking the bottom of year 1 is 10,050 feet in the tailing stock pile area but blends into the contour for 9700 feet.	whw	Contours have been updated.	Appendix G Map 2
8	Map 2 & Map 3	The contours on Map 2 and Map 3 are significantly different for the tailings stockpile area	whw	Contours have been corrected.	Appendix G Map 2 & Map 3
9	Map 4	In the legend please show what the different lines and symbols mean.	whw	Legend has been updated.	Appendix G Map 4
10	Map 4 and Figure 5	The structures listed on Map 4 are different than those on Figure 5. For example in Map 4 there is a fan, parking lot, crushing facilities, fuel tanks, water tanks, parts trailer and portable office. Only a fan and substation are shown on Figure 5. Please include all structures in the bond and equipment list.	whw	Map and Figures have been updated.	Appendix G Map 4 and Figure 5
11	Map 5	Please label contours that are outside of the disturbed area.	whw	Contours outside of the disturbed area are labeled.	Appendix G Map 5
12	Map 5	Please define the line types in the legend	whw	Line types are defined in the legend.	Appendix G Map 5
13	Map 5	There are three green contour lines that all merge into the same contour at the bottom of the map. Please make the appropriate correction.	whw	Corrections have been made.	Appendix G Map 5
14	Map 5	Several of the blue contours stop at the disturbed area boundary. The way they stop suggests a vertical cliff-like structure would be left, but Map 4 shows slopes of 2H:1V. Please have the contours outside the disturbed area connect with the contours within the disturbed area.	whw	Contours have been adjusted.	Appendix G Map 5
15	P68	Some of the slopes would be left at 2H:1V or steeper. Please include a map and cross sections showing slopes that are steeper that 2H: 1V.	whw	Cross section has been added to Map 4.	Appendix G Map 4

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105.2 - Surface facilities map					
16	Figure 5 and Appendix H and page 10, 11 and 58	*From the April 16, 2014, review: Please make sure that all items listed in the bond are shown by the same name on the surface facilities map and in the text. Some items missing from the bond include the material conveyor and the communications tower. Also the warehouse is listed on page 10 as a warehouse and maintenance shop. Please include the change house, substation, and fan house.* This comment was not adequately addressed. The following items are found on pages 12 and 13 and Figure 5: Warehouse and Maintenance Shed, Office Building, Electrical Building, and Process Equipment. In the text, tanks are referred to as a tank farm, but on Figure 5 they are listed as the solvent storage tank, water storage tank and bitumen storage tank. Please be consistent between the text and figures. Items listed on Figure 5 but not in the text are the process building (not to be confused with process equipment), the material conveyor, the substation, and the fan house. On page 6 the plan says the process will use heat. Please state what type of fuels will be stored on site. Also include fuel for vehicles and building heating. Please show the septic system, parking lot, power lines, the change house, and snow storage areas.	whw	Text has been updated to match figure 5 and map 1. Surety has also been updated.	Figure 5, Appendix H and Page 11, 15 and 77, (table 110.3.1)
105.3 - Drawings or Cross Sections (slopes, roads, pads, etc.)					
17	Omission	*From April 8, 2014, review: Please provide a cross section showing the extent of the ore zone to be mined. Please depict the surface elevation, the ore zone elevations, Range Creek and any other important features necessary in this cross section.* Map 4 in Appendix G does not show these features. This is a map of the portal design.	aa	Figure was added, see figure 13A.	Figure 13A
18	Figure 13	Colors on the geologic legend do not match colors on the map. Consider turning off the vegetation layer; most obvious is the Tgu.	lah	Colors have been updated.	Figure 13
19	Figure 13a	Please color code cross section to match Figure 13 and delete the dash lines at 8500 and 9500 feet.	lah	Cross section have been color coded to match Figure 13 and dashed lines removed.	Figure 13A
20	Figure 16	Add H and V to both 2:1 and 2:1.5. The Division suggests using the notation 1.33H:1V instead of 2H:1.5V.	lah	Figure has been updated with H:V.	Figure 16
21	Figure 16 & Map 4 App G	The figures do not match.	lah	Map 5 has been updated to match Figure 16. Map 4 has been reassigned to Map 5 for next submittal.	Appendix G Map 5, Figure 16
22	Map3 App G	Add the maximum slope angles, i.e. "max 2H:1V".	lah	Maximum slope angles have been added to the Map.	Appendix G Map 3
R647-4-106 - Operation Plan					
General Operation Comments					
23	Appendix D and Access Road	The Division was unable to locate the road maintenance agreement with Carbon County in Appendix D. Please provide a copy of the agreement. The road will need to be permitted and bonded unless it is a public road.	whw	County not willing to enter into a Road Maintenance Agreement until permit is granted by DOGM. Therefore a road maintenance agreement has not been obtained yet. However will be in place before any mine activity starts and submitted to DOGM as stated on cover page of Appendix D. A figure has been included in Appendix D showing County roads.	Appendix D and Access Road

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106.2 - Type of operations conducted, mining method, processing etc.					
24	Pg. 8	The plan says an adequate buffer will be maintained as underground mining approaches Range Creek. Please elaborate on what factors will determine what is considered an adequate buffer.	aa	Factors considered for protecting Range Creek from subsidence have been included in the text.	pg. 12 and Figure 17
25	Pg. 9	*From April 8, 2014, review: The underground mining plan states that the sorting waste and tailings will be disposed of in a permanent surface stockpile during the first six years of mine life. However, on Figure 5 the permanent tailings storage area shows only four years of storage (years 0-3). Please correct this discrepancy.* The original Figure 5 submitted was intended to show the topsoil removal plan which was to take place over the first 4 years. It was discovered on this second review that the map now omits the topsoil removal plan for years 0-4. The map legend shows the top soil contours in black but they also should be labeled on the map for each year of removal.	aa	Figures have been updated to resolve this confusion. Description of the dry tailings impoundment and how it will be constructed is included in the text. Additional maps have been included into Appendix G showing the active and covered section year end status.	pg. 20 and Appendix G Topsoil Removal - Replacement Yr 2 through Yr 6
26	Pg. 6 & 15	Type of Operations to be Conducted states, ". . . and uses a fraction of the heat typically required for . . . ." This statement implies that heat will be used in the process. Please identify the source of the heat and include it on Page 15.	mpb	All heat used in the process will be powered by electricity from the local grid. The site will not be supplied with nor consume any liquid or gaseous fuel in the stationary equipment. This includes activities associated with the generation of heat supplied to the process.	pg. 19
27	Pgs. 14-15	Inconsistency: The third paragraph on page 14 says, "In this way all solvent used in the operation will be recovered from both the sand and the bitumen and recycled in the process." Meanwhile, the second paragraph on page 15 says "It is anticipated that some of the solvent will remain with the bitumen requiring some solvent makeup; therefore an ongoing supply of solvent will be required." Research into the process developed by Universal Oil Recovery LLC indicates that the process uses equipment supplied by SRS Engineering Corporation. Even though it says it uses a closed loop system, some solvent will be lost, which amounts to a "release" to the environment. A forthright accounting of the solvent use, amount lost (released), and its chemical make-up is required.	mpb	The solvent removed from the process will be exported from the system to 3 receptors: the tailings product from the process will contain no more than 2 ppm of solvent (w/w). This solvent will leave the plant with the tailings and be transported and disposed of with the them. The 2nd receptor of solvent will be the bitumen product. Bitumen produced from the process will contain a maximum of 0.5% (v/v) of solvent. The solvent contained in the bitumen will be shipped from site with the bitumen and delivered to the refinery. It will not be returned to the site. The Clean Air permit deals with the 3rd receptor of the solvent. A portion of the solvent will be lost from the storage tanks and truck loading operations to the atmosphere. The quality and quantity of these loses are detailed in that application.	pg. 18
28	Pgs. 10 & 16, Appx. G, Figures 5, 7, & 8, and Map 2 (Also Figs 2 & 3 of SWPPP, possibly others throughout the NOI)	Inconsistency: Page 10, paragraph 5 (Type of Operations) and the table in Appendix G indicate that after year 6, 29 million cubic yards of sand tailings will be returned to worked-out parts of the underground mine. Page 16, paragraph 2 seems to reverse this, and says that only 14 million cubic yards of sand will be placed underground. Figures 5 and 7 are labeled with 6 years of sand disposal, while Figure 8 uses the same contours and indicates 16 years of disposal. Map 2 also indicates that sand tailings will be dumped on the sand stockpile area through year 16. The Division requests the operator commit to the underground disposal of the maximum amount of sand tailings as stated on Page 10, Appendix G, and Figures 5 and 7, and remove or correct any statements, figures and maps to the contrary. The Division encourages underground disposal to the maximum extent possible to help minimize the impacts of leaving and reclaiming the sand disposal pile.	mpb	Inconsistencies have been updated. Approximately 29 million cubic yards will be placed underground once there is enough room to start placing material back underground. This will be in approximately 6 years after mining starts.	pg. 21, Appendix G Map 2, Figures 5, 7, & 8
106.3 - Estimated acreages disturbed, reclaimed, annually					
29	Table 106.3.1	Table 106.3.1 shows the total surface disturbed area under the proposed permit. Please include the proposed underground area acreage. The acreages listed in Table 106.3.1 is 560 acres, but the total only comes to 160 acres. Please have one table for Disturbed Area Acreages and another table for Land Affected Acreages.	whw	Table has been added showing land affected.	Table 106.3.1, 106.3.2
106.4 - Nature of materials mined, waste and estimated tonnages					
30		Not Addressed, Please provide a table that shows the estimated annual production of product ore and waste product. A table was not apparent in Appendix G	whw	Table was provided in Appendix G. Sent to Wayne Western 1/27/2015. Confirmed chart looks ok.	Appendix G, Production schedule

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106.8 - Depth to groundwater, extent of overburden, geology					
31	Pg. 35	*From April 8, 2014, review: The description of drilling activities presented one monitoring well drilled to 1,035 feet yielding two gallons of water. None of the figures showed where this drill hole was located. Please add this drilling location to one of the figures.* The exploration drill hole was added to Figure 4. Figure 5 had the drill hole on the map legend, but it was not added to the map.	aa	Exploration drill hole has been added to Figure 5.	Figure 5
32	Pg. 36	*From April 8, 2014, review: More information is needed on the geology underlying the Green River Formation in the project area. Specifically, information is needed as to what formation the springs and seeps in the underlying rock formations identified in the spring and seep survey are originating from and what is the relative depth between the ore formation and the spring and seep-bearing formations.* The second part of this comment asking from which rock formations the springs originate was not addressed in the geology section of the Notice.	aa	This comment is addressed in the Hydrogeology of North Spring Report located in Appendix C. See report.	Pg. 53 and Appendix C
33	Page 35	*From April 8, 2014, review: The surface map refers to Colton and Flagstaff formations, and the text refers to the Wasatch formation. Please provide an explanation in the text.* The inconsistencies have been corrected, but the description of the geologic units has also been eliminated. Please re-insert the descriptions of all the geologic units shown on Figure 13 and 13A.	lah	The Green River Formation consists of three members: Parachute Creek, Garden Gulch and Douglas Creek. The Parachute Creek Member is a 2-60 foot thick outcrop sequence of multiple oil shale beds exposed at the surface. The Garden Gulch Member is dominantly limestone, with poorly bedded greenish grey shales and thinly bedded mixed color shales. The Garden Gulch Member does not contain any significant oil sands. The Douglas Creek Member averages 1,262 feet and is characterized by massive fine grained saturated channel sand deposits; fine grained saturated sheet sand deposits; streaky saturated to saturated siltstones; red shales; and occasional thick zones of algal limestone (AMOCO, 1981).	Pg. 45
106.9 - Location & size of ore, waste, tailings, ponds					
34	pg. 36	The plan indicates there will be two 30,000-ton stockpiles consisting of ore and temporary tailings adjacent to the processing plant as shown on Figure 5. A perimeter berm is planned as a hydrologic control for the processing area, which will include these stockpiles. The Notice needs to include geotechnical information providing design criteria that the berm will sufficiently contain these stockpiles in the event of an environmental hazard event that could release the tailings and ore stockpile materials to the Range Creek Canyon drainage.	aa	The earthen berms were conceptually designed for both containment of drainage runoff within the project area and to divert offsite flow. The preliminary conceptual design of the berms did not consider the effects of significant erosion or slope failure of any kind. Final engineering designs, when available, will be provided for berms and ditches.	pg. 48
R647-4-109 - Impact Assessment					
109.1 - Impacts to surface & groundwater systems					
35	Pg. 39	*From the April 8, 2014, review: The third paragraph on this page states that annual precipitation is estimated at 12.5 inches with another 20 inches of snow. Snow is precipitation. An "average annual precipitation" value is a combination of rain and snow. The snow water equivalent is commonly about one inch of water for every ten inches of snow. So if read as-is, this paragraph basically says the average annual precipitation is about 14.5 inches (12.5 inches of rain and 2 inches of snow-water).* *This estimate contradicts the precipitation values provided in Table 106.5.1 on page 17. The latest PRISM data also estimates annual precipitation at 23-25 inches. Please correct or explain the discrepancy and adjust accordingly any conclusions that may have been based on the original estimate.* The annual precipitation estimate in the last paragraph on page 44 appears to have been revised downward to 10.12". This is in direct contrast to what other data indicates, including that listed in the soils report in Appendix B, where soil type mean annual precipitation ranges from 16"-30", with a weighted average of approximately 22"-24".	mpb	Bruin Point weather station located on Bruin Point was downloaded and used. This data is from 2007-2014 and has been submitted to DOGM for review.	Raw Data submitted to DOGM

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36	Pg. 44	The top paragraph asserts that "[t]he headwaters of Range Creek Canyon, which flows near the eastern boundary of the study area and eventually flows into the Green River (Uintah Watershed), is not within the proposed area of disturbance." However, the USEPA states: "Many headwater streams are prone to natural drying because they lack year-round connections to groundwater and don't have permanent flow" (http://www.epa.gov/eerd/research/headwater.html). On-site observations revealed that here is a defined channel running down the valley to be used for the tailings disposal area. During the course of the last review meeting with the operator, a verbal request was made for delineation of this drainage in accordance with US Army Corps of Engineers (ACOE) guidelines. This drainage may be considered a jurisdictional headwater of Range Creek. The Division requests written concurrence from the ACOE that this is not the case.	mpb	JD Letter will be included in Appendix E, Letter received from the CORPs on January 14, 2015.	Appendix E Approved JD from CORPS
37	Pg. 35	*From the April 8, 2014, review: The only groundwater studies performed for this project appear to be the installation of a single well and a spring and seep survey. The drillers log for this well hole did not identify the geology that was encountered. The Division of Water Quality Groundwater Discharge Permit Application was not included with the permit, so it was not clear if any additional studies have been completed. The Division cannot make an assessment of impacts to groundwater based on this information. A more comprehensive groundwater study to determine the impacts this operation, such as the Groundwater Discharge Permit Application, is needed.* The seep and spring survey prepared by URS in September 2014 focused on the groundwater supply sourcing North Spring which has recorded discharge levels ranging from 1.8 gpm – 40 gpm. Tributary Spring farther downstream has been reported at 4 gpm. The report discussed that the groundwater discharging from these springs is responsible for providing surface flow in the Range Creek channel. The report discusses that snowmelt staged for prolonged periods on the northeast aspect slopes of the dry material impoundment area combined with the highly fractured bedrock of the Green River formation contribute the source water needed to recharge the groundwater system that supplies North Spring and to a lesser extent, Tributary Spring. The location of the dry material impoundment is directly adjacent north of North Spring. The Division is concerned that the construction of the dry material impoundment area and an associated underlying clay liner may impede or disrupt the recharge capability for North Spring. Although the spring is located at an elevation above the T38 ore horizon and the spring is located outside of the active mining area, the location of the dry material impoundment area still places this spring at risk and thereby also puts the flow regime in Range Creek at risk as well if the spring source is disrupted. The report also pointed out two borings drilled by Amoco A-14 and A-17 that reported artesian groundwater conditions below the surface at approximately 70 feet bgs. The flow rates were reported at 300 gpm and 50 gpm respectively. These borings are located in the proposed dry materials impoundment dump, and it is unclear if these artesian conditions could impact the clay liner and possibly weaken it. The operator has committed to actions to mitigate impacts to surface and groundwater, stating that downgradient springs and seeps will be sampled. The plan references the Groundwater Discharge Permit, which was not included in the plan because it is still in the review and approval process with the Utah Division of Water Quality. The groundwater discharge permit application was not provided to the Division. The Division is unclear as to what types of sampling and mitigation measures are being proposed for the springs.	aa	For purposes of Division review, we are providing you a pdf of the draft Groundwater Discharge permit. Once the final Groundwater Discharge permit is issued it will be added to the NOI. The tributary spring is outside of the affected area and on the opposite site of Range Creek. This spring will not be impacted. This Tributary Spring is outside the area identified as the recharge area for North Spring. Additional text has been included describing that the source area to North Spring. The source area of North Spring is the upper Range Creek drainage basin west and northwest of the spring. Recharge to the shallow aquifer feeding North Spring occurs when water derived from snowmelt, infiltrates through the thin site soils and into the underlying fractured bedrock. The estimated drainage contributing to North Spring is shown on attached Figure 5 and is approximately 234 acres. The area of the tailing facility is approximately 110 acres and represents 47 % of the drainage contribution to North Spring. However, the tailings facility will be built in 6 phases, one phase in each of the six consecutive years of operation. Therefore, only one sixth of the tailing facility, or approximately on twelfth (8%) of the source area, will inhibit infiltration at any given time. As phases of the tailings facility are completed, the completed phases will capped and allow infiltration into the subsurface around the perimeter of the cap. Surveys were conducted in the dry impoundment area, there are no known artesian conditions in the impoundment area. These areas would have shown up as wetted areas. The entire footprint of dry tailings impoundment area is dry. In the Amoco reports it is not apparent that the drill holes A-14 and A-17 were of artesian flow, it was only report that groundwater was encountered.	For review only Draft Groundwater Discharge Application provided on disk. Pg. 51

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38	Pg. 39	Page 39 says the storm water pollution prevention plan (SWPPP) is in Appendix E, but this and other permits referenced on the cover page of Appendix E were not provided with the Notice. A SWPPP, or information that would be included in the SWPPP, is needed to evaluate how storm water will be routed around the disturbance area. It is noted that a surface water control plan was submitted as Figure 7, but it is not clear as to what design criteria were used for the diversion ditches, collector sumps, catchments, berms, etc., in order to evaluate if these hydrologic features are capable of handling regional precipitation events. A draft copy of the SWPPP is acceptable.	aa	The SWPPP was provided and is located in Appendix E	Appendix E SWPPP
39	Pg. 39	A map was provided; however, the disturbance appears to be located predominantly in the Range Creek watershed, not the Grassy Trail watershed. See related comment in the general comments regarding Figure 12.	aa	Text has been updated to include Range Creek.	109.1, pg. 51
40	Omission	Provide a detail of the runoff protection systems at the toe of the sand pile to show the sediment trap layouts, relative elevations, flow and outlet routing, and design capacities. Based on typical local conditions, adequate control of erosion and sediment should be achieved by containment capacities designed for a 100-year, 6-hour storm. Current illustrations and descriptions do not provide adequate information to evaluate the probability that protective measures will function as needed.	mpb	Some of this detail is provided in the SWPPP, which is included in Appendix E, however full design details have not be developed and will be developed prior to construction at the site. A final SWPPP will be submitted for insertion into the final NOI upon completion.	Appendix E
41	Stability and Hydrology report Fig 3	Figure 3 of the Stability and Hydrology report shows a retention basin (#8) at the eastern-most point of the tailings storage pile, but Figure 7 of the Notice shows a series of three dots labeled "Sediment traps" at the lowest topographic point of the tailings storage pile. Please correct this apparent inconsistency. The sediment traps on Figure 7 are likely in the more appropriate location to protect the Range Creek drainage. (See comment 40 above.)	mpb	Update map in Stability and Hydrology report to show basin at the lowest topographic point.	Appendix G, Geotechnical Report Figure 3
109.2 - Impacts to threatened & endangered wildlife/habitat					
42	Omission	Provide details of the system(s) to be used at the toe of the slope of the processed sand pile that are intended to protect the Range Creek drainage system in perpetuity and prevent the migration of sediment and/or contaminants into the drainage and likely impact downstream wildlife habitat. Current illustrations and descriptions do not provide adequate information to evaluate the probability that protective measures will function as needed.	mpb	A monitoring plan has been developed (consistent with the terms of its permit) that will include monitoring and sampling of surface water, groundwater and dry materials. Eight groundwater monitoring wells are proposed to be installed. Wells are proposed to be installed at the edges of the tailings storage facility and the processing area. A monitoring plan that will include monitoring and sampling of the sand tailings for SLPL over time will be implemented. Furthermore, samples will also be collected at the seeps and springs downgradiant of the sand tailings and process facilities, Appendix E, Utah Groundwater Discharge Permit. The Range Creek Drainage will be protected from any sediment and or/ contaminants. After construction of the dry tailings impoundment has started tailing samples will be collected and evaluated using the HELP model to determine the time required for water to infiltrate through the tailings down to the bottom compacted liner. If the HELP model indicates that the liner is inadequate, GRR will evaluate additional options to keep the dry tailings disposal facility in compliance with the permit. Examples of these options are redesign of the cover to prevent water infiltrating, a geosynthetic liner, groundwater pump and treatment system, or collection system design to capture water on top of the liner. Sand tailings will be inspected and free of moisture prior to being placed in the dry tailings impoundment. If sand tailings are not dry they will be reprocessed and dry before being placed on the tailings impoundment. A final SWPPP with design specifications will be submitted to DOGM prior to construction and monitored thereafter.	Pg. 72, Appendix E Draft Groundwater Discharge Application

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109.4 - Slope stability, erosion control, air quality, safety					
43	Pg. 53	The topsoil stockpiles are estimated to cumulatively contain approximately 220,000 cubic yards of material. The proposed berms for the topsoil stockpiles are designed to be two feet high and two feet wide with a 1.5H: 1V slope. Please provide the engineering design calculations showing that these berms will contain this volume of topsoil in the event of a slope failure that could pose an environmental hazard to the Grassy Trail Creek watershed.	aa	The earthen berms were conceptually designed for both containment of drainage runoff within the project area and to divert offsite flow. The preliminary conceptual design of the berms did not consider the effects of significant erosion or slope failure of any kind. Final engineering designs, when available, will be provided for berms and ditches and will be designed to prevent slope failure that could pose an environmental hazard to Grassy Creek.	Pg. 69
44	Omission	Please discuss in the text the issues regarding subsidence and the backfilling of tailings.	lah	Text has been updated to further explain that there is no issues with subsidence. Backfilling of mine workings with tailings will be completed beginning in year 6 through the remaining life of the mine. Tailings would be hauled underground and placed with mobile equipment to fill openings as much as possible. Tailings would fill openings not needed for ventilation, access, transport or safety purposes to approximately 10 feet of the back. This practice will minimize surface area needed to dispose of tailings plus help to ensure that the mine workings remain stable for the foreseeable future. Tailings would buttress pillars and provide lateral support to the workings whereby limiting settlement of the immediate back to no more than 10 feet. If settlement did occur, it is unlikely that there would be any evidence on the surface more than 600 feet above the workings.	Pg. 68
45	App G page 12	Page 12 notes a clay liner below the tailings stockpile, but a clay liner is not shown on any of the stability analysis. Please include.	lah	The thickness of the 4-ft clay liner relative to the 400-ft high tailings stockpile makes the clay liner almost impossible to identify in the drawing. 4-ft thick liner added. FS for drained case was 2.907 and Seismic case 1.964. Minimum surfaces do not intersect the clay liner for Section B-B. These are figures D19 and D20.	Appendix G
46	App G page 15	Paragraphs 3 &4: Please include a plan view map that shows sections A-A' and B-B'.	lah	Appendix G, Figure 4 Stability Sections has been added.	Appendix G
47	App G page 15	The last paragraph notes Appendix D. Is this a typo? Should it be Appendix G? This problem was noted elsewhere in the text and on Figure D1 and possibly other figures.	lah	Appendix G page 15 has been updated.	Appendix G
48	App G	Paragraph 4 notes the steepest slope to be 1.75H: 1V, yet Table 5 notes maximum slope grade of 2.25H:1V. The stability analyses should be modeled on the steepest slope angles.	lah	The maximum recommended was 2.25 based on a "very large uniform slope" there is one "point-to-point slope" that is 1.75H:1V. This in and of itself was considered when we ran the cross sections, but does not impact the results for stability of the tailings stockpile. The reference to 1.75H:1V has been removed. Although a localized slope of 1.75:1 was identified, this was only one section between two contour lines. The geometry as proposed in the cross-sections is acceptable, but we will use a slope of 2.25:1 or flatter for stability. It is an isolated instance of stability with a steeper section.	Appendix G
49	Table 5	The header notes a grade, but the units below are not in percent.	lah	Changed grade to slope and removed maximum. The change was also made to include "or flatter" to provide clarity for the reader.	Appendix G
R647-4-110 - Reclamation Plan					
110.2 - Roads, highballs, slopes, drainages, pits, etc., reclaimed					
50		When comparing Google Earth with the reclamation maps there are several roads that show up on Google Earth in the "permit area" that do not appear on the map. Please include a Google Earth or similar image showing existing roads, which ones will be used, and which are scheduled for reclamation or to remain as part of the post mining land use.	whw	The old and partially reclaimed roads that show up on Google Earth will be added to Existing Surface Facilities and Contour Map, Figure 4. The old mine roads will be shown with a red line. These roads are associated with the drilling that took place at the site over time and will not be reclaimed by American Sands. The only areas that will be reclaimed are the disturbed area that is shown on Mine Plan Map, Figure 5. The disturbed area is shown in a blue shaded area.	Figure 4

Comment #	Sheet/Page/ Map/Table #	Comments	Initials	Review Action	Sheet/Page/ Map/Table #
110.4 - Description or treatment/disposition of deleterious or acid forming material					
51	Pg. 59 & Appendix F	*From the April 8, 2014, review: Due to its "proprietary" designation, the Material Safety Data Sheet (MSDS) provided for the Hydrocarbon Extraction Solvent is lacking information necessary to evaluate its potential deleterious impacts. The MSDS also contains several statements and requirements that are contradictory and raise alarms as to its true worker and environmental safety. A more thorough understanding of the constituents that make-up this material is required to determine the potential effects it may have on human health and safety, and the environment. When provided, this information can be marked "Confidential."* This issue is unresolved. To date, the reason given for a "proprietary" designation of the solvent mixture has been "loss of competitive advantage." This is the definition of a "trade secret." Forty CFR part 350 requires a completed EPA Form 9510-1 (7/1988) to be submitted to, and approved by, the EPA for the chemical mixture or process use of a chemical to be legally considered a trade secret. With that said, designating anything as "proprietary" or a trade secret does not automatically justify withholding information requested by any federal, state, or local regulatory agency that is essential in reviewing potential impacts to public health and safety and the environment, and evaluating measures to be employed to prevent or mitigate such impacts.	mpb	Per our discussions with Division of Water Quality there will not be a release of solvent to the environment in any quantities substantial enough to effect wildlife. Please refer to the Groundwater Discharge permit and the Construction permit. There is information provided on how the tailings will be constructed and designed.	Appendix E Draft Groundwater Discharge Permit, Appendix G Map 8
52	Omission	The sampling and analysis plan needs to be provided to the Division for review.	mpb	The SAP and QAPP will be provided as part of the Groundwater Discharge permit. The SAP and QAPP are located in Appendix F of this permit.	Appendix E Draft Groundwater Discharge Permit, Appendix F SAP and QAPP
53	Appendix G	*From the April 8, 2014, review: Analytical data is provided for the processed sands that indicate there will be no residual bitumen or processing chemical in the processed sands disposed of in the tailings pile. These results are from controlled laboratory conditions. An ongoing QA/QC sampling and analysis plan needs to be implemented to ensure that the sands placed in the tailings pile are in fact clean and free of residual bitumen, oils and processing reagents.* The Division makes the following clarification of this requirement. The required QA/QC sampling and analysis plan is to monitor the tailings sands as they are deposited, not for groundwater discharge. This is intended to prevent the introduction of contaminants into the environment rather than monitor their progression through soil and groundwater after deposition. Please provide a brief narrative of how the sands will be monitored and sampled during operations prior to disposal, including sampling frequency and analytes.	mpb	The Analytical results in Appendix G are results from the pilot plant, using tar sands from the Project Site. Sampling as described in the SAP includes collection of surface water, groundwater and dry materials. The goal of the surface water sampling, as described in the SAP, is to monitor for potential impacts to surface water adjacent to the proposed mining and ore processing activities. The goal of groundwater sampling is to monitor for potential impacts to groundwater downgradient of proposed processing and stockpiling operations. The goal of dry materials sampling is to monitor for potential environmental impacts in Solids samples from the Dry Material Impoundment (DMI) area. Full details are in the SAP, which can be found in the Groundwater Discharge Permit, Appendix F.	Appendix G Analytical Data, Appendix E Draft Groundwater Discharge Application, Appendix F SAP and QAPP
54	Appendix G	Without knowing the individual components of the solvent mixture, the Division does not know whether they are included in this list of organic chemicals in the analytical results, which therefore makes the analytical data of limited value.	mpb	American Sands is working with TestAmerica, which documentation will be provided certifying that the constituents of the solvent are included in the list of constituents that will be sampled for in the Groundwater Discharge permit. This documentation will be provided to UDOGM once it is final.	Appendix E Draft Groundwater Discharge Application

Comment #	Sheet/Page/ Map/Table #	Comments	Initials	Review Action	Sheet/Page/ Map/Table #
55		The sampling and analysis plan needs to be provided to the Division for review	mpb	The SAP and QAPP will be provided as part of the Groundwater Discharge permit. The SAP and QAPP are located in Appendix F of this permit.	Appendix E Draft Groundwater Discharge Application, Appendix F SAP and QAPP
110.5 - Revegetation planting program					
56		Please state the depth of topsoil and growth medium that will be placed in each area during final reclamation. The values in the plan are inconsistent. The amount of soil affects the reclamation cost estimate, so the cost estimate will need to be adjusted depending on what value is used.	mpb	Please note that this is just an estimate as stated in last paragraph in section 106.5. For reclamation surety purposes we used 220,000 cyd of topsoil. Text has been adjusted to match this estimate closer. During construction the quantities of topsoil could be a little more or less than what was estimated. Text throughout the permit has been updated to reflect 5-12 inches of topsoil will be redistributed over the 146 acres disturbed. Top soil will not be removed from the 14 acres where the topsoil will be stored, therefore top soil will not be replaced here.	Pg. 81
R647-4-113 – Surety					
57		Please include a table showing where materials will be stored and where they will be placed during reclamation. This is important to verify that all operations are accounted for in the reclamation cost estimate.	whw	All tanks will be cleaned and all solvent and fuel will need to be disposed of at an approved landfill of disposal facility. Text has been added and removal of solvent and fuel has been included in the demo costs for each tank (Appendix H).	Appendix H
58		Map 3 shows the tailings stockpile being covered with four feet of compacted clay material with 18 inches of topsoil/plant growth medium placed over the clay. The cost estimate, though, does not mention placing four feet of clay cover on the tailings stockpile. Please include the cost of placing the clay in the reclamation cost estimate.	whw	Cost have been included.	Appendix H
59	P 68	Sorted waste and sand tailings will be loaded into trucks, hauled back to the mine, and used as backfill for mined out areas. Please include in the reclamation cost estimate a cost to haul material underground.	whw	For the first 6 years of mining dry tailings will be placed in the dry tailings impoundment, which is a permanent structure. Reclamation of that structure, including the tailings, is included in the surety estimate. After 6 years of mining, when sufficient room is available in the workings to begin backfilling, the permanent impoundment will no longer be used and all dry tailings will be placed underground, using the haul trucks on their return trip after they have dumped their ore. If mining were to cease after six years, or at any time during years 7 to the end of mine life, no tailings would be produced, no backfilling would occur, and no backfilling costs would be incurred. Thus, there is no reason to include any backfilling costs in the surety.	
60	P 73 and Reclamation Cost Estimate	Once final grading is complete, as described above, topsoil and topsoil substitute material will be spread on the mine plant area using self-loading scrapers to place soil and a grader to spread the soil. However, in the reclamation cost estimate there is no mention of scrapers. Please clarify.	whw	Scraper costs have been included.	Appendix H

Notice of Intention
To Commence Large Mining Operations

American Sands
Energy Corp

March~~September~~ 20154

Green River Resources, Inc.

Bruin Point Mine

UDOGM M&RP M/007/0040

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

Prepared in part by:

URS Corporation
756 East Winchester Street, Suite 400
Salt Lake City, Utah 84107
(801) 904-4000

and

Mine Engineers Inc.
3901 South Industrial Road
Cheyenne, WY 82007
(307) 638-8833

GRR, Inc. – Bruin Point Mine
Notice of Intention to Revise Large Mining Operations
Table of Contents

GRR, Inc. – Bruin Point Mine
Notice of Intention to Revise Large Mining Operations
Table of Contents

Figures

GRR, Inc. – Bruin Point Mine
Notice of Intention to Revise Large Mining Operations
Table of Contents

Figures

GRR, Inc. – Bruin Point Mine
Notice of Intention to Revise Large Mining Operations
Table of Contents

Appendices

R647. Natural Resources; Oil, Gas and Mining; Non-Coal.
R647-4. Large Mining Operations.

R647-4-101 & -118. Filing Requirements and Review Procedures.

This Notice of Intentions (NOI) is submitted to the Utah Division of Oil, Gas and Mining (UDOGM) in compliance with part R647-4 of the Utah Minerals Reclamation Program by Green River Resources, Inc. (GRR).

The proposed mining operation is located in unincorporated Carbon County, Utah, northeast of Sunnyside Township on a 1760-acre parcel leased by American Sands Energy Corporation. Portions of the proposed mining operation are located in Section 2, 3, and 10 of T14S, R14W, Salt Lake Base and Meridian (SLBM). See **Figure 1,** for the Lease Boundary and the Survey Boundary. The Lease Boundary is the area that is under lease to GRR and the Survey Boundary in the area that has been surveyed for baseline conditions. Surface activities and disturbance will only occur within the Land Affected shown on **Figure 14**. The Land Affected Boundary includes the area that mining will take place. Likewise underground activities will occur within the Land Affected~~Permit Boundary~~. ~~Areas that were surveyed outside of the Permit Boundary will be referred to as the extended survey area and will not have any disturbance.~~

Comment [A1]: Comment #3

R647-4-102. Duration of the Notice of Intention.

GRR understands that upon approval of this NOI, including any subsequently approved amendments or revision, it remains in effect for the life of the mine, but that UDOGM may review the permit and require updated information and modifications when necessary.

R647-4-103. Notice of Intention to Commence Large Mining Operations.

GRR's NOI addresses the requirements of the following rules:

RULE #	SUBJECT
R647-4-104	Operator(s), Surface and Mineral Owner(s)
R647-4-105	Maps, Drawings and Photographs
R647-4-106	Operation Plan
R647-4-107	Operation Practices
R647-4-108	Hole Plugging Requirements
R647-4-109	Impact Assessment
R647-4-110	Reclamation Plan
R647-4-111	Reclamation Practices
R647-4-112	Variance
R647-4-113	Surety

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

1. Mine Name: Bruin Point
2. Operator: Green River Resources Inc.
   William C. Gibbs
   201 South Main Street, Suite 1800
   Salt Lake City, UT 84111
   Phone:801-536-6140
   Email: wgibbs@americansandsenergy.com

Type of Business:	Incorporated
Utah Business Entity No.:	5837950-0142
Local Business License No.:	NA
Issued by:	NA
Registered Utah Agent:	201 South Main Street, Suite 1800 Salt Lake City, UT 84111 Phone:801-536-6140 Email: wgibbs@americansandsenergy.com

3. Permanent Address: 201 South Main Street, Suite 1800
Salt Lake City, UT 84111
Phone:801-536-6140

4. Contact Person for Permitting, Surety, Notices:

William C. Gibbs
201 South Main Street, Suite 1800
Salt Lake City, UT 84111
Phone:801-536-6140
Email: wgibbs@americansandsenergy.com

Robin Gereluk
201 South Main Street, Suite 1800
Salt Lake City, UT 84111
Phone:403-650-5384
Email:rgereluk@americansandsenergy.com

5. Location of Operation: Portions of Section 2, 3, and 10, T14S, R14E, SLBM

Location (T14S, R14E)	Owner	6. Ownership of Land Surface	7. Owners of Record of Mineral to be Mined
All Sec 2	Hunt Oil Company	X	_
	Meany Family, LLC	_	X
N2; SE4 of Sec 3	Hunt Oil Company	X	_
	Meany Family, LLC	_	X
Sunnyside No. 7 (SW4 of Sec 3) Sunnyside No. 4 (NW4 of Sec 10) Sunnyside No. 5 (NE4 of Sec 10) Sunnyside No. 6 (SE4 of Sec 10)	Helene E. Richards Trust	_	X
	Meany Family LLC	_	X
	Oil Sands Corporation of Utah _ Oil Sands Corporation of Utah _ William Batchelder	_	X
	Resource Associates, LLC _ Resource Associates, LLC _ WM S Batchelder, et al. _ William G. Gibbs _ Peter W. Richards _ Helene E. Richards Trust Nancy Schonlau Robert Schonlau	X	X
	William G. Gibbs	_	X

Note: All ownership documentation is provided in **Appendix D.**

Comment [A2]: Comment #6

8. Bureau of Land Management (BLM) Lease of Project File Numbers:

   None

9. Adjacent land owners and written notification status (notification and acceptance letters included in **Appendix D**):

   Notification to adjacent landowners will be provided in advance of commencing operations.

10. Does Permittee / Operator have a legal right to enter and conduct mining operations on the land covered by this notice?

    Yes

11. Federal Mining Claims or Lease Number:

    None

Comment [A3]: Comment #5

R647-4-105. Maps, Drawings and Photographs.

105.1 Base Maps: Figure 1, 2 and 3

Figure 1: Base Map/Location Map shows the mine area and surrounding features and is printed at a scale of 1"=2,000'. It shows streams, springs, water bodies, roads, buildings, topography and utilities as required by rule, within 500 feet of the proposed mining operations. There is an existing power transmission line, a perennial stream, intermittent streams, radio towers and four known water rights that are within the Lease Boundary.

Comment [A4]: Comment #12

Figure 2: Site Access Map is printed at a scale of 1"=2.5 miles and shows the proposed access to the proposed mine site.

Figure 3: Land Ownership Map is printed at a scale of 1"=2,000' and shows the property boundaries, surface ownership of the mine and adjacent lands, and access routes.

105.2 Surface Facilities Maps: Figures 4, 5, 6 and 7

Figure 4: Existing Surface Facilities and Contours Map is printed at a scale 1"=2,000' and shows existing surface facilities, roads, and washes that pass through or near the lands to be affected.

Figure 5: Mine Plan Map is printed at a scale of 1"=1,250' and shows the mine plan and proposed facility location.

Figure 6: Material Handling Plan is printed at a scale of 1"=100' and shows the mining process underground.

Figure 7: Conceptual Surface Water Control Plan is printed at a scale of 1"=1,250' and shows the conceptual drainage controls around the site.

105.3 Reclamation Treatment: Figure 8

Figure 8: Reclamation Treatments Map is printed at a scale 1"=700' and shows details about reclamation treatment areas, including what disturbance, such as ~~highwall,~~ topsoil stockpiles and roads, will be reclaimed. A border outlining the extent of the area to be reclaimed vs. the affected area is shown. There will be no highwalls at this mine site, mining activity will occur underground.~~Salvaged overburden will be used to slope the highwalls during the reclamation process so that no highwall slopes except the portal face-up area, will be left exposed when reclamation is complete.~~

105.4 Additional Maps: Figures 9, 10, 11, 12 13, 13A, 14, 15, 16 and 17

Comment [A5]: Comment #14

Figure 9: Utah Water Rights is a Utah Division of Water Rights map printed at a scale of 1"=2,000' showing area water rights.

Figure 10A and 10B: Typical Erosion Control Details (BMPs) depicts many of the best management practices (BMP) to be employed as part of a comprehensive erosion control effort within the limits of the mine property.

Figure 11: Soil Map Unit Designation is a soils map printed at a scale of 1"=2,000' showing existing soil types.

Figure 12: Watershed Map is a Watershed map printed at a scale of 1"=12,500' showing the principle watershed areas.

Figure 13: Natural Surface Geologic Map is a geologic map and a stratigraphic column printed at a scale of 1"=3,000' showing the geology under the mine property.

Figure 13A: Generalized Cross Section A-A' Map is a geologic cross section of the area under the mine property.

Figure 14: Underground Mine Plan Map by Year is a map showing the extent of the proposed underground mine workings and the approximate acres of disturbance within the underground area at a scale of 1"=1,250'.

Figure 15: Typical Mining Sequence is a figure showing the underground mine sequence, not to scale.

Figure 16: Typical Portal Entry Closure is a figure showing a typical portal closure at a scale of 1"=20'.

Figure 17: Subsidence Schematic is a figure showing the subsidence schematic at a 20 degree angle of draw, scale 1"=20'.

Comment [A6]: Comment #14

Comment [A7]: Comment #52

Comment [A8]: Comment #52

105.5 Photographs

Photographs of existing vegetation and topography are included in **Appendix A,** Biological Resources Survey Report.

R647-4-106. Operation Plan.

106.1 Type of Mineral(s) to be Mined

The type of mineral to be mined is oil sands. The oil sands occur generally in lenticular beds with interbedded sandstone, siltstone, shale, mudstone and calcareous marl.

106.2 Type of Operations to be Conducted

GRR has licensed proprietary extraction technology for a bitumen and hydrocarbon extraction process that separates ~~oil and other~~ hydrocarbons such as bitumen, from sand, dirt and other substances on a 99 percent (%) efficiency basis, without creating tailing ponds. Efficiency basis refers to that percentage of hydrocarbon originally in place, which is removed by the process. Based upon pilot~~prototype~~ trials and feasibility studies, GRR is proposing to process approximately 9,000 tons of ore per day and produce and deliver between 5,000-9,000 barrels per day of bitumen (depending on ore grade) extracted from the Green River Formation oil sands to a refinery. This proprietary process for extracting bitumen from oil sands uses no water, produces clean sand and bitumen, and uses a fraction of the heat typically required for extracting fuels from oil sands.

The acreages associated with the individual components of these operations are described in **Section 106.3**. The types of operations to be conducted include the following:

Surface Preparation/ Site Development

Surface preparation will include the clearing of vegetation and removal of topsoil for storage in designated topsoil storage areas, as described further in **Section 106.5.** Mature trees will be removed and sold to a local mill and/or neatly stacked in an area that the public can access to cut and use for firewood. Larger shrubby vegetation and small trees will be cleared by crushing, then pushing into slash piles. This material will be stockpiled within or on top of the salvaged topsoil, or used to form berms surrounding the topsoil piles (see **Section 106.6**). The estimated volumes of both topsoil and vegetative matter are also provided in **Section 106.6**. All of this vegetative matter will be redistributed along with the topsoil during final reclamation in order to provide organic matter and help with surface roughness and soil moisture retention.

Once cleared of vegetation and topsoil, the plant site will be leveled only as required to allow the installation and operation of the equipment. Processing equipment will be installed on bases constructed of driven steel piles. The area for truck traffic will be created using crushed oil sands and gravel up to a maximum depth of 6 inches. This area will cover~~ing~~ approximately 11 acres. There will be no concrete pads or foundations of any type installed on-site.

All tanks, processing equipment, pumps, etc. will be hauled to the site on flatbed trucks. Necessary equipment and materials needed to assemble it will be hauled into the site using a highboy and single and double drop lowboy trailers. Portable buildings will be hauled to the site and installed.

Access Roads

The main access to the Bruin Point Mine site is via Water Canyon from Whitmore Canyon Road out of Sunnyside, Utah. The road to Bruin Point is a Class B gravel road maintained year round by the County. However, the access that will be taken to the mine site will be via Nine Mile Canyon.

There are two existing county roads across the Bruin Point area that provide access to the cell towers and other equipment located on Bruin Point. These roads will be used and upgraded to provide access from Bruin Point to the plant site. The existing roads are approximately 30 to 35 feet wide. A Road Maintenance Agreement with the County will be obtained prior to the use of the County roads. See **Appendix D** for Road Maintenance and Improvement Agreement with the County.

Access roads will be surfaced with oil sands and gravel and maintained with a grader and water truck (as needed). In total, county roads used to support these operations will be approximately 6,500 feet in length and~~by~~ 30 feet wide. A haul road containing a utility corridor will be constructed from the plant site to the portal via the route shown on **Figure 5**. This haul road will have a length of approximately 8,700 feet and will also be approximately 100 feet wide with a maximum grade of 15%. The overall width includes the required berms, drainage ditches and running surface for two way traffic by ore/tailings haulage trucks.

The north portion of the haul road will follow an existing road down the ridge. An ~~new portion of the haul road~~ extension off the existing road will be cut into the cliff side to access the portal area. Haul roads will be paved with ore extracted from the mine in order to control dust. Should these measures not be effective, they will be kept damp as needed using a water truck to further control fugitive dust ~~during the warmer summer months~~. Snow removal will be completed during the winter to maintain year-round access while personnel are at the mine site.

PORTAL DEVELOPMENT

The mine opening will be developed at approximately 9,100 feet elevation along the cliff face (see **Figure 5** and **Appendix G, Additional Maps**). The road to the portal from the plant site will need to be in place in order for equipment to gain access to the portal location and to move ore from and tailings into the mine. In order to develop the mine access road and the mine portal, the following steps and equipment are required: 1. Pioneer roadway; 2. Drill and blast to establish stable cut slopes; 3. Remove blasted material; 4. Fill at-grade surface for roadway and portal bench; 5. Install berms and slope stabilization features as required for safety; and, 6.Install utilities (water, power, temporary surface support infrastructure) for driving portal entries. During this process, ore zones that are encountered will be mined to recover as much ore as possible prior to beginning underground mining. This ore will be crushed and sized with portable equipment prior to hauling to the plant feed stockpile for processing. The haulage road will be constructed to function as a year round facility to transport ore, sorted waste rock, and sand tailings. In addition, the road will serve as the transport route for personnel and mining supplies throughout the life of the operation.

A pad at the portal area will be developed by mining rock from the face up to establish a level pad. The pad will be large enough to contain the ~~temporary~~ support facilities ~~such: as~~ including a parts trailer, portable office, substation, fan house,~~buildings for maintenance shop, office and change house, supplies storage and fuel station~~ two fuel tanks and two water tanks. ~~These surface facilities and material handling equipment will be at this pad location only during initial underground mine development.~~ Following the initial underground mine development the parts trailer, portable office, substation and fan house will be the only facilities left outside of the mine and they will be located directly outside of the portal. As mining advances, the balance of the support facilities and~~facilities and material handling~~ equipment will be moved to permanent locations underground.

Comment [A9]: Second Review Comment #16

Comment [A10]: Comment #15

Underground Mining

Once the portal is developed, mining will proceed underground, mining the zone designated ~~T38~~T37. The initial underground mining activities will involve the development of four entries. Mining will continue with the development of rooms and pillars as shown on the underground mine Material Handling Plan, **Figure 6** and the Underground Mine Map by Year and Typical Mining Sequence, **Figures 14 and 15.** The mine plan is for total support based on rock strength properties measured from ore recovered from the T37~~8~~ zone in 2013. Generally, the entries/rooms will be mined to approximately 50 feet in width with associated pillars at 50 feet by 50 feet. The mining height depends on the ~~T38~~T37 seam thickness and has the potential to be as much as 100 feet. Site conditions may require changing the room width and pillar size to make certain that the workplace is safe and supported. No subsidence is expected as the mine design is for total support utilizing a room and pillar mining method. It is expected that the abandoned workings would remain in a totally supported configuration in perpetuity following closure and abandonment. No inflows of groundwater are expected nor would surface water be allowed to enter the portal entries as they would be closed at the end of mine life.

GRR will maintain a~~n adequate~~ buffer around Range Creek ~~where~~beneath which no underground mining will take place, thereby preventing it from being impacted by underground mining.

There are three elements that were considered when determining an appropriate set back to Range Creek. These elements include the following:

- Utilize a mine plan which is designed to be totally supported based on the strength of the zone to be mined;
- Calculate the angle of draw which may occur in the event of widespread collapse of mine workings;
- Determine a buffer across the stream bed of Range Creek wide enough such that no subsidence will occur should the widespread collapse of mine workings take place under Range Creek.

Comment [A11]: Second Review Comment #24

Using the methodology outlined above it was calculated that the projected buffer required to protect Range Creek from subsidence due to the widespread collapse of the mine workings is 250 feet. This has been calculated utilizing an angle of draw of 20 degrees (as measured from vertical) projected from the top of the T37 seam approximately 650 feet below Range Creek, **Figure 17**. Underground workings would therefore not take place within 500 feet, as measured horizontally, from the stream bed of Range Creek. This will eliminate the opportunity for subsidence within the Range Creek bed or drainage area in the case of a catastrophic mine collapse.

Comment [A12]: Comment #25

The ore will be drilled and blasted to advance an upper bench and the underlying bench. Holes will be loaded with ammonium nitrate fuel oil (ANFO) blasting agents for blasting to fragment the ore. Once ore has been blasted it will be loaded with front end loaders and hauled using 25 to 40 ton haul trucks to the material handling and sizing equipment located near the portal area initially, and to sorting and sizing equipment located underground as mining advances. Ore mined from the portal will be hauled to the plant site via the mine access road.

The ~~T38~~T37 bed (or deposit) is up to 100 feet thick and averages approximately 60 to 70 feet. The quantity of ore to be mined over the life of the operation is approximately 54~~2~~ million tons. The production schedule for the life of the operation is shown in Mine Production and Mass Balance table, **Appendix G.**

Blasting and handling of explosives will be in accordance with local, state, and federal rules. Warning signs advising the public of blasting protocols will be posted at all ready access points, and in any other locations required by the Mine Safety and Health Administration (MSHA). These signs will include blasting schedules.

Regular and routine inspections will occur throughout the mine area to make sure that operating conditions remain safe, that MSHA safety regulations are being followed, and that the operating plans for the mine are being followed.

Mining will occur year round on a 365 day, 24 hour per day basis. The operation will include drilling, blasting, loading, hauling, roof control/bolting and site inspection, scaling, dust control, crushing, screening, and transport activities. Once mine development has progressed, sand tailings will be hauled from the plant to the mine for disposal in mined out workings. Part of the material handling system will include sorting to remove inseam waste from the run-of-mine ore. The sorting waste will initially be disposed along with sand tailings at a permanent surface stockpile during the first 6 years of the mine life. Beginning in year 6, sufficient advance of workings will have occurred that will allow placement of all sorting waste permanently in the workings.

Equipment

Mining equipment will consist of drills, front end loaders, haul trucks, roof bolters, maintenance equipment, water trucks, motor graders, light pickups/trucks and supply transport equipment. A complete list of mining equipment is included in **Appendix H**.

Hauling and Stockpiles

Crushed and sorted, mined ore will be hauled in haul trucks via the main haul road to the process area and discharged into the material handling equipment at the plant feed stockpile. This stockpile ~~is sized at~~ will contain as much as 30,000 tons of ore and will be available to provide feed in the event of disruption of ore supply from the mine. The material handling system at the mine will consist of: screens, crushers, sorter, conveyor belt line and ore stockpiles. The distance from the portal opening to the plant is approximately 8,700 feet. **Figure 5** shows the locations of the ore and sand tailings (dry) stockpiles.

Once mine development advances to allow disposal of sorted waste and dry sand tailings underground, haul trucks will ~~transport sized ore to the plant feed stockpile and~~ return with dry sand tailings for placement in the mined out workings.

ORE CRUSHING AND STOCKPILING

Ore will be systematically handled in the material handling equipment as shown on **Figure 6**. Two parallel 500 ton per hour class systems will be utilized as this provides redundancy and will ensure continuous production while allowing for maintenance of the systems. In addition to a crushed ore pile on surface of as much as 30,000 tons, underground stockpiles will be maintained ~~for~~ of approximately one week supply of ore (70,000 tons) to address unforeseen equipment breakdowns and delays that may occur by underground operations or surface haulage. The ore will be crushed to -1/4" topsize suited for processing at the plant.

PROCESSING

General Facility Description

The processing facility will be located on the upper bench near Bruin Point, at approximately 10,000 feet elevation in the area shown on **Figure 5**. As shown on the plant site diagram, the major structures included in this area will include: an office building, ~~and associated parking area,~~ warehouse and maintenance shop, Septic tank, potable water tank, water recycle tank, two process buildings~~equipment~~, ~~tank farm~~, electrical building, bitumen truck loading pad, truck dumping building, truck loading building, solvent storage tank, four (4) bitumen storage tanks, raw water tank, two (2) diesel tanks, bitumen solution tank, two (2) gasoline tanks, three (3) fire protection water tanks and bitumen emission control building~~and stockpile of crushed ore.~~ A list of equipment, buildings, and tanks planned for use in the facilities area is included in **Section R647-4-110** Reclamation Plan.

Comment [A13]: Second Review Comment #16

1) Office building: The office will be ~~contained in~~ a prefabricated structure serviced with potable water and a buried septic tank -based domestic sewage system. Potable water will be supplied as needed by tank truck to site from local municipal facilities. Sewage collected in the septic system will be trucked from site to a local licensed disposal facility. ~~The~~A parking area, located in front of the office, will be a gravel pad designed to park approximately 20 vehicles.

2) Warehouse and maintenance shop: This~~A~~ building will be a prefabricated structure ~~will be erected on a precast concrete pad (not cast on-site)~~ to house maintenance activities and provide warm storage. ~~these facilities.~~ The building will contain several maintenance bays along with storage for parts and non-hazardous consumable supplies (rags, lubricants etc.).

3) Process equipment: The process equipment will be housed in two- ~~atwo~~ buildings each with a seal welded steel floor and seal welded drip lip. Thus, any spills from the process equipment will be contained inside the building with the drip lip acting as a berm to prevent the liquid from spilling to the environment, see **Appendix E**. One building will contain process utilities including heating and cooling systems, the second building will house the bitumen extraction process.

4) Tank~~s farm~~: This part of the production facility will include four~~six~~ 5~~2~~,000 barrel (bbl) bitumen storage tanks, one 750 bbl solvent storage tank, ~~and~~ one 750 bbl raw water storage tank, one 400 bbl bitumen solution tank, two diesel tanks, two gasoline tanks, and an emission control building. These tanks will be constructed with secondary containment (liner sealed to all tank structures and a berm sized to contain 110% of the volume of the largest tank); on piles and structural steel and will be operated in a manner consistent with the Spill Prevention, Control and Countermeasure Plan (SPCC), **Appendix E**.

~~4)~~5) Electrical building: All electrical equipment including switch gear, breakers, and lighting panels will be housed in a climate controlled building located in a non-hazardous area. This building will also be a prefabricated structure.

~~5)~~6) Crushed ore storage: Crushed ore will be brought from the mine as described above in this document and stored on-site near the process area. In this way a small volume of ore will be made available as feed stock for processing and continuous bitumen production can be maintained during short term interruptions in the mining process.

On-site stormwater will be handled ~~All precipitation incidents on the site will be controlled and handled~~ as discussed in the Stormwater Pollution Prevention Plan (SWPPP) and the Utah Multi-Sector ~~Permit Utah Pollutant Discharge Elimination System (UPDES)~~ general permits provided in **Appendix E**. As mentioned above both the process and storage facilities will be sealed from the environment. Because the Bruin Point operation is located primarily along a ridge top, with little or no up-gradient features, off-site runoff flowing onto the site will be minimal.

The processing facility will operate 24 hours per day, approximately 365 days per year, not including unscheduled shutdowns/outages. Approximately three full-time workers will be required to run and maintain the processing facility.~~plant site during operations.~~ These workers will travel to/from the site daily.

Process Flow Details

~~Processing~~Separating of the bitumen from the ore requires initially rinsing the mined and crushed ore with a proprietary solvent (solvent), followed by recovery of the solvent and bitumen solution from the washed ore, drying of the sand, separation of the solvent from the bitumen, and recovery of condensed solvent **(Appendix G, Process Flow Diagram)** .

Ore recovered from the mine will be crushed and screened to maintain a size no greater than 1/4 inch. Material thus processed will be fed into a sealed hopper continuously fed with solvent. Solvent-wetted sand will then be mixed with additional solvent in an auger system. The wet sand/solvent mixture will flow~~drop~~ from the auger to a closed settling tank. In this tank sand will settle to the bottom and solvent bitumen (bitsol) mixture will rise to the top. The liquid ~~(bitsol)~~ will be decanted off the vessel through a filter to remove any fines not separated from it in the decanter tank. Wet sand will be augured from the bottom of the settling tank to a system of drying augers.

The heated drying augers will serve to dry the sand in a sealed system thus removing the solvent by application of heat. The solvent will be evaporated from the sand and the solvent vapors thus generated will be condensed by cross exchange with chilled heat transfer fluid. Condensed solvent will be filtered and sent to a sealed holding tank. Clean dry sand will be produced from the drying augers to sand tailings storage as detailed elsewhere in this document.

The bitsol stream from the sand washing system will be sent to a water separator. Connate (formation or naturally occurring) water will be separated from bitsol by gravity separation. This water will be sent to ~~atmospheric~~ a water storage tank for subsequent use as underground dust control. Dry bitsol from the water separator will be heated and sent to a distillation unit.

The hot bitsol will be separated into its bitumen and solvent components under vacuum distillation. The distillation system will produce hot liquid bitumen to storage and solvent vapors. The solvent vapors will be condensed to liquid by cross exchange with cool heat transfer medium. The clean dry solvent will be sent to storage along with the solvent recovered off the sand. Solvent will be drawn from storage and used in the sand washing portion of the plant as described above. ~~In this way all solvent used in the operation will be recovered from both the sand and bitumen and recycled in the process.~~ Bitumen will be stored on-site in tanks and held for transportation to the market.

Solvent used in the operation will be recovered from both the sand and the bitumen. During the pilot testing of the process 2 ppm of solvent remained in the dry sand tailings. No more than 25 ppm of solvent (w/w) will remain in the dry sand tailings. Bitumen produced from the process will contain a maximum of 0.5% (v/v) of solvent. This solvent will be shipped from site with the bitumen product and delivered to a refinery. These two streams (dry sand to storage with a maximum solvent content of 25 ppm and the bitumen product with a solvent content of 0.5%) represent the two streams to which solvent will be lost. All other solvent will be recovered and reused in the process.

Comment [A14]: Second Review Comment #27

The processing plant products are~~will include~~ sand, ~~filtered fines,~~ and bitumen~~,~~ ~~and a recycled stream of solvent~~. The process system will be designed to accommodate 9,000 tons of ore per day, producing ~~approximately~~ between 5,000-9,000 bbl/day of bitumen, depending on ore grade. A maximum of 20,000 bbl of bitumen will be stored in tanks on-site. The tank contents will be transferred to 190 bbl tanker trucks and transported to refineries for refining into saleable products. It is anticipated that the site will require the loading of 27 to 55 bitumen transport trucks per day, depending on ore grade and processing. ~~Truck loading will occur during daytime hours only.~~ All bitumen produced will be transported in this manner. *De minimis* solvent vapors will be lost from the storage tanks and truck loading operations to the atmosphere. The quantity and quality of these loses are detailed in **Appendix E**, Air Approval.

Comment [A15]: Second Review Comment #27

The process to recover the solvent from the sand will generate fines in the recycled solvent stream. These will be recovered using ~~a~~ filters; ~~if they contain residual chemical they will be disposed of as contaminated waste~~and will be sent to the sand drying system. These fines will combine with the dry sands product and be disposed of accordingly.~~It is anticipated that this waste stream will be produced at a rate of 20 lbs per day.~~

Process Chemical Storage & Handling

It is anticipated that some solvent will remain with the bitumen and sand products ~~requiring some~~thereby necessitating solvent makeup; therefore, ~~an ongoing supply of solvent will be required at the plant. T~~this solvent supply will be trucked to site and offloaded into the solvent storage tank mentioned above.

The solvent ~~will be obtained from local sources and~~ will be delivered to the site twice a week, in one truck. The process chemical characteristics are shown in the attached material safety data sheet (MSDS), **Appendix F**. It will be stored and handled according to MSDS criteria.

Power Source

The site is currently served by three-phase power lines. These lines will be used to power the site. ~~It is anticipated that~~ The power supplied from the electrical grid will satisfy all the power demand for the project. All heat used in the process will be powered by electricity from the local grid. The site will not be supplied with nor consume any liquid or gaseous fuel in the stationary equipment. This includes activities associated with the generation of heat supplied to the process.

Comment [A16]: Second Review Comment #26

Water Source

The process does not consume any water for the removal of bitumen from oil sands. The water needed for potable domestic purposes will be purchased locally and stored on-site in a water tank. Water used for dust control measures where needed will be purchased from a local supplier and trucked to site.

Snow Handling

Snow accumulated on working areas will be removed to the edge of the site within 24 hours. As previously mentioned, the process will be contained in a building and will not be subject to contact with snowfall. Therefore snow will be removed from the site only as required to allow vehicle access to occur.

Sand Tailings Storage Area

The sand tailings (clean and dry) storage area will be developed in an area north of the plant site. The tailings will be built from the bottom (lowest elevation point) back towards the summit. The lined containment pond will be constructed at the toe (lowest point of the pile) and left there for the working life and beyond. As the pile advances uphill it will be capped and concurrently reclaimed each year with a working section left farthest up from the lined containment pond. The capped area will be equipped with 2 dirt berms; one at the bottom of the pile between the containment pond and the capped section and one at the top of the capped section between the exposed area and the capped section. Refer to maps in **Appendix G, Additional Figures** that show the year end status of the construction and concurrent reclamation of the dry tailing impoundment.

Comment [A17]: Second Review Comment #25

The area ~~is~~ will be designed to hold approximately 30 million cubic yards. However, current designs and material handling methods indicate that 28 million cubic yards will be placed in this permanent location. The design criteria for the stockpile will utilize a compacted base and cover with impermeable clay material $1x10^{-7}$cm/s, approximately four feet thick to support the sand tailings. The system will include a capillary barrier just above the clay cover with 18 inches of growth media. This compacted base liner will have a weeping tile system that runs downhill from the highest point in the pile of the working section to the lined containment pond, see **Appendix G, Map 8**. The sand tailings will be placed in controlled lifts from approximately 10 feet to 50 feet in thickness. The tailings are light brown sand consisting of approximately 90.4% fine silica sand, a moisture content of 0.1% and an average angle of repose 34 degrees. Lab data is included in **Appendix G.** As the material is placed from the bottom of the site upwards, when final slopes can be reclaimed, a cover consisting of approximately four feet of sorted waste will be used to cover the sand tailings. Topsoil which has been removed from the site and stored in a designated area will be used to cover the sorted waste to enhance successful revegetation and final reclamation activities. The capillary barrier system will ensure that water collected on the cap will flow off the cap and be available to re-charge the groundwater system (see Groundwater Discharge Permit). The planned schedule and associated quantities to be placed in the stockpile are shown in **Table 106.3.2**, below.

Comment [A18]: Comment #27

~~The maximum quantity of~~Starting in year 6, all of the sand tailings from production ~~that can be~~will be placed in final disposal in mined out areas underground. ~~will be completed beginning in year 6.~~ When Sand Tailings are being sent underground they will no longer be disposed of in the surface tailings storage area and that area will be reclaimed as explained elsewhere in this document. Because of the limited work out areas and the need to maintain travel ways for continued mining, approximately 29~~14~~ million cubic yards of sand tailings will be disposed underground.

Comment [A19]: Second Review Comment #28

UNDERGROUND MINE BACKFILL

Sand tailings and sorted waste disposal underground will be completed by mining equipment. This equipment will include haul trucks, front end loaders, and crawler tractors with supporting water trucks and motor graders. A system of roads, ramps, and benches will be utilized to dump the sand tailings and sorted waste from haul trucks into the mined out workings. Sufficient head room will be required to allow efficient equipment operations that will result in leaving a void at the back which will not be filled. Considering the travel ways, ventilation requirements and access for ongoing mining, approximately 60% of the workings will be filled by dry sand tailings and sorted waste. The remaining workings will not be available for disposal of dry sand tailings or sorted waste. The estimated disposal rate by year in the underground mine is shown in Mine Production and Material Mass Balance table, **Appendix G.**

106.3 Estimated Acreage

Approximately 160 acres will be disturbed on surface over the life of the mine. This figure includes all access roads, storage piles, processing areas, mine areas and affected areas. See **Figure 8** and **Tables 106.3.1**, ~~and~~ **106.3.2**~~,~~ and 106.3.3 **Figure 14** shows the proposed underground mine acres.

Table 106.3.1: Surface Land Disturbance Areas

Facility	Area (acres)
Plant site including office and processing facilities	26
Sand tailings access road	2
Mine Haul Road	7
Portal entrance/pad	2
Topsoil storage area	14
Sand tailings storage area	109
~~Underground (not included in surface area to be reclaimed)~~	~~400~~
Total	**160**

Comment [A20]: Comment #14

Comment [A21]: Comment #28

Table 106.3.2: Surface and Underground Land Affected Areas

Comment [A22]: Second Review Comment #29

Facility	Area (acres)
Plant site including office and processing facilities	26
Sand tailings access road	2
Mine Haul Road	7
Portal entrance/pad	2
Topsoil storage area	14
Sand tailings storage area	109
Underground (not included in surface area to be reclaimed)	400
Total	**560**

Table 106.3.3~~2~~: Disturbance by Year (approximate)

Year	Planned Disturbance (acres)	Type of Disturbance	Cumulative Disturbance (acres)
Year 0	92	Plant site, processing facilities, roads, topsoil storage, portal, etc.	92
Year 1	16	Sand tailings storage area	108
Year 2	22	Sand tailings storage area	130
Year 3	30	Sand tailings storage area	160

106.4 Nature of Materials to be Mined

The materials to be mined are oil sands. The oil sands deposits in the Sunnyside area are estimated to be the third largest in Utah (Glassett and Gould, 1977). There have been historic mining operations in the area that began as early as 1892. The oil sands occur in the upper part of the Wasatch Formation and lower part of the Green River Formation, both of Eocene age.

The Wasatch Formation is composed of nonmarine, fluvial (stream), and deltaic sandstone interbedded with red and green shale, mudstone, and thin limestone (Morrison Knudsen, 1984). The fluvial sandstone is the host rock for the bitumen.

106.5 Existing Soil Types

EXISTING SOIL TYPES

Soil survey information compiled by the Natural Resources Conservation Service (NRCS) identifies several mapping units within the project boundary. These datasets provide a suitable level of context which assists with soil analysis and surveys. The following narrative provides a description of these mapping units, and soil map units are shown on **Figure 11**. While these descriptions are published by the NRCS, the actual on-the-ground conditions will vary. ~~An on-the-ground soil survey will be conducted and results to be provided to UDOGM in the summer of 2014.~~

Table 106.5.1 lists the soil map units found within the study area. Further information about soil types within the study area are listed below.

Table 106.5.1: Soil Types Found Within the Study Area[1]

Soil Map Unit Symbol and Name	Ecological Site	Topsoil depth & surface texture (inches)[2]	Topography & Slope	Elevation	Precipitation (inches)
27 Doney family-Podo complex	R048AY466UT - Mountain very steep loam (Salina Wildrye)	8 to 20	Mountain slopes, 40 to 70%	7,980 to 8,970	16 to 20
47 Guben-Rock outcrop complex	R048AY475UT - Mountain very steep stony loam (Douglas Fir)	0 (extremely bouldery)	Mountain slope, 50 to 80%	5,980 to 7,480	16 to 20
62 Midfork family-Commodore complex	R048AY530UT - High Mountain very steep loam (Douglas Fir)	0 to 7 (bouldery loam)	Mountain slopes, 50 to 70%	7,880 to 9,470	16 to 25
102 Senchert-Senchert family complex	R048AY524UT - High mountain stony loam (Engelmann Spruce)	20 to 24 (loam)	Ridges, plateaus	9,370 to 10,070	20 to 30
104Senchert family, 3 to 15% slopes	R048AY515UT - High mountain loam (Thurber Fescue)	20-23 (loam to clay loam)	Plateaus, ridges, 3 to 15%	8,770 to 9,670	20 to 30
125 Uinta-Toze families complex	R048AY532UT - High mountain very steep stony loam (Engelmann Spruce)	11-24 (fine sandy loam to stony sandy loam)	Mountain slopes, 35 to 70%	7,780 to 9,570	20 to 30

[1] Soil data from Soil Survey of Carbon Area, Utah, Parts of Carbon, and Emery Counties. NRCS. 2014.
[2] Topsoil depth is based on soil map unit descriptions and may not represent what is present in the field.

Map Unit: 27—Doney family-Podo complex

Component: Doney (55%)
The Doney component makes up 55% of the map unit. Slopes are 50 to 70%. This component is on mountain slopes. The parent material consists of colluvium and/or slope alluvium over residuum weathered from siltstone, sandstone and shale. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2%. This component is in the R048AY466UT Mountain Very Steep Loam (Salina Wildrye) ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10%.

Component: Podo (35%)
The Podo component makes up 35% of the map unit. Slopes are 40 to 70%. This component is on mountain slopes. The parent material consists of colluvium and/or slope alluvium over residuum weathered from limestone, sandstone and shale. Depth to a root restrictive layer, bedrock, lithic, is 8 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1%. This component is in the R047XA473UT Mountain Very Steep Stony Loam (Browse) ecological site. Nonirrigated land capability classification is 8e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3%.

Remaining components include Rock Outcrop (5%), Midfork (3%), and Senchert (2%). Minor components are not described in detail in the soil survey.

Map Unit: 47—Guben-Rock outcrop complex

Component: Guben (55%)
The Guben component makes up 55% of the map unit. Slopes are 50 to 80%. This component is on mountain slopes. The parent material consists of colluvium derived from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4%. This component is in the R048AY475UT Mountain Very Steep Stony Loam (Douglas Fir) ecological site. Nonirrigated land capability classification is 8e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 30%. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Remaining components include Rock Outcrop (20%), Midfork (12%), Comodore (10%), and Perma family (3%). Minor components are not described in detail in the soil survey.

Map Unit: 62—Midfork family-Comodore complex

Component: Midfork (50%)
The Midfork component makes up 50% of the map unit. Slopes are 50 to 70%. This component is on mountain slopes. The parent material consists of colluvium derived from sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 8%. This component is in the R048AY530UT High Mountain Very Steep Loam (Douglas Fir) ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3%.

Component: Comodore (20%)
The Comodore component makes up 20% of the map unit. Slopes are 50 to 70%. This component is on mountain slopes. The parent material consists of colluvium derived from sandstone. Depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4%. This component is in the R048AY530UT High Mountain Very Steep Loam (Douglas Fir) ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Other map unit components of this soil complex are the Midfork, dark colored surface (15%), midfork, tick surface layer (10%), and commodore, very stony fine sandy loam (5%). The soil survey does not describe minor soil components.

Map Unit: 102—Senchert-Senchert family complex

Component: Senchert (55%)
The Senchert component makes up 55% of the map unit. Slopes are 1 to 15%. This component is on ridges and plateaus. The parent material consists of colluvium and/or slope alluvium over residuum weathered from sandstone and shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 8%. This component is in the R048AY524UT High Mountain Stony Loam (Engelmann Spruce) ecological site. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Component: Senchert (20%)
The Senchert component makes up 20% of the map unit. Slopes are 3 to 15%. This component is on plateaus, ridges. The parent material consists of colluvium and/or slope alluvium over residuum weathered from sandstone and shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 8%. This component is in the R048AY515UT High Mountain Loam (Thurber Fescue) ecological site. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Other components in this complex include the Senchert, less than 20 inches thick (15%), Senchert, clayey substratum, 15 to 30% slope (5%), and Senchert, sandstone depth, 60 inches or more (5%). Minor components of soils are not described in detail in the soil survey.

Map Unit: 104—Senchert family, 3 to 15% slopes

Component: Senchert (80%)
The Senchert component makes up 80% of the map unit. Slopes are 3 to 15%. This component is on plateaus, ridges. The parent material consists of colluvium and/or slope alluvium over residuum weathered from sandstone and shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 8%. This component is in the R048AY515UT High Mountain Loam (Thurber Fescue) ecological site. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Other components of this soil family, each of which make up 5% of the soil, include the Beje, Senchert 3 to 6% slopes, Senchert, 40 inches deep to bedrock, and toe Toze family complex.

Map Unit: 125—Uinta-Toze families complex

The two main components of this map unit are the Uinta and Toze soil series. The Commodore soil is a minor component and is not described in detail in the soil survey.

Component: Uinta (35%)
The Uinta component makes up 35% of the map unit. Slopes are 40 to 70%. This component is on mountain slopes. The parent material consists of colluvium derived from sandstone and siltstone. Depth to a root restrictive layer, bedrock, lithic, is 40 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 8%. This component is in the R048AY532UT High Mountain Very Steep Stony Loam (Engelmann Spruce) ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Toze (30%)
The Toze component makes up 30% of the map unit. Slopes are 35 to 70%. This component is on mountain slopes. The parent material consists of colluvium derived from sandstone, shale and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 8%. This component is in the R048AY532UT High Mountain Very Steep Stony Loam (Engelmann Spruce) ecological site. Nonirrigated land capability classification is 8e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 9%.

An on the ground survey was conducted June 2014. Samples of the top 12 inches were collected from five soil pits throughout the proposed mine area. Two soil samples were collected at each location. The first sample was collected from the soil located zero to 6 inches below the ground surface and the second was collected from the soil located six to 12 inches below ground surface. These samples were taken to characterize the soils in preparation for future soil salvage. The sample locations are shown on **Figure 2**, Soil Survey Report, **Appendix B**. Analytical results are shown in **Table 106.5.2** below.

Comment [A23]: Comment #30

The soil laboratory results were compared with the Soil Suitability Table 3.1 found in the *Practical Guide to Reclamation in Utah* (UDOGM, 2000). The table provides plant growth suitability guidelines for the following soil parameters: USDA Soil Classification, EC, pH, SAR, and water-holding capacity. Based on the suitability recommendations, the suitability of the soil samples ranged from fair to good for all parameters.

Table 106.5.2: Analytical Results of Summer, 2014 Soil Samples

Analyte (Units)	Detection Limit	Analytical Results									
		Doney Family-Podo Complex		Guben-Rock Outcrop Complex		Senchert-Senchert Family Complex		Senchert Family – 3 to 15% Slopes		Uinta-Toze Families Complex	
		0-6"	6-12"	0-6"	6-12"	0-6"	6-12"	0-6"	6-12"	0-6"	6-12"
Total Potassium (mg/Kg)	20	4820	4790	5180	5150	5870	5620	4620	4730	3020	2390
USDA Soil Classification	NA	Silty Clay Loam	Silty Clay Loam	Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam/ Silty Clay	Clay Loam	Silty Loam
CEC (meq/100g-dry)	0.02	23.8	20.2	25.3	29.9	26.5	29.4	32.7	31.5	17.0	14.4
EC @ 25 °C (mmhos/cm)	0.001	0.161	0.086	0.092	0.097	0.261	0.214	0.195	.0186	0.067	0.050
pH @ 25 °C	0.1	6.0	6.0	6.0	6.3	6.7	7.0	6.5	6.9	5.8	5.6
Extractable Phosphorus (mg/Kg)	1	7	5	10	7	15	11	5	2	8	3
SAR	0.03	0.043	0.060	0.04	0.04	0.026	0.030	0.039	0.034	0.053	0.085
Total Nitrogen (as N) (%)	0.02	0.22	0.19	0.37	0.26	0.40	0.31	0.46	0.33	0.20	0.12
Sulfur, Total (%)	0.01	0.03	0.02	0.04	0.03	0.04	0.04	0.06	0.04	0.02	0.02
Acid Generation Potential	0.3	0.937	0.625	1.3	0.937	1.3	1.3	1.9	1.3	0.625	0.625
Acid Neutralization Potential	1	15	15	13	20	26	22	20	22	9	7
Acid Base Potential	1	14	14	14	12	25	21	18	21	8	6

Acronyms/Symbols
CEC Cation exchange capacity
°C degrees Celsius
EC electrical conductivity
" inches
meq/100g-dry milliequivalents per 100 grams
mg/Kg milligrams per kilograms
N nitrogen
NA not applicable
% percent
SAR sodium absorption ratio
USDA U.S. Department of Agriculture
mmhos/cm millimhos per centimeter

LOCATION AND EXTENT OF TOPSOIL

Topsoil occurs at some extent across the mine area. Topsoil removed for the mine sites development will be salvaged and stored in stockpiles. Approximately 14 acres will be used to store topsoil. Topsoil will not be salvaged from this area. From all other areas of disturbance approximately 143 acres topsoil will be salvaged prior to mining activities and salvaged where practical. An average depth of 124 inches is assumed to be the depth of salvageable topsoil (see **Table 106.5.1**). An estimated 220,000 cyd of topsoil will be stored for reclamation from these areas. Topsoil stockpiles will be stored at flatter slopes 2H:1V. Note that this is just an estimate; actual soil salvage volume could be more or less than this amount**.** The actual amount is dependent upon what is encountered in the field. All available topsoil will be salvaged and stored for reclamation.

Comment [A24]: Second Review Comment #56.

106.6 Plan for Protecting and Re-depositing Existing Soils

It is estimated that 160 acres of mining disturbance will occur. The deepest topsoils are found in map units 102, 104, and 125 (see **Section 106.5** and **Figure 11**). These are located on top of the ridge crest on which Bruin Point is located, and extend eastward on the top of the plateau. These soils are found on flat to gently rolling terrain, versus the steep slopes found in the bottom of Range Creek or the west-facing escarpment slopes below Bruin Point. The proposed sand tailings disposal area, plant site, vent site, and associated disturbances will be located within these map unit boundaries. No soil will be salvaged from roads, portals or other disturbances proposed for the steep, southeast facing slopes of the escarpment face as soil is too rocky and shallow.

Based on the topsoil depths listed in **Table 106.5.1**, an average of 124 inches of topsoil can likely be salvaged from the 143-acres proposed disturbance area on top of the plateau in map units 102, 104, and 125. Total topsoil salvage volume available for reclamation will be approximately 220,000 cyd. The estimated volume of topsoil excludes areas where no soil will be salvaged as described above.

Topsoil will be salvaged using a dozer, loader, and/or dump trucks and stored in topsoil stockpiles shown on **Figure 5**. The stockpile(s) will contain approximately 220,000 cyd of topsoil. These storage areas are located on flat to gently sloping ground along the margins of the processing areas. To protect the soil from wind and water erosion, soil stockpiles will be seeded with a fast growing cover grass the first autumn after the soil is stored. Topsoil piles will be bermed at the outer edges for runoff control, using salvaged and compacted woody vegetation that is removed prior to topsoil salvage activities. All available topsoil will be salvaged and used for vegetation at the end of the mine life.

106.7 Existing Vegetative Communities to Establish Revegetation Success

The study area is located at an elevation between 8,800 feet and 10,200 feet above mean sea level (amsl). Two distinct vegetation zones exist within the project area; on the upper elevations near and above 10,000 feet, a mixed conifer/aspen forested community type is interspersed with a sagebrush/grass/forb community. The dominant conifer in the forested community is Engelmann spruce (*Picea engelmanii*), with varying amounts of sub-alpine fir (*Abies lasiocarpa*) that occur within a matrix of aspen (*Populus tremuloides*). On the more open, highest slopes, limber pine (*Pinus flexilis*) occurs as single trees or in small clumps. On the eastern side of the upper lease area, aspen often occupies the south facing slopes while the mixed conifers occupy the north-facing slopes. Mountain snowberry (*Symphoricarpos oreophillus*) is the dominant understory shrub in the aspen component of this high elevation community. Mountain currant (*Ribes montigenum*) and wax current (*Ribes cereum*) are the dominant shrubs within the mixed conifer component.

On July 25 and 26, 2012 a quantitative vegetation survey was conducted utilizing 16 transects, a combination of 100-foot transects, 20-foot diameter circle plots, and photo points. The 100-foot transects were used to measure cover in open areas, under open aspen stands, and on steep side slopes located just below (west of) the escarpment edge of Patmos Ridge. The 20-foot diameter circle plots were used to characterize areas of thick mixed-conifer or mixed-conifer-aspen forest that contained no understory growth. Circle plots provide information on the size and density of trees; refer to **Appendix A** for full Vegetation Survey Report.

Table 106.7.1 Common Understory Species along Transects in the Survey Area

Common name ***Scientific name***	**Total hits (all transects)**	**Relative occurrence within type (shrub, forb, or grass)**	**# transects encountered (out of 16)**
SHRUBS	**42**		
Mountain snowberry *Symphoricarpos oreophillus*	13	31%	**4**
Mountain big sagebrush *Artemisia tridentata* var. *vasayana*	11	26%	**3**
Gooseberry currant *Ribes cerneum*	8	19%	**3**
FORBS	**71**		
Silvery lupine *Lupinus argenteus*	11	15%	**5**
Dandelion *Taraxacum officinale*	10	14%	**6**
Common yarrow *Achillea millefolium*	9	13%	**5**
Alpine leafybract aster *Symphyotrichum foliaceum* var. *foliaceum*	6	8%	**3**
GRASSES	**77**		
Mountain brome *Bromus carinatus* var. *marginatus*	11	14%	**7**
Kentucky bluegrass *Poa pratensis*	10	13%	**3**
Thurber fescue *Festuca thurberiana*	10	13%	**3**

Table 106.7.2 Aspen Transect Data (# Hits) and Cover Calculations

Life Form	Asp-1	Asp-2	Asp-3	Asp-4	Asp-5	Asp-6	Average (per transect)	Percent Cover (all transects)
Shrubs/trees	2	5	5	4	3	0	3.17	16
Forbs	2	3	7	4	2	7	4.17	21
Grasses	8	5	3	1	5	2	4.00	20
Litter	8	5	5	10	7	11	7.67	38
Rock	0	0	0	0	0	0	0.00	0
Bare Ground	0	2	0	1	3	0	1.00	5
TOTAL VEG HITS (out of 20)	12	13	15	9	10	9	11.33	100
Percent Vegetation Cover	60	65	75	45	50	45	57	

Table 106.7.3 Grass-Shrub Transect Data (# Hits) and Cover Calculations

Life Form	GS-1	GS-2	GS-3	GS-4	GS-5	GS-6	GS-7	GS-8	Average (per transect)	Percent Cover (all transects)
Shrubs/trees	0	7	1	0	3	6	0	0	2.13	11
Forbs	1	9	4	5	1	4	6	7	4.63	23
Grasses	15	3	7	1	9	5	6	6	6.50	33
Litter	3	1	5	2	4	5	3	3	3.25	16
Rock	0	0	0	11	3	0	1	0	1.88	9
Bare Ground	1	0	3	1	0	0	4	4	1.63	8
TOTAL VEG HITS (out of 20)	16	19	12	6	13	15	12	13	13.25	100
Percent Vegetation Cover	80	95	60	30	50	40	65	60	66	

Table 106.7.4 Steep Slope Transect Data (# Hits) and Cover Calculations

Life Form	Slope 1	Slope 2	Average (per transect)	Percent Cover (all transects)
Shrubs/trees	2	4	3.00	15
Forbs	3	6	4.50	22.5
Grasses	1	0	0.50	2.5
Litter	4	6	5.00	25
Rock	8	3	5.50	27.5
Bare Ground	2	1	1.50	7.5
TOTAL	6	10	8.00	100
Percent Vegetation Cover	30	50	40	

Overall, the plant diversity was high within the survey area and consisted of native or highly naturalized species. Average total vegetation cover across all 16 transects was 56%.

Table 106.7.5 Species List of all the species noted on the July field trips to the study area.

Family	Scientific Species Name	Common Name	NRCS Symbol	Location(s)
TREE/SHRUB Species				
Pinaceae	*Abies lasiocarpa*	Subalpine fir	ABLA	Aspen-mixed conifer; major cover type
Rosaceae	*Amelanchier utahensis*	Utah serviceberry	AMUT	Open, rocky slopes near limber pine
Asteraceae	*Artemisia tridentata* var. *vasayana*	Mountain big sagebrush	ARTRV	Lower elevations of survey area; major cover type
Cupressaceae	*Juniperus communis*	Ground juniper	JUCO6	Open, rocky slopes near limber pine
Cupressaceae	*Juniperus occidentalis*	Western juniper	JUOC	Open, rocky slopes

Family	Scientific Species Name	Common Name	NRCS Symbol	Location(s)
Berberidaceae	*Mahonia repens*	Oregon grape	MARE	Open, rocky slopes near limber pine
Celastraceae	*Pachistima myrsinites*	Mountain lover	PAMY	Lower elevations on rocky slopes
Pinaceae	*Picea engelmanii*	Engelmann spruce	PIEN	Highest elevations in aspen-conifer dominating north and east-facing slopes
Pinaceae	*Pinus flexilis*	Limber pine	PIFL	Lower elevations on bare, rocky slopes
Salicaceae	*Populus tremuloides*	Aspen	POTR	Major species; co-dominant with mixed conifer
Pinaceae	*Pseudotsuga menziesii*	Douglas fir	PSME	Lower elevations on bare, rocky slopes
Grossulariaceae	*Ribes cerneum*	Gooseberry currant	RICE	Openings in aspen-conifer Aspen-conifer
Grossulariaceae	*Ribes montigenum*	Alpine prickly currant	RIMO2	Aspen-conifer Old clear-cuts in aspen-conifer
Rosaceae	*Rosa woodsii*	Wood's rose	ROWO	Edge of old clear-cuts in aspen-conifer
Rosaceae	*Rubus idaeus*	Red raspberry	RUID	Co-dominant in mountain big sage communities
Caprifoliaceae	*Sambucus racemosa*	Red elderberry	SANIC5	Edge of old clear-cuts in aspen-conifer
Caprifoliaceae	*Symphoricarpos oreophillus*	Mountain snowberry	SYOR2	Co-dominant in mountain big sage communities

Family	Scientific Species Name	Common Name	NRCS Symbol	Location(s)
FORBS (Herbaceous Species)				
Asteraceae	*Achillea millefolium*	Common yarrow	ACMI	
Asteraceae	*Agoseris aurantiaca*	Orange agoseris	AGAU	
Primulaceae	*Androsace septentrionalis*	pygmyflower rockjasmine	ANSE	Uncommon aspen understory
Rosaceae	*Antennaria rosea*	Rosy pussytoes	ANRO	Open rocky sagebrush
Asteraceae	*Arnica cordifolia*	Heartleaf arnica	ARCO9	Shady aspen-conifer
Fabaceae	*Astragalus tenellus*	Pulse milkvetch	ASTE5	Aspen-conifer
Liliaceae	*Calochortus gunnisonii*	Gunnison's mariposa lily	CAGU	Edge between sagebrush-grass and aspen-conifer
Scrophulariaceae	*Castelleja flava*	Yellow paintbrush	CAFL	Shady aspen-conifer
Scrophulariaceae	*Castelleja linarifolia*	Wyoming paintbrush	CALI	Open sagebrush
Asteraceae	*Chaenactis douglasii*	Douglas dustymaiden	CHDOD	Open, rocky sites within sagebrush/grass communities
Asteraceae	*Chamaechaen-actis scaposa*	Fullstem	CHSC	Open, rocky sites within sagebrush/grass communities
Chenopodiaceae	*Chenopodium fremontii* var. *fremontii*	Fremont's goosefoot	CHFRF	Edges of aspen-conifer
Asteraceae	*Cirsium undulatum*	Wavyleafed thistle	CIUN	Openings in sagebrush-grass
Polemoniaceae	*Collomia linearis*	Collomia	COLI	Common along disturbed paths in aspen-fir

Family	Scientific Species Name	Common Name	NRCS Symbol	Location(s)
Scrophulariaceae	*Collinsia parviflora*	Maiden blue eyed Mary	COPA3	Disturbed clearcuts
Brassicaceae	*Descurainia californica*	Sierra tansymustard	DECA6	Disturbed
Asteraceae	*Erigeron aphanactis*	Rayless shaggy fleabane	ERAP	Open, rocky sites within sagebrush/grass communities
Asteraceae	*Erigeron engelmannii*	Engelmann's fleabane	EREN	Aspen-conifer
Asteraceae	*Erigeron speciosus*	Oregon fleabane	ERSP	Aspen-conifer
Polygonaceae	*Eriogonum alatum*	Winged buckwheat	ERAL	Open, rocky sagebrush-grass
Polygonaceae	*Eriogonum brevicaule*	Shortstem buckwheat	ERBR	Dry, rocky, open sites near limber pine
Polygonaceae	*Eriogonum umbellatum*	Sulphur-flower buckwheat	ERUM	Open, rocky sagebrush-grass
Rosaceae	*Fragaria vesca ssp. bracteata*	Woodland strawberry	FRVEB2	Openings in aspen-conifer
Gentianaceae	*Frasera speciosa*	Elkweed	FRSP	Openings in sagebrush-grass
Gentianaceae	*Gentianella amarella ssp. heterosepala*	Autumn dwarf gentian	GEAMH	Aspen-conifer
Gentianaceae	*Gentianopsis thermalis*	Rocky Mountain fringed gentian	GETH	Shady aspen-conifer
Geraniaceae	*Geranium fremontii*	Sticky purple cranesbill	GEVI2	Open slopes
Geraniaceae	*Geranium richardsonii*	Richardson's geranium	GERI	Shady aspen-conifer
Asteraceae	*Heliomeris multiflora var. multiflora*	Showy goldeneye	HEMUM	Openings in aspen-conifer

Family	Scientific Species Name	Common Name	NRCS Symbol	Location(s)
Polemoniacea	*Ipomopsis aggregata*	Scarlet gilia	IPAG	Common forb in open sagebrush-grass
Fabaceae	*Lathyrus pauciflorus*	Fewflower pea	LAPA5	Aspen understories
Brassicaceae	*Lesquerella hemiphysaria*	Intermountain bladderpod LEHE3	LEHE3	Openings in sagebrush-grass
Apiaceae	*Ligusticum porteri*	Porter's licorice-root	LIPO	Aspen understories
Linaceae	*Linum lewisii*	Blue flax	LILE	Openings in sagebrush-grass
Linaceae	*Linum kingii*	King flax	LIKI	Open, rocky sites in sagebrush
Fabaceae	*Lupinus argenteus*	Silvery Lupine	LUAR3	Aspen/Mixed Conifer community
Fabaceae	*Lupinus sericeus*	Silky lupine	LUSE4	Open rocky slopes
Lamiaceae	*Monardella odoratissima*	Mountain monardella	MOOD	Open sagebrush, very common
Hydrophyllaceae	*Nemophila breviflora*	Great Basin nomophila	NEBR	Disturbed
Apiaceae	*Osmorhiza depauperata*	bluntseed sweetroot	OSDE	Aspen understory
Apiaceae	*Osmorhiza occidentalis*	western sweetroot	OSOC	Aspen understory
Scrophulariaceae	*Penstemon barbatus var. torreyi*	Barbed throat penstemon	PEBAT	Open rocky slopes
Scrophulariaceae	*Penstemon commarrhenus*	Dusty penstemon	PECO	Openings in aspen-conifer
Scrophulariaceae	*Penstemon pachyphyllus*	Thickleafed penstemon	PEPA	Openings in aspen-conifer
Hydrophyllaceae	*Phacelia hastata*	Silky phacelia	PHHA	Openings in aspen-conifer

Family	Scientific Species Name	Common Name	NRCS Symbol	Location(s)
	Polemonium pulcherrimum	Skunkleaf Jacobs ladder	POPU3	Aspen understory
Rosaceae	*Potentilla anserina*	Silverweed	POAN	Moist areas near drainages
Rosaceae	*Potentilla concinna*	Elegant cinquefoil	POCO13	Sagebrush-grass
Rosaceae	*Potentilla glandulosa*	Sticky cinquefoil	POGL	Sagebrush-grass
Rosaceae	*Potentilla gracilis*	Slender cinquefoil	POGR9	Openings in sagebrush-grass
Caryophyllaceae	*Pseudostellaria jamesiana*	tuber starwort	PSJA2	Disturbed
Asteraceae	*Senecio canus*	Wooly groundsel	SECA	Open dry slopes
Asteraceae	*Senecio integerrimus*	Western groundsel	SEIN	Aspen-conifer
Asteraceae	*Stenotus acaulis*	Stemless goldenweed	STAC	Open, rocky sagebrush-grass
Asteraceae	*Symphyotrichum foliaceum* var. *foliaceum*	Alpine leafybract aster	SYFOF	Both sagebrush and aspen communities
Asteraceae	*Taxacarum officinale*	Dandelion	TAOF	Open, disturbed
Ranunculaceae	*Thalictrum fendleriana*	Fendler meadowrue	THFE	Common aspen understory
Violaceae	*Viola adunca*	Hooked spur violet	VIAD	Shady aspen-conifer
GRASSES & GRASS-LIKES				
Cyperaceae	*Carex bella*	Pretty sedge	CABE3	Aspen-mixed conifer
Cyperaceae	*Carex egglestonii*	Eggleston's sedge	CAEG	Aspen-mixed conifer
Cyperaceae	*Carex* geyeri	Elk sedge	CAGE2	Aspen-mixed conifer
Cyperaceae	*Carex microptera*	Small-awned sedge	CAMI7	Aspen-mixed conifer

Family	Scientific Species Name	Common Name	NRCS Symbol	Location(s)
Cyperaceae	Carex norvegia	Norway sedge	CANO2	Shaded subalpine meadows
Cyperaceae	Carex rostrata var. utriculata	Beaked sedge	CAUT	Moist shaded subalpine meadows
Cyperaceae	Carex tahoensis	Dryland or Tahoe sedge	CATA	Moist sage/grass meadows
Poaceae	Achnatherum columbiana	Columbia needlegrass	ACNE9	Sagebrush/grass Less common than ACLE9
Poaceae	Achnatherum lettermanii	Letterman's needlegrass	ACLE9	Sagebrush/grass Common native mountain grass
Poaceae	Achnatherum hymenoides	Indian ricegrass	ACHY	Uncommon in sagebrush openings
Poaceae	Agrostis scabra	Ticklegrass	AGSC	Uncommon; sagebrush
Poaceae	Alopecurus pratensis	Meadow foxtail	ALPR	Range Creek spring
Poaceae	Bromus carinatus var.marginatus	Mountain brome	BRCA5	Sagebrush/grass
Poaceae	Elymus glaucus	Blue wildrye	ELGL	Barren slopes
Poaceae	Elymus lanceolatus	Thickspike wheatgrass	ELLA3	Sagebrush/grass
Poaceae	Festuca arizonica	Arizona fescue	FEAR2	Aspen and sagebrush/grass
Poaceae	Festuca arundinaceae	Tall fescue	FEAR	Aspen-conifer
Poaceae	Festuca thurberiana	Thurber fescue	FETH	High mountain bunchgrass in sagebrush/grass
Poaceae	Hesperostipa comata	Needle and thread	HECO26	Open sagebrush/grass
Poaceae	Hesperostipa lettermanii	Letterman's needlegrass	HELE	Open sagebrush/grass

Family	Scientific Species Name	Common Name	NRCS Symbol	Location(s)
Poaceae	Hesperostipa nelsonii	Nelson's needlgegrass	HENE	Openings in clear-cuts
Poaceae	Koeleria cristata	Junegrass	KOCR	
Poaceae	Leymus salinus ssp. salinus -	Saline wildrye	LESAS	Open sagebrush/grass and open, rocky slopes
Poaceae	Pleuraphis jamesii	James' galleta	PLSA	Open sagebrush/rocky
Poaceae	Poa fendleriana	Muttongrass	POFE	Open sagebrush/grass
Poaceae	Poa nervosa	Wheeler bluegrass	PONE2	Openings in aspen-conifer
Poaceae	*Poa nevadensis*	Nevada bluegrass	PONE3	Sagebrush/grass
Poaceae	*Poa pratensis*	Kentucky bluegrass	POPR	Open/disturbed
Poaceae	*Poa secunda*	Sandburg bluegrass	POSE	Sagebrush/grass
Poaceae	*Pseudoreoeg-neria spicata var. spicata*	Bluebunch wheatgrass	PSSPS	Aspen-conifer
Poaceae	*Trisetum spicatum*	Spike trisetum	TRSP2	Open sagebrush/grass

106.8 Geologic and Hydrogeologic Setting

GROUNDWATER

On November 20, 2013 GRR began drilling on-site under a UDOGM exploration permit. Drilling went down to approximately 1,035 feet. During drilling there was a small amount of water encountered at approximately 400 to 420~~10~~ feet at 2 gallons per minute. In addition, the drill hole never had any detectable gas. Refer to **Appendix G** for drill log data.

Nearby springs and seeps shown in **Appendix C, Figure 2** provides evidence of localized shallow groundwater, likely representing isolated perched aquifers. Depth to groundwater is also discussed in **Appendix E**, within an application for groundwater discharge permit under the Utah Division of Water Quality's (DWQ) groundwater protection program.

GEOLOGY

Comment [A25]: Comment #33

The Bruin Point Mine is located in eastern Utah in the Book Cliff-Roan Plateau section of the Colorado Plateau physiographic province in rugged, mountainous terrain with steep slopes. The mine is located approximately 25 miles east of Price near the headwaters of Dry Creek and Range Creek at elevations between 9,200 and 10,200 feet amsl.

The bitumen sand deposits at the mine site are within what is collectively known as the Sunnyside oil sands. The deposits occur in late Paleocene/early Eocene (ca. 60-40 Ma) rocks in the upper part of the Colton Formation and the lower part of the Green River Formation, both of Eocene age. Both are derived from deposition into Lake Uinta, a prehistoric lake that persisted for 15 my in a large intermontane basin occupying the regions of the present-day Uinta and Piceance Basins. These units consist of interbedded, fine-grained shales and sandstones. Bitumen has migrated from the shale into the sand units.

The Green River Formation overlies the Colton Formation and the two formations are inter-tonged making it difficult to distinguish in the project area. This formation consists of freshwater marlstone, oil shale, limestone, siltstone, sandstone, oil sands, and shale. The contact between the Colton and Green River Formations is identified as the horizon where dominantly fluvial strata below give way to dominantly lacustrine strata above (Morrison Knudsen, 1984). The oil sands beds occurring in the lower part of the Green River are similar in origin and appearance to the oil sands beds of the Colton Formation.

Comment [A26]: Comment #34

Bitumen occurs chiefly in the sandstone beds of the Colton and lower part of the Green River Formations. The oil sands beds outcrop conspicuously along the west face of the Book Cliffs, locally known as Bruin Point. Oil sands outcrops are persistent for over nine miles along the west face of the Book Cliffs (Morrison Knudsen, 1984). The oil sands deposits in this area are estimated to be the third largest in Utah (Glassett and Gould, 1976). There have been historic mining operations in the area that began as early as 1892. The fluvial sandstone is the host rock for the bitumen. The rocks of the Colton Formation were deposited as a fluvial and deltaic system along the periphery of Lake Uinta. The oil sands are confined to the upper one-third of this section.

The Green River Formation consists of three members: Parachute Creek, Garden Gulch and Douglas Creek of the tertiary period. The Parachute Creek Member is a 2-60 foot thick outcrop sequence of multiple oil shale beds exposed at the surface. The Garden Gulch Member is dominantly limestone, with poorly bedded greenish grey shales and thinly bedded mixed color shales. The Garden Gulch Member does not contain any significant oil sands. The Douglas Creek Member averages 1,262 feet and is characterized by massive fine grained saturated channel sand deposits; fine grained saturated sheet sand deposits; streaky saturated to saturated siltstones; red shales; and occasional thick zones of algal limestone (AMOCO, 1981).

Comment [A27]: Second Review Comment #33

~~The Bruin Point Mine is located in eastern Utah in the Book Cliff Roan Plateau section of the Colorado Plateau physiographic province (Stokes, 1986). It is situated between the San Rafael Swell to the southwest and the Uinta Basin to the northeast. The terrain is mountainous and rugged with steep slopes. The project area is approximately 25 miles east of Price in the Roan Cliffs near the headwaters of Dry Creek and Range Creek at elevations between 9,200 and 10,200 feet amsl. The oil sands deposits in this area are estimated to be the third largest in Utah (Glassett and Gould, 1976). There have been historic mining operations in the area that began as early as 1892. The oil sands occur in the upper part of the~~
~~nonmarine, fluvial (stream), and deltaic sandstone interbedded with red and green~~

~~shale, mudstone, and thin limestone (Morrison Knudsen, 1984). The fluvial sandstone is the host rock for the bitumen. The rocks of the Formation were deposited as a fluvial and deltaic system along the periphery of Lake Uinta. The oil sands are confined to the upper one-third of this section.~~

~~The Green River Formation overlies the . This formation consists of freshwater marlstone, oil shale, limestone, siltstone, sandstone, oil sands, and shale. The contact between the Wasatch and Green River Formations is identified as the horizon where dominantly fluvial strata below give way to dominantly lacustrine strata above (Morrison Knudsen, 1984). The oil sands beds occurring in the lower part of the Green River are similar in origin and appearance to the oil sands beds of the Wasatch Formation.~~

~~Bitumen occurs chiefly in the sandstone beds of the Wasatch and lower part of the Green River Formations. The oil sands beds outcrop conspicuously along the west face of the Book Cliffs, locally known as Bruin Point near the headwaters of Range Creek. Oil sands outcrops are persistent for over nine miles along the west face of the Book Cliffs (Morrison Knudsen, 1984).~~

106.9 Ore and Waste Stockpiles, Tailings Facilities, and Water Storage/Treatment Ponds

ORE STORAGE

Mining operations and materials handling systems, including crushing, screening and sizing, have been designed for stockpiling underground to provide surge capacity that ensures continuous supply of ¼" ore as plant feed for processing. Approximately 70,000 tons of live storage will be located underground which is approximately seven days of plant feed.

As part of the ore material handling system, sorting technology based on color will be utilized to remove light colored interburden and partings from the ore which are barren or very low grade. This sorted material will initially be hauled to the permanent stockpile located adjacent to the processing plant for permanent disposal. Beginning in year 6, the sorted waste will be returned to the mined out workings for permanent disposal. Some of the waste will be utilized as the compacted base of the permanent stockpile and for a cover during reclamation of it.

Ore will be hauled to a 30,000 ton plant feed stockpile located adjacent to the processing facility.

A 30,000 ton capacity covered sand tailings stockpile will be maintained adjacent to the processing plant. The purpose of the stockpile is to have capacity available for temporary storage of sand tailings in the event that weather or other site conditions preclude direct placement of the sand tailings in the permanent stockpile or disposal in the mined out workings.

Clean earthen berms 4-foot in height will be placed around the processing plant, including the ore stockpile and the temporary tailings stockpile, to prevent surface runoff resulting from precipitation or snowmelt from leaving the disturbed area associated with the processing plant. The berms will have a two foot flat top with 2H:1V side slopes and be lined with a clean 2-foot clay liner. Stockpiles will be covered and constructed on a prepared pad designed and constructed for that purpose. See **Appendix G, Preliminary Stability and Hydrology Analyses Report** for additional information. Final engineering designs will be provided when available prior to construction. The earthen berms will be designed to sufficiently contain the stockpiles in the event of an environmental hazard and designed to prevent any release of the tailings and ore materials into Range Creek. Locations of surface storage facilities are shown on **Figure 5.**

Comment [A28]: Comment #35 Section 5

Comment [A29]: Second Review Comment # 34

TAILINGS FACILITIES

For the first 6 years of operations, s~~S~~and tailings will be disposed in a permanent stockpile adjacent to the processing plant,~~. After~~after which time the sand tailings will be placed~~ and~~ underground in mined out workings. The maximum quantity of sand tailings will be disposed underground and the remaining quantity placed in the permanent stockpile. This stockpile footprint, the final surface elevation of the stockpile, the schedule and sequence of construction by year is shown on **Figure 5**. The volume by time period of sand tailings production and disposal is shown in **Appendix G** Production and Mass Balance Table. The location of the permanent stockpile is shown on **Figures 5 and 8**.

106.10 Amount of Material to be Extracted, Moved

Over the~~the next~~ 15 year operating life of the mine~~s~~ approximately 52 million tons of oil sands ore will be removed from the Bruin Point Mine for processing into bitumen. The production schedule and overall mass balance of material removed from the mine is shown on Production and Mass Balance Table, **Appendix G**. Part of materials handling process includes removal of approximately 20% of the production volume as interburden and parting material that is barren or very low grade. Sorting technology based on color difference will be utilized to reduce the ore volume to be hauled to the processing plant and to enhance the grade of the ore being produced.

R647-4-107. Operation Practices.

As required, the relevant Operation Practices stipulated in R647-4-107 will be followed.

R647-4-108. Hole Plugging Requirements.

All exploration holes drilled by GRR have been plugged according to the requirements of R647-4-108. Future drill holes (should there be any) will be plugged according to the same requirements. Drill holes will not be left unplugged for more than 30 days unless approved by UDOGM.

R647-4-109. Impact Assessment.

GRR has performed baseline studies and an analysis of impacts that are expected to result from the Bruin Point Mine operation. This section summarizes the environmental impacts on surface water and erosion control, groundwater, threatened and endangered species and their critical habitats, soil resources, air quality, seismic stability, and general public health and safety.

109.1 Surface and Groundwater Systems

SURFACE WATER

The study area is located within the Book Cliffs and Roan Cliffs area in the Colorado Plateau Physiographic Province. Hydrologically, it is within the headwaters Range Creek Canyon (hydrologic unit code [HUC] 14060005), Lower Grassy Creek (HUC 14060007), Dry Creek (HUC 140600050402), and Cottonwood Canyon (HUC 140600050403), all~~which is~~ part of the Colorado River system. The 1,760 acre study area is mountainous, with nearly 2,000 feet of relief. Elevations range from approximately 8,200 feet amsl at the southern extreme of the property, to over 10,150 feet amsl at the Bruin Point in the northwest. **Figure 12** shows watershed boundaries in the study area, as well as other water features such as streams and seeps or springs.

The south and west sides of the lease area drop steeply off a plateau into the headwaters of Water Canyon, which drains to Whitmore Canyon (i.e., Grassy Trail Creek; Price Watershed) above the town of Sunnyside. Grassy Trail Creek eventually drains to the Price River before joining the Green River. Water features in the study area were confined to Water Canyon and tributaries on the west side of the plateau and Range Creek on the east side. The plateau area in the north and central portion of the study area, including the Range Creek headwaters, as well as the drainages southeast of Water Canyon (southeast portion of the Survey Area) were dry. Seep and spring resources were sparse in the vicinity of proposed mine operations: only two springs and a cluster of cliff seeps were found in addition to several dry features (at the time of the inventory), which may constitute seeps or springs during runoff (see **Appendix C, Seep and Spring Inventory and Hydrogeology of North Spring and Bruin Point**).

Comment [A30]: Comment #37

The most relevant climate data information is from the National Oceanic and Atmospheric Administration (NOAA) Bruin Point weather station approximately 1.5 miles southeast of the project area, at an elevation of 9,341 feet (NOAA, 2014). Climate data available for Sunnyside, UT, at an elevation of 6,414 feet, are not as applicable to the project site because the difference in elevation results in a considerable difference in precipitation and snowpack. Precipitation in this area is estimated at about 10.12 inches annually, with September having the highest levels, (NOAA, 2014).

The annual precipitation is not sufficient to sustain perennial flow in the watersheds in this region. Instead much of the study area is dissected by ephemeral drainages with small channels located within larger canyons with steep slopes.

The disturbances will be located in the Grassy Trail Creek and Range Creek watersheds. Range Creek and North Spring are located outside of the Disturbed Area but within the Lease Boundary as shown in **Figure 5**. North Spring is located near the northern boundary of the Lease Boundary, outside of the Disturbed Area and approximately 500 feet southeast of the proposed dry tailings storage area. The source area of North Spring is the upper Range Creek drainage basin west and southwest of the spring. North Spring is fenced, piped, and flows into a stock pond. A culvert runs from the stock pond to Range Creek. The condition of the spring is noted as being highly disturbed as a result of overgrazing (JBR, 2014; Calkin, 1990). Recharge to the shallow aquifer feeding North Spring occurs when water derived from snowmelt infiltrates through the thin site soils and into the underlying fractured bedrock. The estimated drainage contributing to North Spring is shown on attached **Figure 5** and is approximately 266 acres. The estimated drainage contributing to Range Creek, at the point where its flow becomes perennial about 1 mile downgradient from the tailing facility, is 681 acres. The footprint of the final tailing facility is approximately 109 acres which represents about 41 % of the drainage area contributing North Spring, and about 16% of the drainage area above the first perennial reach of Range Creek.

Comment [A31]: Second Review Comment #3

To mitigate potential impacts of the tailings facility to North Spring and Range Creek flows, the facility will be built in 6 phases, one phase in each of the six consecutive years of the facility's operation. The ground surface upgradient of the active phase will be left undisturbed, leaving infiltration from that area unchanged until the area is needed for tailing placement. The area of the active phase will contribute little if any infiltration during the year of its operation. As each phase is completed and transitioned from active to inactive, it will be covered and reclaimed, with infiltration and runoff from the reclaimed area being directed off the facility cap to adjacent areas for infiltration to shallow groundwater. Using this method to construct the tailing facility ensures that only one sixth of the ultimate tailing facility footprint, which is only approximately 7% of the source area for North Spring, and only 3% of the source area for the nearest perennial reach of Range Creek, will be subject to inhibited infiltration at any given time. After six years, the full area of reclaimed tailings facility will again be available to contribute runoff for infiltration into the shallow groundwater system.

Comment [A32]: Second Review Comment #37

By using this construction method and design, potential impacts to flows in North Spring and Range Creek should be minor and short-lived. If the Division believes that further mitigation is appropriate, GRR will commit to the installation of up to 4 guzzlers at locations determined by the Division, in consultation with the Division of Wildlife Resources. ~~The headwaters of Range Creek Canyon, which flows near the eastern boundary of the study area and eventually drains to the Green River~~

~~(Uinta Watershed), is not within the proposed area of disturbance.~~
No perennial streams or intermittent waters have been or are expected to be impacted by the mining operations at the Bruin Point Mine. Any precipitation that enters the Bruin Point area from sheet flow, which enters the mine area from the hillside above, will be controlled and contained using drainage controls (as described in the SWPPP provided in **Appendix E**).

Areas used for stockpiles, dry sand tailings, and processing facilities will be graded higher than surrounding areas to prevent contamination of stormwater within the Bruin Point Mine area. Dry sand tailings within the process area will be placed on a concrete pad area and covered, prior to placement into the dry tailings impoundment. In addition, the working platforms that make up the mining areas will be bermed to meet MSHA regulations, and act as a containment area where runoff would be managed as described in the SWPPP. ~~remains until it soaks into the ground or evaporates.~~

Precipitation that is intercepted by the haul roads and access roads will be diverted into roadside ditches. Ditches will be designed to pass the 100-year, 6-hour precipitation event. They will be triangular in cross section with side slopes approximately 1.5H:1V; depth including freeboard will be less than two feet; or will have an equivalent cross section. Berms will generally be two feet high, with a two-foot top width and 1.5H:1V side slopes. More detail on the use of these structures will be provided when final engineering designs are available.

Comment [A33]: Comments #39

Runoff and sediment from the dry sand tailings storage area will be controlled by facing the steepest portions of the slopes with coarse sorted waste material visually and olfactory free of oil sands. Armoring will be placed within the channel forming contact between the pile and native slope and by installing a rip-rapped energy dissipater at the toe. Runoff and erosion will be minimal from the dry sand tailings storage area top surfaces because these will be maintained with a gentle grade away from the outslope.

If erosion is observed, GRR is committed to using appropriate water and erosion control measures, in accordance with BMPs shown in **Figure 10A and 10B**. This includes but is not limited to: properly installed filter fence, straw bales check damns, dirt berms, log berms, (<0.1 acre-foot) sediment retention sumps and rock check dams (see **Figure 7**). Through the use of BMPs no dry tailings will be released to Range Creek.

All BMP erosion control measures will be inspected regularly and maintained in operable conditions. These types of BMP controls are also described in a SWPPP, provided in **Appendix E,** developed to comply with a State of Utah Multi-Sector General Permit for industrial Discharges.~~, (and/or the analogous Environmental Protection Agency [EPA] permit).~~ That Permit also requires quarterly visual monitoring of stormwater. All of these measures will reduce the likelihood of inadvertent discharges of process waters or sediments produced by erosion. This subject is discussed further in **Section 109.4**. All fuel, oil, gas, and solvents will be stored in approved tanks in lined retention areas to prevent pollution to stormwater runoff. These protective measures are discussed more thoroughly in the SWPPP, provided in **Appendix E**.

GROUNDWATER

The oil sands occur in the Roan Cliffs, which crest at an elevation of 10,131 feet amsl. The Roan Cliffs contain rocks of the Paleocene and Eocene age and are within the upper part of the Colton~~Wasatch~~ Formation and lower part of the Green River Formation. The Green River Formation consists of three formal members subdivided on the basis of depositional environment: Parachute Creek Member (lake facies); Garden Gulch Member (shore facies); and Douglas Creek Member (delta facies). The State Water Plan (Utah Division of Water Resources, 2000) doesn't include any Green River Formation aquifers as significant enough to be target for groundwater development, and information from wells and springs indicates generally low yields (Price and Miller, 1975).

Most springs in the area are reported to discharge from the Parachute Creek Member of the Green River Formation (Price and Miller, 1975). A 1984 BLM report, Utah Combined Hydrocarbon Leasing Regional Final EIS reports that known springs within the Sunnyside Special Tar Sands Area (STSA) typically discharge between 1 and 350 gpm. According to Price and Miller 1975 the TDS concentration in water from springs within the Lease Boundary area are less than 500 mg/L (Price and Miller, 1975). Water quality in area springs is not anticipated to be impacted by GRR operations because the mining and processing activities are designed to be zero discharge.

Comment [A34]: Comments #36

Comment [A35]: Second Review Comment #32

Groundwater is not a major source of water in the West Colorado River Basin. Groundwater within the disturbed area is best characterized as shallow (<100 feet bgs) as evidenced by discharge from North Spring and other seeps near Range Creek. Additional information on the hydrogeology of the region is included in **Appendix C**, describing the hydrogeology of North Spring. The amount of recharge to the shallow groundwater and spring system is relatively sparse and directly related to precipitation. The shallow groundwater system follows an annual cycle related to snowmelt, with maximum discharge from springs during the spring, decreasing during summer and fall to less than 2 gpm, and often times drying up altogether. Indeed, the studies (reviewed in the referenced hydrogeologic report) provide consistent evidence that Range Creek is dry in the vicinity of the Affected Area. This is because, in a typical year, there is insufficient precipitation and discharge from springs/seeps to sustain perennial flow in Range Creek near the Affected Area. In turn, the shallow ground water flow does not move downward. Vertical movement of groundwater from the shallow system to greater depths is inhibited by low permeability shale and oil sand layers, which dominate the stratigraphic column at depths greater than 100 feet bgs.

~~This is due to several reasons: 1) the general absence throughout the basin of productive and easily developed alluvial aquifers; 2) the unfractured consolidated aquifers generally have hydraulic properties that are not conducive to large-scale groundwater development; 3) the quality of the groundwater in many parts of the basin is unsuitable for domestic, municipal, and/or agricultural uses; and 4) the economics of drilling and pumping water from deep buried consolidated aquifers is uneconomical for many of today's uses (Utah Division of Water Resources, 2000).~~

GRR has~~will~~ filed for a Groundwater Discharge Permit with Division of Water Quality. The permit application will be provided in **Appendix E.** GRR does not anticipate that the operations will have any effects on groundwater quality due to the zero discharge design. This includes, for the dry tailings facility, a compacted clay under-liner and a vegetated clay and earthen cover, designed to eliminate downward infiltration through tailings to groundwater, and to direct runoff from the cover onto the adjacent undisturbed areas for infiltration into the shallow groundwater. Furthermore groundwater is prevented from migrating downward from the shallow system to greater depths by low permeability shale and oil layers, which dominate the stratigraphic column at depths greater than 100 bgs.

Comment [A36]: Comment #38

WATER RIGHTS

According to online records of the State Engineer's office, (Utah Division of Water Rights, 2014) there are four water rights in the vicinity of the Project as shown in **Table 109.1.1** and **Figure 9**. No water rights will be affected by the GRR operations. Areas of disturbance will not be near the water right locations.

Table 109.1.1 Water Rights

Water Right No.	Water Source	Quantity (cfs)	Use	Water Right Owner
91-3054	Range Creek	-	Stock watering directly on stream	Hunt Oil Company (25%) Meany Land & Exploration Inc. (75%)
91-11	Range Creek	-	Livestock	State of Utah DWR (Application Permanently Lapsed)
91-15	Unnamed Spring	0.1	Stock watering directly on stream	Magnificent Seven, LLC (34.5%) Penta Creek LLC (65.5%)
91-Area	Stock Pond on Range Creek	1.2	Stock watering directly on stream (Expired)	Amoco Production Company

GRR will not be consuming any water in their operations process; however, water will be used for dust control. All water needed for potable domestic purposes will be purchased locally and stored on-site in a water tank.

109.2 Wildlife Habitat and Endangered Species

The Utah Division of Wildlife Resources, Utah Conservation Data Center (UCDC) was reviewed for information about wildlife managed by the State (UCDC, 2014). It contains links to habitat maps and a database of plant and animal species that are federally listed as threatened, endangered, or are candidates for T&E designation in Utah, or are listed as a sensitive species by the Division of Wildlife Resources (together called TESC species). The UCDC also maintains lists of TESC plants and animals by county.

Based on information found at the UCDC website, the study area is within crucial summer and substantial yearlong habitat for elk and mule deer, as well as brood-rearing and crucial winter habitat for greater sage grouse. The ~~permit boundary~~Lease Boundary does not contain any Sage Grouse leks. The elevation of the project is at 10,000 feet, amsl, greater sage grouse is unlikely to occur in the project area as further described below. While Rocky Mountain big horn sheep tracks were seen adjacent to Water Canyon Road in Section 4, T14S, R14E SLBM during the November site visit, mapped yearlong, crucial habitat for bighorn sheep is found at lower elevations on either side of Whitmore Canyon.

The Utah Natural Heritage Program (NHP) of the Division of Wildlife Resources was contacted directly for information about known occurrences of any species of concern. Their response letter is attached in the correspondence section (**Appendix D**) does not have any record of occurrence for any threatened, endangered or sensitive species within the permit area. However, within a two-mile radius there are recent records of occurrence for northern goshawk, a species included on the Utah Sensitive Species List.

Comment [A37]: Comment #42

A Raptor Survey was conducted on June 24 through June 27, 2014. Northern Goshawks and other raptor species were surveyed within the project area. The Raptor survey resulted in no observations of individuals or signs of activity. The complete survey report is in **Appendix A,** Raptor Survey Report.

Observations of TESC species listed for the Bruin Point quadrangle include greater sage grouse, Townsend's big-eared bat, and Colorado River cutthroat trout. **Table 109.2.1** lists TESC plant and animal species, their status, basic habitat, and an evaluation of whether the project area provides habitat for each species.

Table 109.2.1 Threatened, Endangered, and Candidate Species that may be present at GRR Oil Sands Mine

Common Name	Scientific Name	Status	Habitat	Habitat present in Study Area?
PLANTS				
Ferron milkvetch	*Astragalus musiniensis*	BLM Sen	Mixed desert shrub below	No
Creutzfeldt's cryptantha	*Cryptantha creutzfeldtii*	BLM Sen	Mancos shale	No
Jones' cryptantha	*Cryptantha jonesiana*	BLM Sen	Mixed desert shrub and P-J woodland	No
Canyonlands prairie clover	*Dalea flavescens var. epica*	BLM Sen	Red sandstone, desert shrub	No
Giant hellebore	*Epipactis gigantea*	Utah Sen	Marshy areas from desert to spruce forest	Maybe
Coal-cliffs sweetvetch	*Hedysarum occidentale var. canone*	BLM Sen	Mountain shrub habitats	Maybe
Uinta Basin Hookless Cactus	*Sclerocactus wetlandicus*	T	Desert, shale outcrops	No
Graham beardtongue	*Penstemon grahamii*	C	Desert, shale outcrops	No
ANIMALS				
Bald Eagle	*Haliaeetus leucocephalus*	SPC	Tall trees, significant water	No
Black-Footed Ferret	*Mustela nigripes*	E	Require large prairie-dog colonies for food source	Unlikely
Bluehead Sucker	*Catostomus discobolus*	CS	Fast flowing mountain streams	No
Bonytail	*Gila elegans*	E	Large rivers	No
Burrowing Owl	*Athene cunicularia*	SPC	Prairie dog burrows, open prairie lands	Unlikely
Colorado Pikeminnow	*Ptychocheilus lucius*	E	Large rivers	No
Colorado River Cutthroat Trout	*Oncorhynchus clarkii pleuriticus*	CS	Headwater Streams	No
Ferruginous Hawk	*Buteo regalis*	SPC	Open prairies, not forests or tight canyons	Unlikely
Flannelmouth Sucker	*Catostomus latipinnis*	CS	Large rivers	No

Common Name	Scientific Name	Status	Habitat	Habitat present in Study Area?
Gray Wolf	*Canis lupus*	E	Wide range of habitats	Unlikely
Greater Sage-Grouse	*Centrocercus urophasianus*	C	Open prairies	Unlikely
Humpback Chub	*Gila cypha*	E	Fast moving, large rivers	No
Kit Fox	*Vulpes macrotis*	SPC	Desert, prairie areas	No
Long-Billed Curlew	*Numenius americanus*	SPC	Short grass and bare areas	Unlikely
Northern Goshawk	*Accipiter gentilis*	CS	Forested, riparian areas	Maybe
Razorback Sucker	*Xyrauchen texanus*	E	Slow-moving warm waters	No
Roundtail Chub	*Gila robusta*	CS	Large rivers	No
Townsend's Big-Eared Bat	*Corynorhinus townsendii*	SPC	Forested areas, old mines	Yes
Western Red Bat	*Lasiurus blossevillii*	SPC	Forests, riparian areas	Unlikely
Western Toad	*Bufo boreas*	SPC	Wooded areas, wet areas	Unlikely
White-Tailed Prairie-Dog	*Cynomys leucurus*	SPC	Grasslands, prairies	Unlikely

BLM Sen – BLM Sensitive species in Utah
C – Candidate for federal listing
CS – Utah Conservation agreement with state and federal agencies
E – Federally Endangered
SPC – Utah species of special concern

General wildlife observations were made within the survey boundary shown on **Figure 1**. Habitats were reviewed to assess the likelihood that federally listed or State sensitive species would occur in the Lease Boundary. No Federally listed TESC plant or animal species are likely to occur within the project area. Of the Utah sensitive plant species Giant Hellebore and Coal-cliffs sweetvetch have a moderate to high potential to occur within the project area. Utah sensitive animal species with a moderate to high potential to occur within the project area include the Northern Goshawk, and the Townsend's big-eared bat. Sage grouse are unlikely to occur, as habitat is limited and elevation is high. Many raptors, other birds, big game, and a variety of mammals are likely to utilize the types of habitats in this area (see the Biological Resources Survey Report in **Appendix A**).

Comment [A38]: Comment #43

Throughout the life of the mine measures will be taken to ensure that mining activity does not impact wildlife. If protected wildlife is encountered during mining, measures will be taken for the least impact, timing restrictions as defined by USFWS will be followed if active nests are encountered. Mitigation measures will be taken to ensure that dry sand tailings do not enter into Range Creek and or flow downstream see **Section 109.5**.

Comment [A39]: Comment #41

Plant and animal species listed in **Table 109.2.1** are described below in greater detail.

PLANTS

Canyonlands prairie clover grows on red sandstone areas in blackbrush and mixed desert shrub communities. These are not found in the project area.

Coal-cliffs sweetvetch is endemic to Carbon, Duchesne, and Emery Counties in Utah. It grows in pinyon-juniper, serviceberry, maple, mountain mahogany, and sagebrush communities between 6,400 and 8,300 feet elevation. It blooms late June to mid-August. This species was not observed in the survey area.

Comment [A40]: Comment #44

Cruetzfeldt's cryptantha grows on the Mancos Shale Formation between 5,250 and 6,500 feet and will not be found in the project area.

Ferron milkvetch grows in mixed desert shrub and pinyon-juniper communities on alluvial deposits and shale areas between 4,700 and 7,600 feet, a lower elevation than the project area.

Giant hellebore grows in moist areas from low to high elevations. It would likely be found near Range Creek if it were growing in the project area or surrounding locations. This species was not observed in the survey area.

Comment [A41]: Comment #45

Graham's beardtongue has a purple flower that blooms in June. It is found on shale barrens in the Uinta Basin on similar substrates to those found on the toe slopes of the Book Cliffs. The elevation, moisture content, and amount of vegetation is too high for this species to thrive in the project area.

Jones cryptantha grows in mixed desert shrub and pinyon-juniper communities in the San Rafael Swell area of Carbon and Emery Counties, Utah. Its habitat is at a much lower elevation than the project area and thus would not be found there.

Uinta Basin hookless cactus is a squat barrel cactus that is found at middle elevations on shaley-rocky soils almost barren of other plants. It is known to occur in the Uinta Basin, and similar habitat exists along the toe slopes of the Book Cliffs. The project area is too high elevation and too lush for this species.

ANIMALS

The **Bald Eagle** is a sensitive species in Utah. It is a large bird with a striking white head once mature. It is found in Alaska, Canada, and portions of the northern U.S. and lives year-round in Utah. It nests in tall trees or cliffs near bodies of water that support fish and waterfowl. During non-breeding periods, especially winter, Bald Eagles roost communally in sheltered tree stands. There is unlikely nesting habitat in the project area; however, it is possible to have fly-overs during the winter months.

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

Black-footed ferrets are nocturnal and rely on prairie dogs for their primary food, thus they are closely associated with prairie dog towns. Loss of prairie dogs (by plague, poisoning or habitat loss) directly threatens the survival of the ferrets. It is unlikely that a large enough population of prairie dogs will be identified within or near the study area to support black-footed ferrets.~~; however, their presence cannot be denied as of this writing (February 2014).~~

Burrowing Owls are found in southwest Canada, the western U.S., northern Mexico, Florida, and the West Indies. They winter from the southwestern U.S. to Honduras; they inhabit Utah in the summer. They prefer open grasslands and prairies, but also will use human-affected environments such as golf courses and airports. They often utilize prairie dog or groundhog holes for their burrows, although they will excavate their own if necessary. They eat terrestrial invertebrates and small vertebrates such as snakes, frogs, and birds. Both parents raise the young.

Bluehead suckers are native to Utah and the upper Colorado River, Snake River, and Bonneville basin watersheds. It is a bottom-dwelling fish that scrapes algae from surface rocks. It prefers fast-flowing, high-gradient reaches of mountain rivers. There are no suitable bodies of water present in the project area.

The **bonytail** is a very rare minnow native to the Colorado River system. They are opportunistic feeders, eating insects, zooplankton, algae, and other plant matter. They spawn over a gravel substrate and prefer to live in eddies, pools and backwaters of large rivers. There are no suitable bodies of water present in the project area.

The **Colorado pikeminnow** is the largest minnow in North America, reaching more than a foot in length, with historic records showing six-foot long pikeminnow. They are native to the Colorado River system and are now limited to the upper Colorado. They prefer medium to large rivers with varied habitats. Young prefer slow-moving backwaters. There are no suitable bodies of water present in the project area.

The **Colorado River cutthroat trout** has been observed within the area covered by the Bruin Point U.S. Geological Survey quadrangle. It prefers cool, clear waters of high-elevation headwater streams and lakes. The Utah Division of Wildlife Resources raises this species in hatcheries to expand the fish's numbers. They spawn over gravel substrates in spring. They eat invertebrates and small fishes. There are no suitable bodies of water present in the project area.

Ferruginous Hawks breed in western North America from south-central Canada to New Mexico. They are not found in northeastern Wyoming or northeastern Idaho, Central Utah, or the Black Hills of South Dakota. They winter in grassland/shrub steppe areas. They eat small mammals such as rabbits and prairie dogs. Nesting begins in March or April. Nests are built in trees and shrubs, low cliffs, utility structures, hay stacks, and abandoned buildings. Nests are used for many years and get very large over time. The bird requires rolling grassland terrain, and avoids narrow canyons, forests, and other tight areas. Due to elevation, nesting is unlikely; however, possible foraging may occur in the project area.

The **flannelmouth sucker** is native to the Colorado River system. It is found in the main-stem Colorado River and many of the large tributaries feeding into the Colorado. It is a bottom-dwelling species that eats algae, invertebrates, and plant matter. It prefers the bottoms of deep pools in large rivers. There are no suitable bodies of water present in the project area.

The **gray wolf** were extirpated from Utah many years ago, but now may be present in Carbon County, as wolves have been moving further from the Yellowstone Area, where they were re-introduced in 1995-1996. Unconfirmed sightings of wolves indicate that they may exist in southeastern Utah, as well as other parts of the west. Gray wolves tend to hunt in packs, but lone males will move miles by themselves looking for new territory or a mate. Not all gray wolves are gray, but range from black to almost white. They are larger than coyotes and carry their tail high while running, instead of low like the coyote. There is an extremely slight and unlikely possibility that wolves will pass through the project area.

The **greater sage grouse** is a "wildlife species of concern" and is a Candidate for listing under the Endangered Species Act. It is the largest of the "prairie chickens", and inhabits sagebrush-dominated steppe areas. It takes part in an elaborate mating strut that occurs at a lek, which is used by generations of sage grouse. While it used to be widespread across the western U.S. its habitat has shrunk significantly due to fragmentation by power lines, roads, and urban/industrial sprawl. A recent (BLM, December 2011) guidance document prepared by BLM underscores the high-profile nature of conservation efforts for this bird. Efforts to protect sage grouse and their habitat will be required. The locations of any greater sage grouse leks or high-quality brood-rearing habitat should be discussed with a Utah Division of Wildlife Resources Sensitive Species Biologist prior to finalizing the mine plan. The greater sage-grouse is found at elevations ranging from 4,000 to 9,000 feet amsl, and are highly dependent on sagebrush for cover and food. There are some patches of sagebrush on the upper plateau of the project area but not extensive cover. Due to the limited sagebrush cover in the project area and the high elevation, it is possible but not probable that greater sage grouse will occur.

The **humpback chub** is native to the upper Colorado River system. It prefers fast, deep, white-water areas of the Colorado and its major tributaries. It is limited to the Colorado, Green, and White Rivers in Utah. It eats insects, other invertebrates, and occasional fish and algae. It spawns in spring and summer in backwater areas. There are no suitable bodies of water present in the project area.

Kit foxes are found primarily in western Utah. It eats small mammals, birds, invertebrates, and plants. It is nocturnal and lives in open prairie and desert habitats. It mates in winter with pups being born about two months later. The Kit fox requires deeper soils conductive to burrowing and prefers lower elevations than are found in the project area.

The **Long-billed Curlew** breeds from south British Columbia to Manitoba and south to central California, Nevada, Utah, New Mexico, and northern Texas. It is a common summer resident in Utah, particularly around the Great Salt Lake. It is not limited to this area, however, and is found in much drier areas as long as they have the following four characteristics: short grass, bare ground areas, shade, and abundant vertebrate prey. Mixed fields, uncultivated rangelands, and pastures are prime habitat areas. They nest on the ground, often on manure piles, which make the nests hard to see by aerial predators. No habitat exists in the project area.

The **Northern Goshawk** is an agile bird of forests and mountains. It occurs as a permanent resident of Utah but is not common. It constructs nests in mature forests, and may be found near riparian areas. It eats rabbits, hares, squirrels, and birds. Habitat exists in the project area.

The **roundtail chub** is another minnow native to the Colorado River system. It prefers large rivers and murky pools of the main stem Colorado and its large tributaries. It eats insects, mollusks, fishes, and algae. There are no suitable bodies of water present in the project area.

The **razorback sucker** is an endangered fish native to the Colorado River system. It has been impacted by dams, which change water flows and temperatures, and predation by nonnative fish. It eats algae, zooplankton, and other aquatic invertebrates. It prefers slow backwater habitats and impoundments with warmer water. There are no suitable bodies of water present in the project area.

The **Townsend's big-eared bat** is native to western North America from Canada to Mexico. It occurs in Utah state-wide at elevations below 9,000 feet. It is often found near forested areas and day-roosts and winter-hibernates in caves, mines, and buildings. This bat eats moths and other flying insects, and often hunts near trees. Fairly common in the area and likely to occur in the project area.

The **western red bat** lives in the western U.S. and Mexico. It is extremely rare in Utah. It prefers water and wooded areas. While some members of the species hibernate, many migrate south in winter. It roosts during the day in trees and forages for insects at night near riparian areas. Prefers to live near water, of which there is very little in the project area, unlikely to occur within the project area.

Western (Boreal) toads inhabit western Canada and much of the western U.S., especially the Pacific Northwest. They are found near slow-moving streams, wetlands, desert springs, ponds, lakes, meadows, and woodlands. It burrows underground in winter. Adults feed on invertebrates such as ants and beetles while tadpoles feed on algae and detritus in their watery habitat. Prefers to live near water, of which there is very little in the project area, unlikely to occur within the project area.

White-tailed Prairie-dogs inhabit open prairies and live communally in underground burrows. They eat grasses and bulbs and generally hibernate in the dens in winter. They are the main source of food for black-footed ferrets. They are typically found below about 9,000 feet and so are unlikely to be seen in large numbers on the plateau near Bruin Point. They require deeper soils conducive to burrowing and prefer lower elevations than are found in the project area.

109.3 Existing Soil and Plant Resources

SOILS

Existing soil types in the study area are described in **Section 106.5** and depicted in **Figure 11**. Associated disturbance related to mining and processing at Bruin Point mine includes approximately 160 acres to be disturbed by the plant site, roads, dry sand tailings storage area, and portal. These disturbances will remain un-reclaimed for the life of the mine or until they are of no further use. The dry sand tailings impoundment will be reclaimed concurrently as the dry tailings impoundment advances up towards the summit. As the dry tailings impoundment advances uphill the topsoil removed from the upper end of the impoundment will be placed on the lower end of the impoundment allowing the dry impoundment to be concurrently reclaimed as areas are completed. Approximately 6 years after mining starts there will be room to start placing dry sand tailings back underground. At this time the dry sand tailings impoundment will be completely top soiled and seeded. This will result in the reclamation of approximately 109 acres. Topsoil will not be stripped from the topsoil storage area and therefore will not require top soil replacement over the 14 acres that are used to store topsoil. The additional 37 acres will be topsoiled and seeded at the end of mine life.~~. Topsoil storage will take up approximately 14 acres of land. The soil will not be stripped under the topsoil. This is a total disturbance footprint of 160 acres.~~

Comment [A42]: Second Review Comment #56

~~The Topsoil Handling Plan in **Appendix G** shows the expected volume of topsoil stripped from each area that will be salvaged for topsoil.~~ All salvaged soils will be used on-site in reclamation. Approximately 220,000 cyd of topsoil will be salvaged and replaced once mining activities are complete. As the dry sand tailings stockpile is constructed some concurrent reclamation will take place.

Plants

Existing plant types in the study area are described in **Section 106.7**. The survey area is dominated by mixed conifer forests (mostly Engelmann spruce [*Picea engelmanii*] and subalpine fir [*Abies lasiocarpa*]), open grassland/shrublands, and occasional aspen (*Populus tremuloides*) stands. Overall, plant diversity was high within the study area and consisted of native or highly naturalized species. No sensitive plant species were observed during the vegetation survey.

109.4 Erosion Control, Air Quality, Seismic Stability, Public Health, and Safety

Slope Stability

Mining will be conducted underground, therefore the main concerns for slope stability will be the slope upon which dry sand tailings are stored, storage areas, and topsoil stockpiles.

GRR has specifically considered slope stability in the design of the Bruin Point Mine and, by applying a conservative approach to design grades, has made certain that the operation will be safe and environmentally sound.

Regular and routine inspections will occur throughout the mine area to make sure that operating conditions remain safe; that MSHA safety requirements are being followed, and that the mining plan stated herein is being followed. This will include inspections to verify that the dry sand tailings storage area is constructed according to design and that outslopes remain stable.

STABILITY OF THE TAILINGS

Comment [A43]: Comment #50

Tailings would be placed within the footprint of the permanent tailings stockpile site in a sequenced and controlled manner that maximizes utilization of the site plus minimizes any possibility for instability to occur. See **Appendix G, Preliminary Stability and Hydrology Analyses** for additional information. The tailings are dry and would be placed in a controlled manner to ensure that dust from the site is minimized. Some planned techniques that will be utilized during construction and maintenance of this stockpile include the following:

1. Controlled lift thickness for compaction including addition of water for dust control;
2. Covering of the final design grade/slope with fine grained sorter waste that would provide a foundation/surface for placement of topsoil and seeding to support revegetation of the site as soon as practicable;
3. Installation and maintenance of surface water control features including berms and ditches, check dams, grass/vegetation strips, filter fences, hay bales, etc. to prevent surface erosion of the interim construction surface;
4. Controlled entry to the site to only required construction traffic and personnel;
5. Installation of a perimeter berm to prevent surface runoff from leaving the construction surface onto the final slope/graded face; and
6. Interim utilization of available fine grained sorter waste for covering of erosion prone areas which may be problematic within the stockpile construction area.

PITS

There will be no mine pits.

SUBSIDENCE

Comment [A44]: Comment #49

No subsidence is expected as the mine design is for total support utilizing a room and pillar mining method. This is supported by rock strength testing from a core recovered from this ore zone in late 2013. It is expected that the abandoned workings will remain in a totally supported configuration for the foreseeable future following closure and abandonment. No inflows of groundwater are expected nor will surface water be allowed to enter the portal entries as they will be closed at the end of mine life.

Backfilling of tailings, (dry spent ore) is planned to minimize surface stockpile quantity and footprint plus take advantage of the mined out workings that are available for backfilling. Backfilling of mine workings with tailings will begin in year 6 of mining through the remaining life of the mine. Backfilling underground will begin when mined out workings are no longer needed for mining, travel ways, ventilation or safety purposes. When these areas are available, tailings will be end-dumped within the opening. Mobile equipment, such as crawler tractors, front end loaders, motor graders, track hoes, etc., will be used to maximize utilization of the available void as economically practicable. Tailings would be hauled underground and placed with mobile equipment to fill openings as much as possible. This practice will minimize surface area needed to dispose of tailings plus help to ensure that the mine workings remain stable for the foreseeable future. Tailings would buttress pillars and provide lateral support to the workings whereby limiting settlement. If settlement did occur, it is unlikely that there would be any evidence on the surface more than 600 feet above the workings.

Comment [A45]: Second Review Comment #44

EROSION CONTROL

Erosion control at the site will in part be accomplished by measures inherent in the design and siting of the facilities. However, some runoff and erosion control at specific locations is expected to be necessary to prevent off-site impacts. Generally, surface water will be restricted to that generated by on-site precipitation: little or no up-gradient runoff will enter the site. What surface water runoff does occur will be controlled such that erosion is minimized.

A few of the specific means of handling runoff and controlling erosion are described below, with reference to specific typical drawings. As appropriate, conventional practices such as silt fences, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, storm drain inlet protection, and sediment basins will be employed. See **Figures 10A and 10B** for erosion control BMPs. The exact placement of most of the features will hinge on the final engineered plans for the development, or specific nature of observed instances of runoff/sediment problems once the site is developed. Final engineering designs and drawings will be submitted to UDOGM once they are available. Should the specific means of handling runoff and controlling erosion that are described in the section be ineffective, GRR will replace them with another type of BMP. These structures will be of industry standard, using similar materials, installation techniques, and maintenance protocols as specified on UDOGM's reclamation guide (UDOGM, 2008).

Slopes of the constructed stockpile would be kept relatively low, less than 3H:1V, to also control erosion and improve stability of the stockpile. There is not expected to be a risk of slope failure as the stockpiles have been sited on a relatively flat site to prevent any unstable conditions from occurring. All topsoil piles will be bermed to catch eroded material and prevent run-on and runoff of stormwater. As noted in **Section 106.6**, these berms will either be comprised of topsoil, or built using the salvaged and compacted woody vegetation that is removed prior to topsoil salvage activities. These berms will be trapezoidal in cross section: 2 feet high, with a 2-foot wide top width and approximately 1.5H:1V sideslopes. In addition, topsoil stockpiles would be seeded to establish vegetation as early as practicable which would help to control erosion and improve overall stability of the stockpile. Final earthen berm designs will be provided to UDOGM prior to construction. Earthen berms will be designed to control erosion and prevent slope failure.

Comment [A46]: Comment #48

Comment [A47]: Second Review Comment #43

Haul roads will be ditched, and if the grade increases to above 2% water turn-outs will be constructed to prevent erosion of the road base. In addition, these ditches may also be outfitted with small coir rolls, silt fences, or other check features if needed.

The facilities site will be constructed to be a self-contained area through the use of perimeter berms or ditches as needed to direct runoff. All erosion control BMPs will be regularly inspected, and maintained in operable condition. These aforementioned types of BMPs are also described in a SWPPP, provided in **Appendix E**, developed to comply with a State of Utah Multi-Sector General Storm Water Permit for Industrial Discharges. ~~(and/or the analogous EPA permit).~~ The Permit also requires quarterly visual monitoring of stormwater discharges. These measures will reduce the likelihood of inadvertent discharges of process waters or erosion-produced sediments. This SWPPP is included with the NOI as **Appendix E**.

AIR QUALITY

Potential air quality issues include the following:

- Fugitive dust from stripped lands, sand tailings storage areas, and topsoil stockpiles.
- Fugitive dust from the plant site area and ore stockpiles.
- Emissions from the equipment used to mine, haul, and process the ore.
- Fugitive dust from newly reclaimed lands.

Fugitive dust will be minimal from ore piles. However, consistency of raw ore is massive to granular and thus does not readily become airborne. Topsoil and sand tailings storage piles may or may not be moist, depending on current weather conditions.

Once the bitumen is removed from the ore, clean sands will remain. Waste sands will be deposited in the dry sand tailings storage area. Sprinklers or a water truck will be used to reduce wind-blown sand, should it become dry.

Haul roads will be sprayed regularly with water from a water truck. Water will be obtained from a local source.

GRR has coordinated with the Division of Air Quality (DAQ) on air permitting to sufficiently address the above air quality issues, including those associated with equipment emissions. GRR intends to comply with the conditions set forth by the DAQ under their Approval Order. Documentation is included in **Appendix E**.

PUBLIC HEALTH AND SAFETY

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

- MSHA safety regulations will be followed in all aspects of this project.
- Shafts and tunnels within the mine site will be fenced or gated. Access will be restricted until closure.
- All trash, scrap metal, wood, and extraneous debris will be temporarily stored at a designated location prior to being routinely hauled offsite to a licensed facility. Further, volumes of material such as product, waste oil, etc. will be periodically removed from the site as needed so that their allocated storage is not exceeded.
- Any exploratory or other drill holes will be plugged or capped as set forth in Rule R647-4-108.
- Warning signs will be posted in locations where public access to operations is readily available, including at the points of exit/entry from the main access road to the portal area and processing facilities.
- All blasting materials are kept in locked Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF)-approved magazines.
- The facilities and mine area will be bermed and fenced.
- Containers stored on-site will be labeled so that wastes are clearly identified. Salvageable materials and other wastes will be stored at the plant site within the fenced area.
- Hazardous materials will be stored per regulation.
- Hazardous wastes will be stored and disposed of in an approved facility.

109.5 Actions to Mitigate Any Impacts

Comment [A48]: Comment #37

Throughout the life of the mine measures will be taken to ensure that the material does not impact surface water or ground water, see **Appendix E**, Utah Groundwater Discharge Permit. Production facilities on the site will have welded steel floors and seal welded drip lips to contain any spill and all tanks within the tank farm will be constructed with secondary containment structures as outlined in the SCPP.

As part of our Utah Ground Water Discharge Permit, a monitoring plan has been developed that will include monitoring and sampling of surface water, groundwater and dry materials. Eight groundwater monitoring wells are proposed to be installed. Wells are proposed to be installed at the edges of the tailings storage facility and the processing area. A monitoring plan that will include monitoring and sampling of the sand tailings for Synthetic Precipitation Leaching Procedure (SPLP) over time will be implemented. Furthermore, samples will also be collected at the seeps and springs downgradiant of the sand tailings and process facilities, **Appendix E**, Utah Groundwater Discharge Permit.

The Range Creek Drainage will be protected from any sediment and or/ contaminants. After construction of the dry tailings impoundment has started, tailing samples will be collected and evaluated using the HELP model to determine the time required for water to infiltrate through the tailings down to the bottom compacted liner. The dry tailings impoundment will be constructed so that there will not be impact to Range Creek. The dry tailings will be constructed with a four foot clay liner, a four foot clay cap (1x10-7 cm/s permeability), weeping tiles, capillary barrier and 18 inches of growth media. The capillary barrier will allow any water to drain off the dry tailings impoundment and preclude water from coming into contact with any contaminants within the capped area; therefore allowing the water to be discharged to the sides of the dry tailings storage for recharge of the groundwater system and North Spring. The weeping tile system will allow any contact water to drain into an HDPE lined collection basin at the toe of the tailings impoundment. In addition the weeping tile system will be designed to ensure that over time any solvent within the cap and cover system will be drawn down and collected into the HDPE lined collection basin. This water will be collected and allowed to evaporate. Any water that is collected in the HDPE lined basin will not be discharged. These measures will ensure that there will be minimal impact to groundwater flows and that no solvent will be released to the environment.

Sand tailings will be inspected and free of moisture prior to being placed in the dry tailings impoundment. If sand tailings are not dry they will be reprocessed and dry before being placed on the tailings impoundment.

Comment [A49]: Second Review Comment #42

R647-4-110. Reclamation Plan.

110.1 Current Land Use and Post-Mining Land Use

The current land use is for telecommunications cell towers and wildlife habitat/open space. The post-mining land use is likely to include telecommunication cell towers, wildlife habitat and open space. The stated objective of reclamation planning in this NOI is to reclaim the site in order to provide for future post mining land uses of wildlife habitat and open space. In order to make certain an environmentally safe and stable condition for the wildlife in the area that meets the objectives of the Utah Mined Land Reclamation Act 40-8-12, GRR will leave safe stable topography; establish native vegetation suitable for habitat; remove man-made structures, including tanks, portals, etc.; and cause no degradation or harm to water sources.

Cultural Resources

Cultural resources were reviewed and inventoried on-site. No previously documented or new cultural resources were recorded. ~~(See **Appendix D**, Confidential).~~

110.2 Reclamation of Roads, Highwalls, Portal, Surface Facilities, Etc.

If economics allow, mining may continue in other portions of the study area. In this case, facilities, and some roads may be maintained for access, and all new disturbances and operations would be subject to new permit approvals, either through amendments to this NOI or otherwise as required by UDOGM. These amendments or revisions would address how any mine expansion would occur, including details on any limited need for re-handling of materials, alterations to the processing plant, etc. At this time, however, the mine/reclamation plan and associated bond estimate are based upon the portal, haul road, process facility and sand tailings stockpile. Also, for the purposes of the reclamation plan and bond estimate, it is assumed that all facilities and roads within the 160-acre affected area will be reclaimed as stated herein.

The overall objective of the reclamation plan described herein is to reclaim the entire affected area so as to allow post-mining land uses of wildlife habitat and open space to resume. This objective will be met in part by removing facilities and structures that have been brought to the site, regrading, topsoiling, and reseeding, as described in more detail below. The intent is to meet the requirements of the Utah Rules at R647-4, as stated in **Section 110.6** and to meet the objectives of 40-8-12 of the Utah Mined Land Reclamation Act which include provisions for a safe, stable, environmentally functioning site.

Safety will be managed during reclamation by continuing to follow safe operating conditions while using equipment and continuing to follow the appropriate MSHA guidelines and regulations.

Visual inspections will be made during the course of reclamation activities, ensuring that reclamation goals can be met. Further, visual inspections will also be made by UDOGM, and will include ensuring that all reclamation activity obligations under the Utah Mined Land Reclamation Act and associated rules are being met. This will focus on erosion and sediment control, further ensuring that reclamation goals can be met. These inspections will continue until such time as UDOGM approves the reclamation work and releases the surety.

Various types of equipment will be used to accomplish the reclamation objectives, as detailed in the surety calculations (**Appendix H**). This equipment includes but is not limited to: loader, grader, dozer, hand power tools, water truck, trackhoe, backhoe, seeder and manure spreader. The water truck will be used to provide dust suppression.

ROADS

During operations, any interim reclamation, ongoing reclamation and on-site roads are still needed to access affected areas during final reclamation. GRR will maintain roads as needed to minimize erosion and off-site sedimentation. Such road maintenance will continue until the roads are fully reclaimed.

There are approximately 9 acres attributed to haul roads that are integral to the mining process. During final reclamation these haul road will be deep-ripped to relieve compaction, regraded to blend with site topography, topsoiled, and seeded. Except where bedrock is encountered, ripping will be 24 inches deep with ripper shanks spaced no more than 24 inches apart. In shallow bedrock areas, ripping depth may be less than 24 inches by necessity. Roads that are integral to storage areas will be reclaimed as part of those features.

HIGHWALLS

Mining will occur underground; therefore, no highwalls, except the portal face up area, will remain at the end of mining as no highwall will be created by mining.

PORTALS

Comment [A50]: Comment #52

The portal would be backfilled at the bench/face-up to cover the portal area and adjacent slope to prevent entry by personnel as well as to prevent infiltration of any surface water. Portal will be closed by backfill only. See **Figure 16** for Typical Portal Closure.

SLOPES

All outslopes of the storage areas (covering approximately 109 acres) will be regraded to at least a 2H:1V slope to achieve a stable, natural-looking landscape. While short segments may exceed this overall slope, no areas will be so steep as to be unstable, cause safety hazards, encourage erosion, or hinder successful revegetation. The storage areas will be re-contoured by dump-top rounding, toe extension and surface re-contouring to create an undulating, roughened surface that will blend with the surrounding terrain, provide a site amenable to revegetation, and minimize runoff and erosion. The steepest portions of slopes will be faced with coarse overburden material to minimize erosive potential. This will be done with a trackhoe, backhoe, and/or dozer prior to topsoil placement. Safety and erosion control will be of primary focus during reclamation activities. As described further in **Section 110.5**, available salvaged topsoil will be applied to all areas with the exception of the armored drainage channels. The entire area will be seeded with native species to stabilize the soil, and provide for the post-mining land use.

As noted, drainage will not be an issue on these regraded areas as there is little to no run-on and infiltration capacity will be high on reclaimed slopes.

DRILL HOLES

Any drill holes drilled by GRR will be plugged in accordance with the requirements of R647.4.108.

FACILITIES AND MATERIALS

All of the facilities on the 26-acre facility site will be taken apart and hauled away for disposal at an approved license facility. As described further in the surety calculations (**Appendix H**), the office, maintenance building, warehouse, change house, substation, fan house, and materials handling equipment, support and mining equipment, and tanks will be hauled away to a licensed disposal facility.

No process materials that are hazardous or represent an impact to public health and safety will be disposed on-site.

Sorted waste, dry sand tailings, (approximately 29 million cyd, total) will be loaded into trucks, hauled back to the mine, and used as backfill for the mined out areas. As described in **Section 106.2** approximately 60% of the workings will be backfilled with dry sand tailings. Portal entries will be plugged as part of the associated backfilling of the mine entries. Portals will be plugged to prevent any water from entering the mine workings. The 26-acre facilities area will be ripped, topsoiled, and reseeded. Mining equipment with no salvage value will be abandoned underground. A list of equipment is included in **Appendix G.**

Trash removal will occur after all buildings and facilities are removed; it will involve collection of all refuse, litter, stray metal, pipe, wood, insulation, and other debris. The 160-acre area will be inspected to check for and collect trash. There will be no shafts, adits, or similar structures that would require reclamation. As noted the mine will be backfilled with process sand and sand tailings.

110.3 Surface Facilities to be Left

The processing plant, all associated support facilities, and mining equipment will be removed from the site. A list of typical structures to be removed and reclaimed (but not limited to) is included in **Table 110.3.1.**

Table 110.3.1 Typical Surface Facilities to be Reclaimed

Typical Structure	Size (L'xW'xH'Ø)	Steel (tons)	Size Gallons (gal)
Office Building	12x60x12	NA	NA
Warehouse and Maintenance Shop	20x30x12	NA	NA
Septic Tank	NA	NA	1,000
Water Recycle Tank	NA	NA	16,956
Potable Water Tank	NA	NA	16,956
Process Building	20x20~~60~~x20~~12~~	NA	NA
Electrical Building	12x30x12	NA	NA
Process Equipment~~Utility~~ Building	20x5~~6~~0x20~~12~~	NA	NA
Bitumen Truck Loading Pad	15x75x0.5	NA	NA
Storage Building	160x400x35	NA	NA
Truck Dumping/Loading Building	30x60x40	NA	NA
Storage Building #2	175Øx30	NA	NA
(4) Bitumen Storage Tanks	NA	NA	250,000
Raw Water Storage Tank	NA	12.5	16,956
Solvent~~Chemical~~ Storage Tank	NA	24	31,500
(2) diesel tanks	NA	NA	6,000
Bitumen Solution Tank	NA	NA	18,000
(2) Gasoline Tanks	NA	NA	6,000
(3) Fire Protection Storage Tanks	NA	NA	50,000
~~Process Equipment~~Bitumen Emission Control Building	~~NA~~10x10x10	~~30~~NA	NA
Parts Trailer	12x30x100	NA	NA

Typical Structure	Size (L'xW'xH'Ø)	Steel (tons)	Size Gallons (gal)
Portable Office	12x30x100	NA	NA
(2) Fuel Tanks (diesel and gasoline at portal)	NA	NA	6,000
(2) Water Tanks	NA	NA	6,000
Substation	20x50x12	NA	NA
Fan House	15x25x12	NA	NA

Comment [A51]: Comment #15

The change house, substation and fan house are all located at the portal face-up bench area. After the initial year, the change house, office, supply/warehouse facilities would all be underground and left in place. A parts trailer, portable office, two (2) fuel tank, two (2) water tanks, substation and the fan house would remain on surface. Only surface facilities needed to be removed are included in the surety. All solvent and fuel will need to be properly disposed of upon reclamation of the tanks. Tanks will need to be cleaned and solvent and fuel hauled offsite to an approved landfill or disposal facility.

Comment [A52]: Second Review Comment #57

Table 110.3.2 Material Handling System

Surface Equipment Components	No.	Size
Ore Stockpile - Plant Feed		
Truck Dump Hoppers	3	50 ton ea
Truck Dump Feeder	1	4x60
Truck Dump Building	1	30x60x40
Storage Building Feed Conveyor	1	3x250
Building Head House	1	15x15x20
Storage Building	1	160x400x35
Shuttle Conveyor	1	3x150
Reclaim Conveyor	1	3x340
Reclaim Hoppers	3	15 ton ea
Transfer Tower	1	20x20x30
Transfer Conveyor	1	3x500
Reclaim Feeders	3	4.5x10
Storage By-Pass Conveyor	1	3x110
Temporary Tailings Stockpile		
Tailings Feed Transfer Conveyor	1	3x500
Tailings Storage Feed Conveyor	1	3x40
Building Head House	1	20x25x35
Storage Building		175 dia. Dome x 30
Reclaim Conveyor	1	3x100
Transfer Tower	1	20x20x30
Truck Load Conveyor	1	3x150
Truck Load-out Shuttle Conveyor	1	3x250
Truck Load-out Hopper	1	100 ton
Truck Load-out Building	1	30x60x40
Other		
Concrete stockpile tunnel	2	1.5x350x12
Concrete stockpile floor	1	160x400x1.5
Concrete stockpile floor	1	175 diameter x 1.5

During the initial year, a portable crushing and conveying/stacking system will be utilized and be located at the portal bench. This equipment will be leased and are limited to the leasing/rental company coming to disassemble and tow these components from the site, not included in surety. The surface conveyors and other components that will be included with the ore stockpile at the processing plant and the temporary tailings also located at the processing plant are tabulated above. These are based on initial design concept and are subject to change. All changes will be submitted to UDOGM.

110.4 Treatment, Location and Disposition of Deleterious Materials

During operations all new and spent fuel, oil, and lubricants will be stored within secondary containment as required by the SPCC Plan, as further described in the operations **Section 106.2**. These containers and their contents will be removed to a licensed disposal facility prior to reclamation of the process facility. If any hydrocarbon spills occur during mining, these will be dealt with as outlined in the SPCC Plan, and thus will not pose a problem during reclamation. Any fuel spills that occur during the reclamation process would be similarly managed.

Any other chemicals, including the process chemical, present during operations are consumed during mining and processing. Any of the stored substances remaining on-site at the end of mining will be properly removed and disposed of, prior to final reclamation. Any remaining fuels will be used to fuel equipment used in reclamation work. Fuels and liquids remaining after reclamation will be removed for disposal or re-use by a licensed facility. No acid forming or deleterious material will be left on-site.

An ongoing sampling and analysis program will be developed to test the sands tailings to ensure that the sand tailings meet the requirements of this permit and the Groundwater Discharge Permit. Compliance monitoring is further described in the Groundwater Discharge permit filed with DWQ.

Comment [A53]: Comment #56

110.5 Revegetation Planting Program and Topsoil Re-distribution

Table 110.5.1, below, shows that all of the 160 acres of affected areas will be reclaimed by various methods. This includes redistributing topsoil with 5-12 inches on all areas except those associated with the armored drainage channels and the topsoil storage areas (soils will not have been salvaged on those areas, so original topsoil will remain).

Comment [A54]: Second Review Comment #56

Table 110.5.1: Reclamation Treatment Areas

Facility	Affected Area (acres)	Acres to be Graded	Acres to be Ripped	Acres to be Topsoiled	Seeded Acres
Plant site including office and processing facilities	26	0	26	26	26
Haul Road from portal to plant site	7	7	7	7	7
Portal entrance/pad	2	2	2	2	2
Road from plant site to sand tailings storage area	2	2	2	2	2
Topsoil storage area	14	0	14	0 (topsoil already in place)	14
Sand Tailings storage area	109	0	109	109	109
Total	**160**	**11**	**160**	**146**	**160**

Soil Material Replacement

Once final grading is complete, as described above, topsoil and topsoil substitute material (described in **Section 109.3**) will be spread on the mine/plant area using self-loading scrapers to place soil, and/or a grader to spread the soil. Approximately 220,000 cyd of topsoil will be redistributed to a depth of five to twelve inches over the 146 acres; marked lath will be used to guide dozer operators to the correct topsoil depth. Topsoil storage areas will not be topsoiled.

The graded/topsoiled surfaces will be ripped with a road grader on the contour to provide a greatly roughened surface to retain seed and to enable root penetration. Vegetative matter gathered during the topsoil salvage operations and stockpiled as a component of those piles will also be spread along with the topsoil, providing organic matter and helping with soil moisture retention. Any additional salvaged vegetation that was stored in slash piles will be placed and redistributed on reclaimed areas in order to provide organic matter and surface roughness.

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

Seed Bed Preparation

As described above, the topsoil will be spread and left in a much roughened surface that will be loose but not erodible. Ripper shanks on a road grader will be used to stabilize soil, depending on field conditions. The ripper will be used with shanks spaced approximately 36 inches apart and 18 inches deep. The salvaged topsoil will provide a reasonable growth medium for the site. No mulch or fertilizer will be used in reclamation efforts. The final surface will be rough, creating small depressions for water retention sites and habitat niches.

Seed Mixture

A single seed mixture (shown in **Table 110.5.2**) will be used in reclamation on all bonded, disturbed areas at the Bruin Point Mine area. Any alterations beyond what is included in the list would require agency approval. All 160 acres affected will be seeded with a tractor-pulled broadcast seeder.

Table 110.5.2 Reclamation Seed Mix for Bruin Point Mine

Species	PLS lbs/acre
Utah Serviceberry (*Amelanchier utahensis*)	0.~~2~~4
Gooseberry-leaved Globemallow (*Sphaeralcea grossulariifolia var. grossulariifolia*)	0.~~2~~4
Red Elderberry (*Sambucus racemosa*)	1.1~~0.5~~
Big Sagebrush (*Artemisia tridentata Var. vaseyana*)	0.1
Oregon Daisy (*Erigeron speciosus Var. mollis*)	0.1
Richardson Geranium (*Geranium richardsonii*)	3.4~~1.7~~
Western Sweetroot (*Osmorhiza occidentalis*)	5.9~~2.9~~
Blue Mountain Penstemon (*Penstemon rydbergii*)	0.~~1~~2
Mountain Brome (*Bromus marginatus*)	3~~1~~.9
Sandberg Bluegrass (*Poa secunda*)	0.~~2~~4
Idaho Fescue (*Festuca idahoensis*)	0.84
Sheep Fescue (*Festuca ovina*)	0.~~3~~5
TOTAL	17~~8.5~~

*PLS = Pure Live Seed

Comment [A55]: Comment #58

The following trees are desirable for planting in select areas where tree grouping will be used. GRR will evaluate, in consultation with UDOGM, modifications to the approved tree and seed species for the Bruin Point Mine to determine what species, planting rate, and planting location at the time of final reclamation.

Comment [A56]: Comment #57

Table 110.5.3 Potential Tree Plantings for Bruin Point Mine

Species	**Planting Density/acre**
Quaking aspen (Populus tremuloides)	300-1,200
Limber pine (Pinus flexilis)	430-1,200
Douglas fir (Pseudotsuga menziesii)	300-1,200
Sub-alpine fir (Abies lasiocarpa)	300-1,200
Engelmann spruce (Picea engelmannii)	300-700
TOTAL	1,630-5,500

SEEDING METHOD

The seed mix will be broadcast seeded on all areas that will be reclaimed, including regraded sand tailings storage area, slopes, and portal area. Revegetation work, including both seedbed preparation and seed application, will take place in the late fall season. Seeds will be spread as soon as possible following seedbed preparation.

OTHER REVEGETATION PROCEDURES

As noted throughout this document, all reclaimed slopes will be stabilized by regrading to at least 2H:1V and will be left in a very roughened form to maximize infiltration and minimize runoff. It is important to note that there will be little to no run-on to these reclaimed surfaces.

GRR will monitor for noxious weeds, and will provide weed control measures according to County directives should noxious weeds pose a potential problem. This will be done in the early summer months each year after reclamation until bond release has occurred. The monitoring will consist of a site visit by a biologist familiar with the potential noxious weeds, and a simple visual walk around the 160-acre area will be sufficient for this small area. If any noxious weeds are identified the County will be informed of their extent, and actions taken as directed by them.

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

110.6 Statement

R647-4-111. Reclamation Practices.

During reclamation, the operator shall conform to the practices described herein unless the Division grants a variance in writing.

R647-4-112. Variance.

No variances are anticipated at this time.

R647-4-113. Surety.

The reclamation surety calculations are contained in **Appendix H**. A summary of the estimated costs of reclamation is included below.

Direct Costs	
Subtotal Demolition and Removal	$ 1,036,975.50
Subtotal of Backfill and Grading	$ 1,380,154.50
Subtotal Revegetation	$ 208,000.00
Direct Costs	$ 2,625,130.00
Indirect Costs	
Mob/Demob	$ 262,513.00
Contingency	$131,257.00
Engineering Redesign	$ 65,628.00
Main Office Expenses	$ 178,509.00
Project Management Fee	$ 65,628.00
Subtotal Indirect Costs	$ 703,535.00
Escalation (2014)	$ 292,721.00
Reclamation Cost Escalated (for 160 acres disturbed, rounded to nearest $1,000), 2019 dollars	$ 3,621,000.00

Comment [A57]: Comment #15

References

AMOCO Minerals Company, 1981. Geologic Summary Report of the Sunnyside Tar Sands Project.

BLM, 2011. http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2012/IM_2012-044.html. December 2011.

BLM, 1984. Utah Combined Hydrocarbon Leasing Regional Final Environmental Impact Statement. Volume I: Regional Analyses.

Flint, A.L., L.E. Flint, and M.D. Dettinger. 2008. Modeling soil moisture processes and recharge under a melting snowpack. Vadose Zone Journal, 7:350-357.

Glassett, J.M., Gould, W.R., and Glassett, J.A., 1977. Utah tar sand mining methods: Provo, Eyring Research Institute, (done under contract no. J0166164 with the U.S. Bureau of Mines), variously paginated.

Morrison Knudsen, 1984. Mono Power Company, Sunnyside tar sands project – 1983 geologic evaluation.

NOAA, 2014. National Oceanic and Atmospheric Administration. National Operational Hydrologic Remote Sensing Center Interactive Snow Information.
Station SHEF ID:
BRPU1. <http://www.nohrsc.noaa.gov/interactive/html/graph.html?station=BRPU1>.

NRCS, 2014. Soil Survey of Carbon Area, Utah, Parts of Carbon, and Emery Counties. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/. Accessed February 2014.

Price, Don, and Lousie L. Miller, 1975. *Hydrologic Reconnaissance of the Southern Uinta Basin, Utah and Colorado,* State of Utah Department of Natural Resources Technical Publication No. 49, Prepared by the United States Geological Survey in cooperation with the Utah Department of Natural Resources Division of Water Rights.

Stokes, W.L., 1986. Geology of Utah. Utah Mus. of Nat. Hist. Occas. Pap. No.6. Utah Mus. Nat. Hist. and Utah Geol. and Mm. Surv., Salt Lake City, Utah. 280 p.

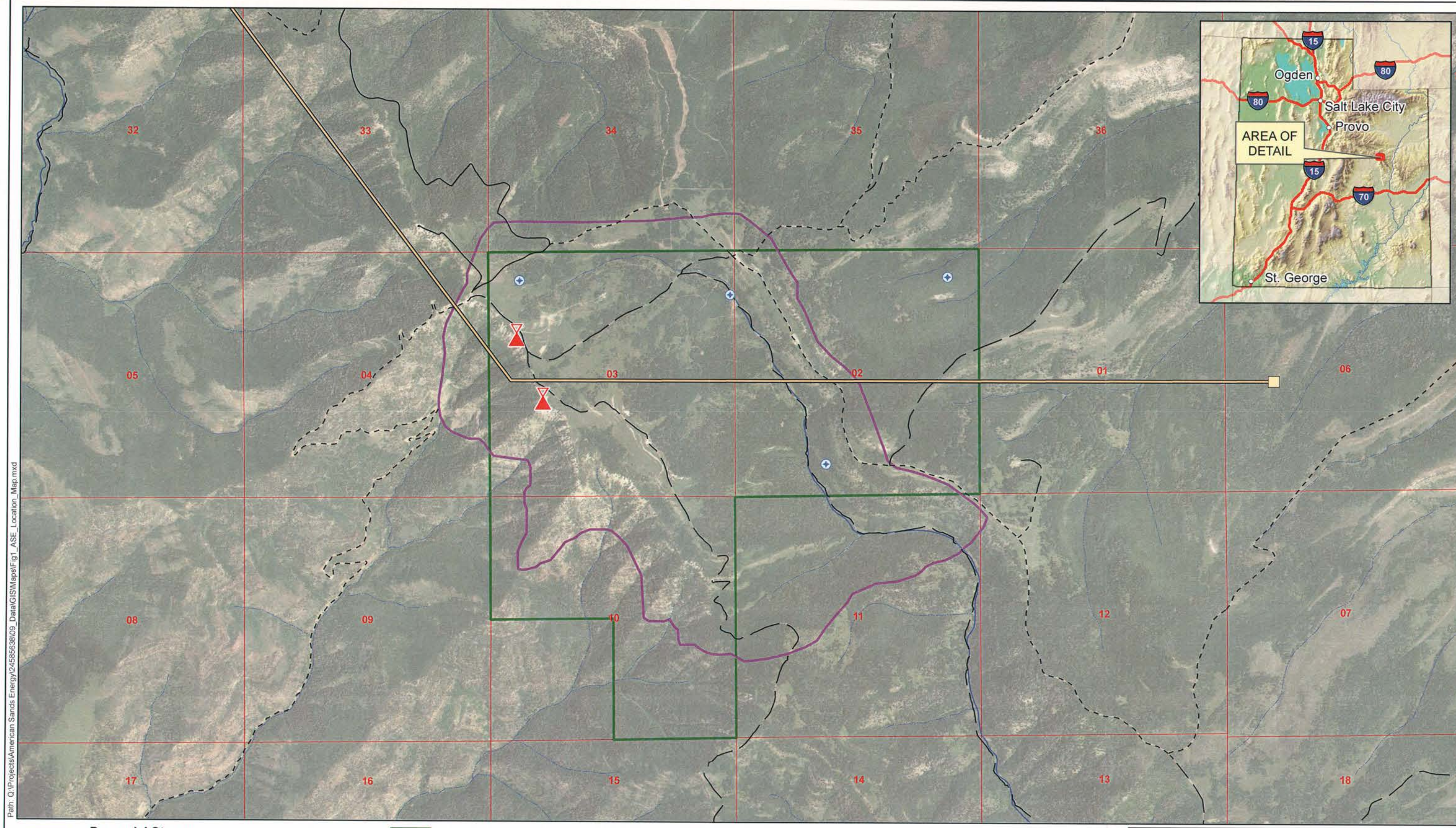
UCDC, 2014. Sensitive Species List by County. Available online at http://dwrcdc.nr.utah.gov/ucdc/ViewReports/sslist.htm. Accessed February 2014.

UDOGM, 2008. The Practical Guide to Reclamation in Utah. Updated regularly and available online at https://fs.ogm.utah.gov/PUB/MINES/Coal_Related/RecMan/Reclamation_Manual.pdf

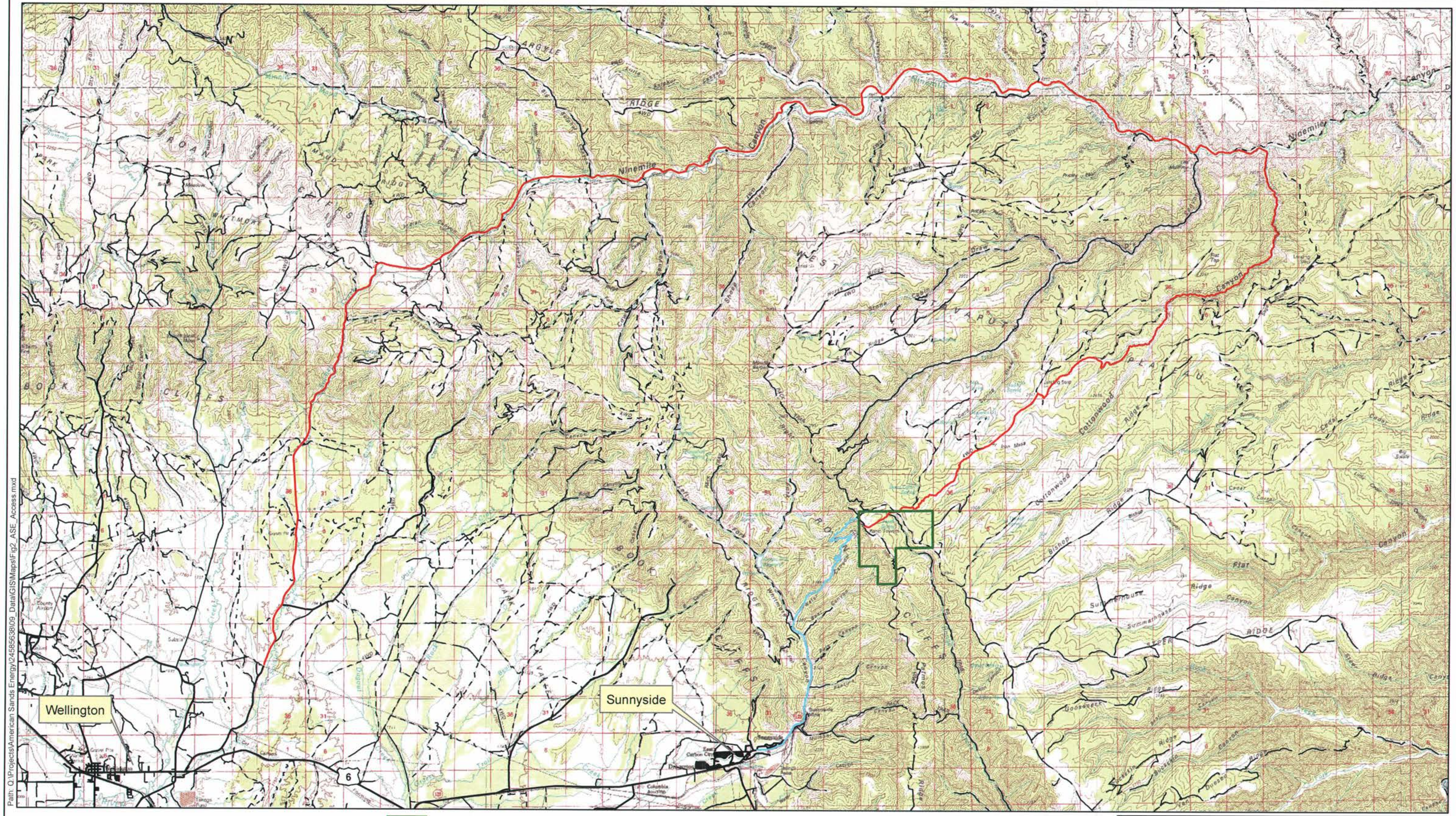
Utah Division of Water Resources, 2000. Utah State Water Plan, West Colorado River Basin. August 2000.

Utah Division of Water Rights, 2014. Water Right Record Information. Available online at http://www.waterrights.utah.gov/wrinfo/query.asp. Accessed February 2014.

Wilson, J.L., and H. Guan, 2004. Mountain-block hydrology and mountain-front recharge. p. 113–137. In J.F. Hogan, F.M. Phillips, and B.R. Scanlon (ed.) Groundwater recharge in a desert environment: The southwestern United States. Water Science and Applications Ser. Vol. 9. American Geophysical Union, Washington, DC.



Title:	Base Map / Location Map
Bruin Point Mine DOGM Permit Application	Proj No: 24585638
	Figure: 1
American Sands Energy Corp	Date: February 2015
	URS



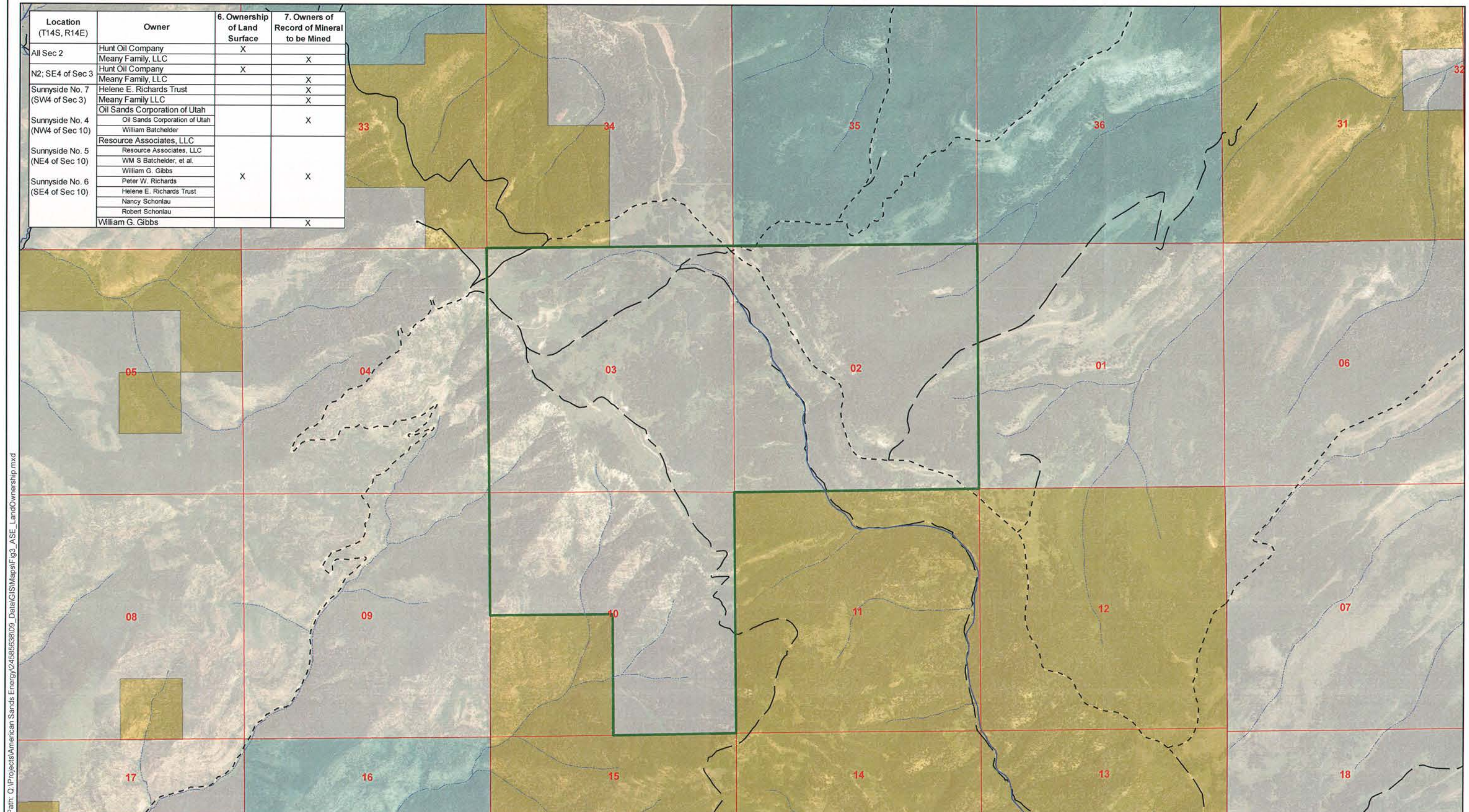
Site Access Road (via Nine Mile Canyon)
Additional Access Route to Site
Paved Road
Improved Road
Dirt Road
Road (Conditions Unknown)

Lease Boundary

N

2.5 0 2.5 5 Miles

Title:	Site Access Map
Bruin Point Mine DOGM Permit Application	Proj No: 24585638 Figure: 2 Date: February 2015
American Sands Energy Corp	URS



Location (T14S, R14E)	Owner	6. Ownership of Land Surface	7. Owners of Record of Mineral to be Mined
All Sec 2	Hunt Oil Company	X	
	Meany Family, LLC		X
N2; SE4 of Sec 3	Hunt Oil Company	X	
	Meany Family, LLC		X
Sunnyside No. 7 (SW4 of Sec 3)	Helene E. Richards Trust		X
	Meany Family LLC		X
Sunnyside No. 4 (NW4 of Sec 10)	Oil Sands Corporation of Utah		X
	Oil Sands Corporation of Utah		
	William Batchelder		
Sunnyside No. 5 (NE4 of Sec 10)	Resource Associates, LLC	X	X
	Resource Associates, LLC		
	WM S Batchelder, et al.		
Sunnyside No. 6 (SE4 of Sec 10)	William G. Gibbs		
	Peter W. Richards		
	Helene E. Richards Trust		
	Nancy Schonlau		
	Robert Schonlau		
	William G. Gibbs		X

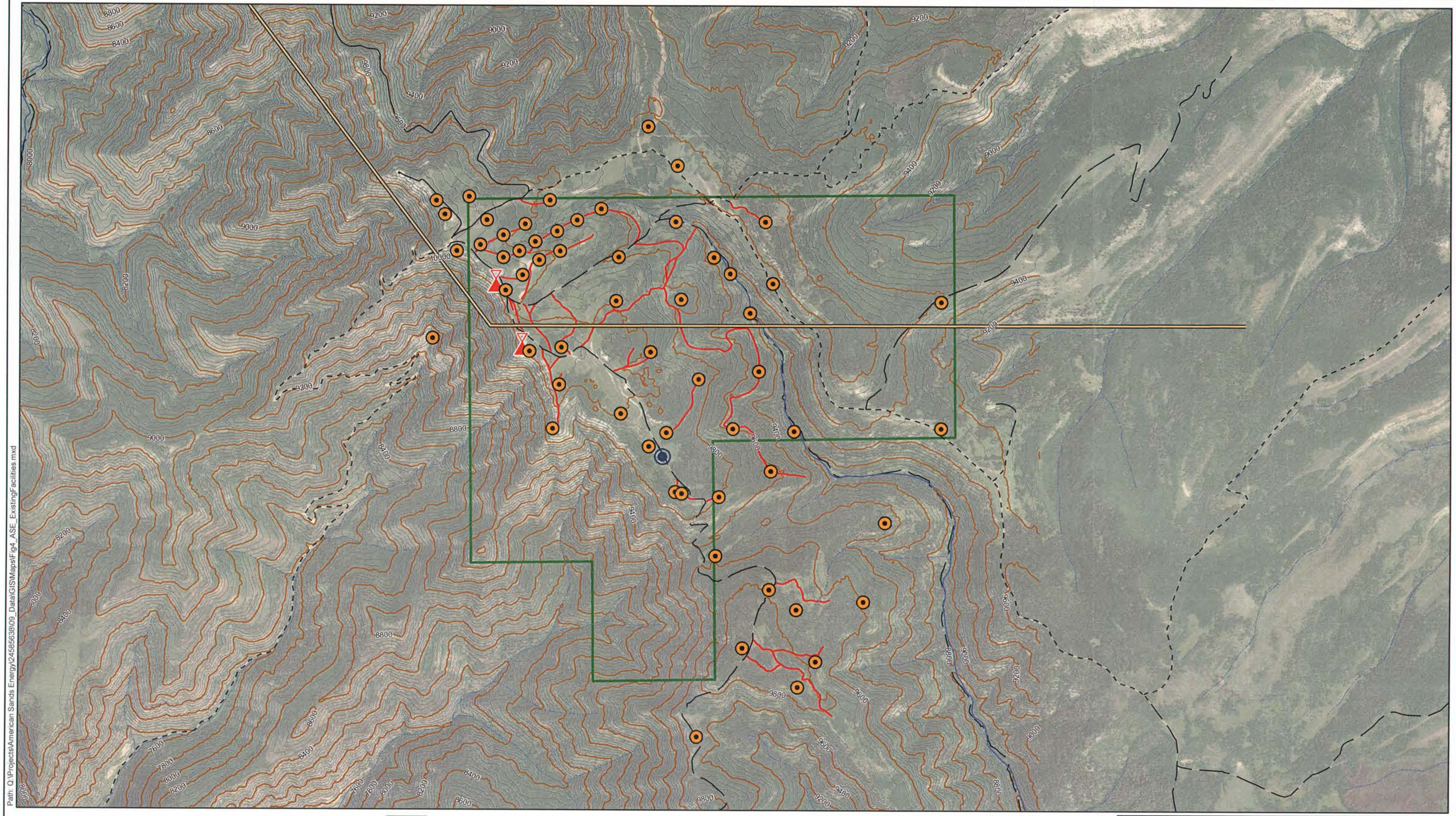
Perennial Stream
Intermittent Stream
Section Lines
Improved Road
Dirt Road
Road (Conditions Unknown)

Property Ownership

Federal
Private
State

Land Boundary

Title:	Land Ownership Map
Bruin Point Mine DOGM Permit Application	Proj No: 24585638
	Figure: 3
American Sands Energy Corp	Date: February 2015
	URS



Perennial Stream
Intermittent Stream
Improved Road
Dirt Road
Road (Conditions Unknown)
40 foot Contour Line
Elevation Data from 5m DEM Utah AGRC
Existing Power Transmission Lines

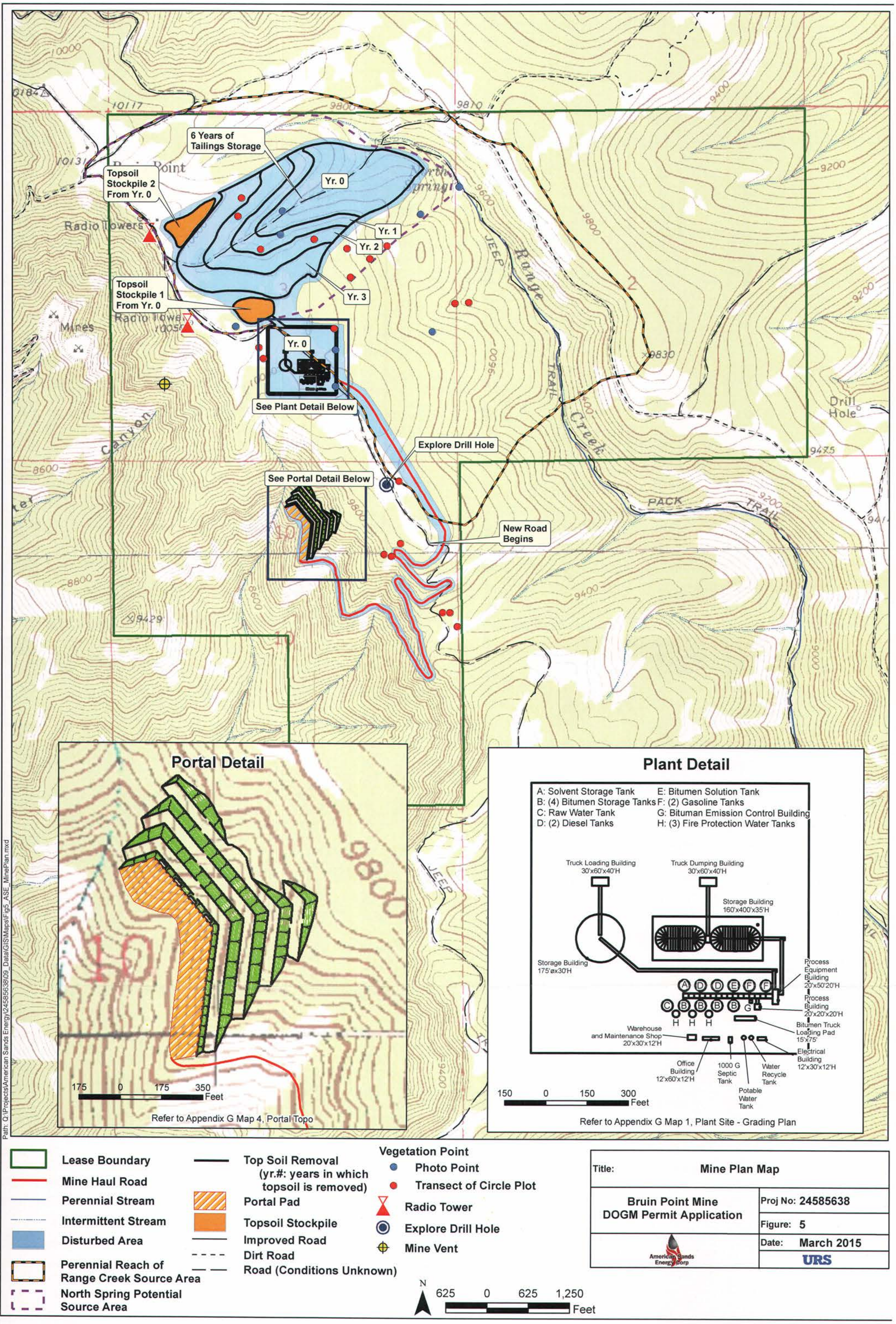
Lease Boundary
Radio Tower
Explore Drill Hole (Under Permit)

N

1,000 0 1,000 2,000
Feet

Previously Disturbed Areas
Drill Holes (Approx. 30 ft x 40 ft)
Existing Old Mine Roads

Title: Existing Surface Facilities and Contour Map	
Bruin Point Mine DOGM Permit Application	Proj No: 24585638
	Figure: 4
American Sands Energy Corp	Date: February 2015
	URS

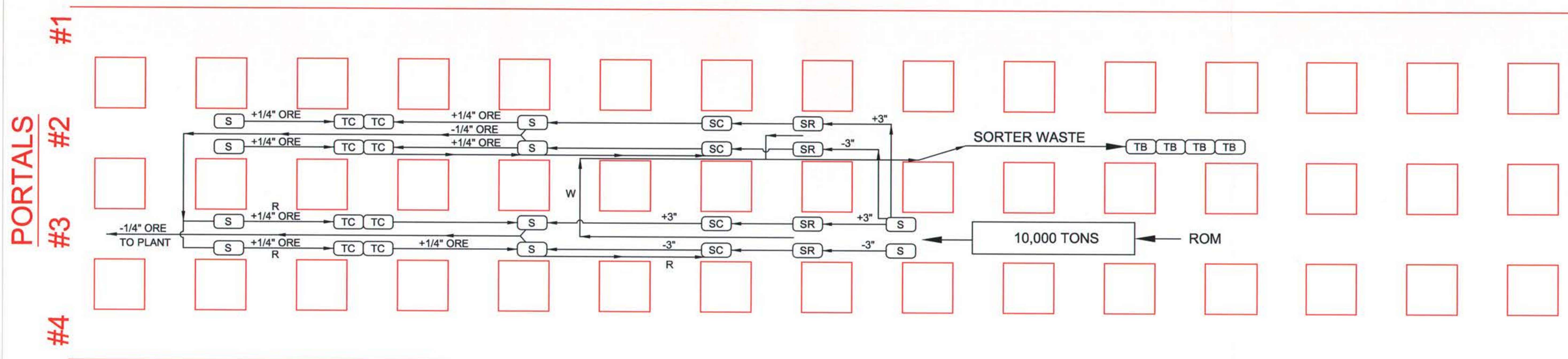


6 Years of Tailings Storage
Topsoil Stockpile 2 From Yr. 0
Topsoil Stockpile 1 From Yr. 0
Yr. 0
Yr. 1
Yr. 2
Yr. 3
Radio Towers
Mines
See Plant Detail Below
Explore Drill Hole
See Portal Detail Below
New Road Begins
JEEP TRAIL
Range Creek
PACK TRAIL
Drill Hole
Canyon
Portal Detail
175 0 175 350 Feet
Refer to Appendix G Map 4, Portal Topo
Plant Detail
A: Solvent Storage Tank
B: (4) Bitumen Storage Tanks
C: Raw Water Tank
D: (2) Diesel Tanks
E: Bitumen Solution Tank
F: (2) Gasoline Tanks
G: Bituman Emission Control Building
H: (3) Fire Protection Water Tanks
Truck Loading Building 30'x60'x40'H
Truck Dumping Building 30'x60'x40'H
Storage Building 160'x400'x35'H
Storage Building 175'øx30'H
Process Equipment Building 20'x50'20'H
Process Building 20'x20'x20'H
Bitumen Truck Loading Pad 15'x75'
Electrical Building 12'x30'x12'H
Warehouse and Maintenance Shop 20'x30'x12'H
Office Building 12'x60'x12'H
1000 G Septic Tank
Potable Water Tank
Water Recycle Tank
150 0 150 300 Feet
Refer to Appendix G Map 1, Plant Site - Grading Plan
Lease Boundary
Mine Haul Road
Perennial Stream
Intermittent Stream
Disturbed Area
Perennial Reach of Range Creek Source Area
North Spring Potential Source Area
Top Soil Removal (yr.#: years in which topsoil is removed)
Portal Pad
Topsoil Stockpile
Improved Road
Dirt Road
Road (Conditions Unknown)
Vegetation Point
Photo Point
Transect of Circle Plot
Radio Tower
Explore Drill Hole
Mine Vent
N
625 0 625 1,250 Feet
Title: Mine Plan Map
Bruin Point Mine DOGM Permit Application
Proj No: 24585638
Figure: 5
Date: March 2015
American Sands Energy Corp
URS
Path: Q:\Projects\American Sands Energy\24585638\09_Data\GIS\Maps\Fig5_ASE_MinePlan.mxd

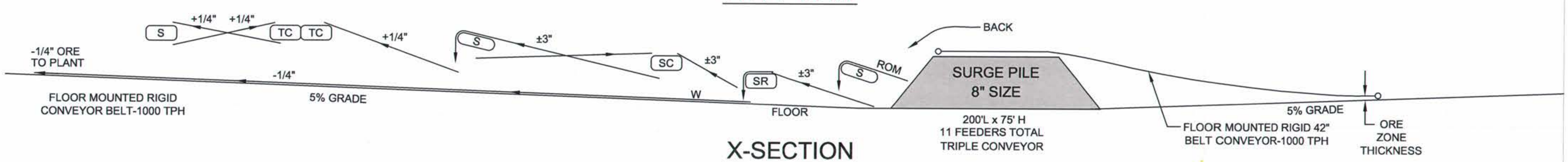
TYPICAL LAYOUT OF CRUSHING PLANT
U/G - 2 - 500TPH CIRCUITS
1 INSTALLED OUTSIDE
1 INSTALLED U/G #3 HEADING & THE OUTSIDE
UNIT MOVED U/G #2 HEADING

SCALE: 1" = 100'-0"

2 - PRIMARY SCREENS
2 - SETS OF SORTER EQUIPMENT @ 500TPH EACH
4 - SECONDARY CRUSHERS
4 - SECONDARY SCREENS
8 - FINE CRUSHERS
4 - FINE SCREENS
2 - PRIMARY CRUSHERS-IN EACH MINING AREA
1 - 10,000 TON LIVE SURGE PILE U/G, REST OF
STORAGE IS IN HEADINGS / BENCHES~60,000 TONS



PLAN VIEW



X-SECTION

TB - TRUCK BIN
ROM 12" FROM PRIMARY CUSHERS
NEED 50'x1500' FOR CRUSHING PLAN AT PORTAL TO START WITH +PRIMARY CRUSH+1/4" ORE LOADING / BINS / STOCKPILE.

SR - SORTER +3" -3"
S - SCREEN SIZING DEVICE
SC - SECONDARY CRUSHER
R - RETURN TO CRUSHER
TC - FINE CRUSHING
W - WASTE TO BE RETURNED TO UNDERGROUND WORKINGS OR UTILIZED AT THE TAILINGS STOCKPILE

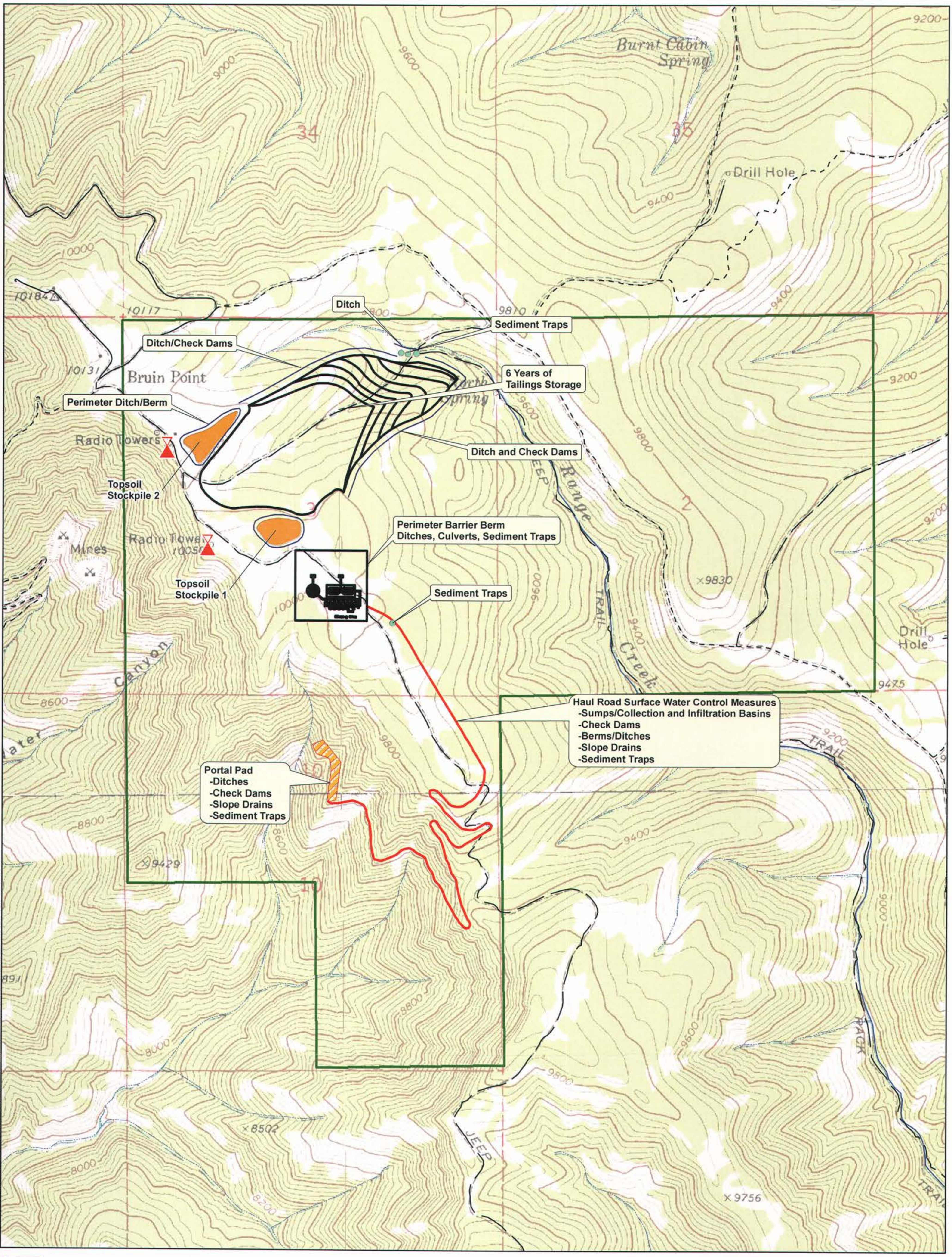
NOTE:
SEE MINE PLAN FIGURE 2 FOR LOCATION AND ORIENTATION

Title: MATERIAL HANDLING PLAN

Bruin Point Mine
DOGM Permit Application

Proj No: 24585638
Figure: 6
Date: MAY 2014

American Sands Energy Corp



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Lease Boundary
Mine Haul Road
Radio Tower
Perennial Stream
Intermittent Stream
Sediment Traps
Top Soil Removal
Portal Pad
Topsoil Stockpile
Improved Road
Dirt Road
Road (Conditions Unknown)

N

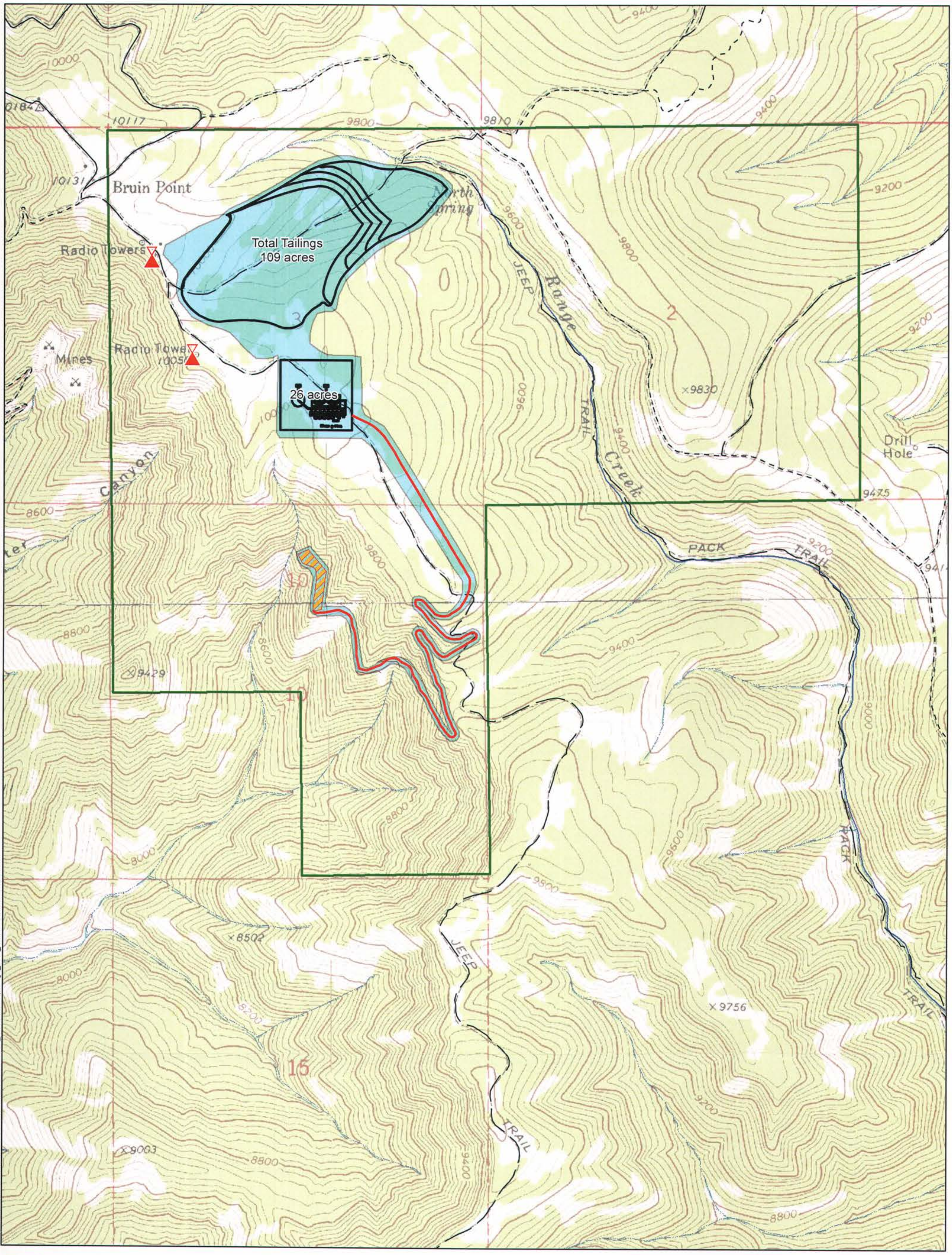
625 0 625 1,250
Feet

Title: Conceptual Surface Water Control Plan

Bruin Point Mine
DOGM Permit Application

Proj No: 24585638
Figure: 7
Date: February 2015

American Sands Energy Corp
URS



- Lease Boundary
- Top Soil Replacement
- Regraded and Revegetated Area
- Portal Pad (2 ac.)
- Mine Haul Road (7 ac.)
- Improved Road
- Dirt Road
- Road (Conditions Unknown)
- Perennial Stream
- Intermittent Stream
- Radio Tower

N

625 0 625 1,250 Feet

Title:	Reclamation Treatment Map
Bruin Point Mine DOGM Permit Application	Proj No: 24585638 Figure: 8
American Sands Energy Corp	Date: February 2015 URS

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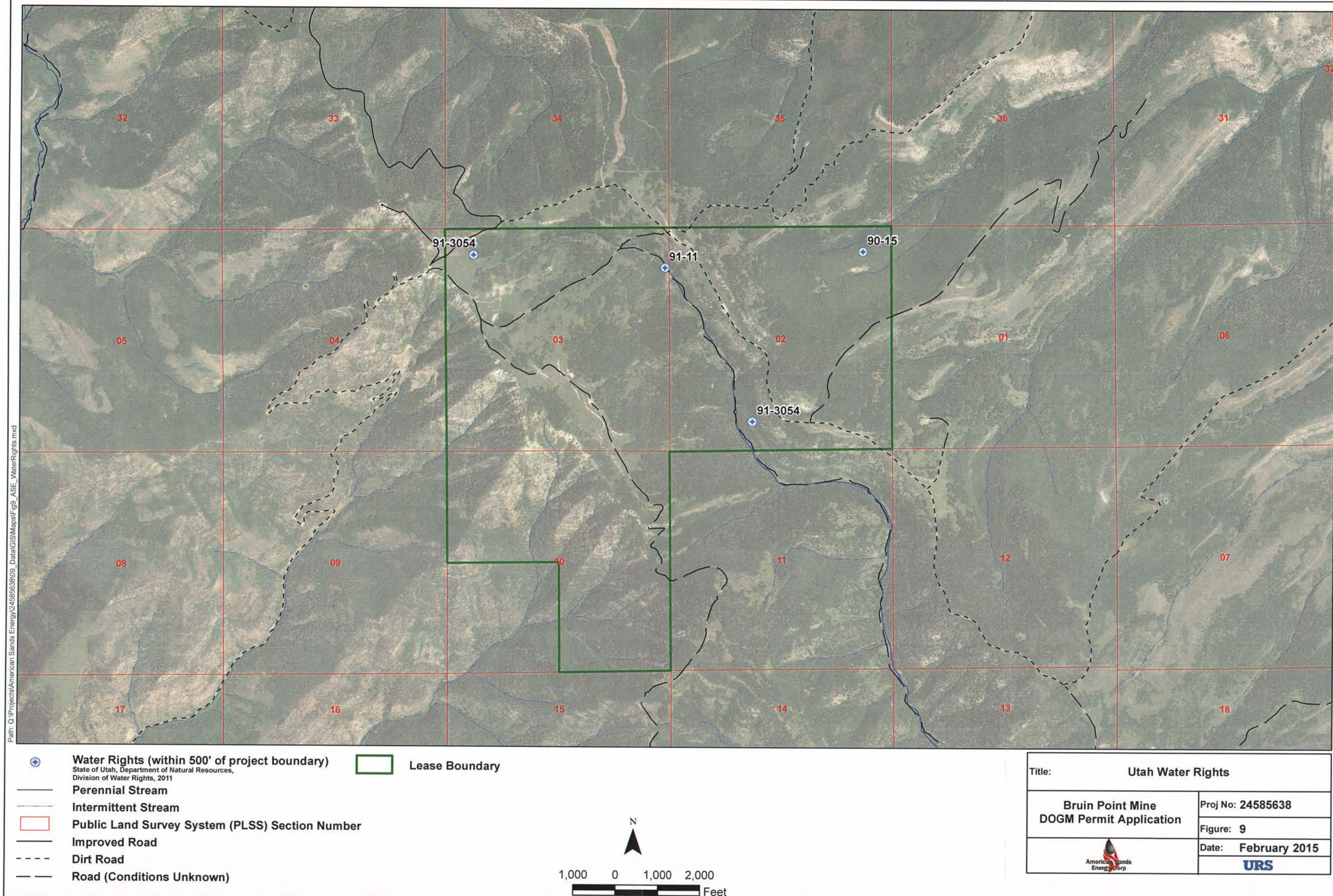
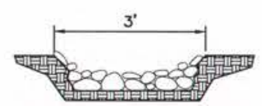
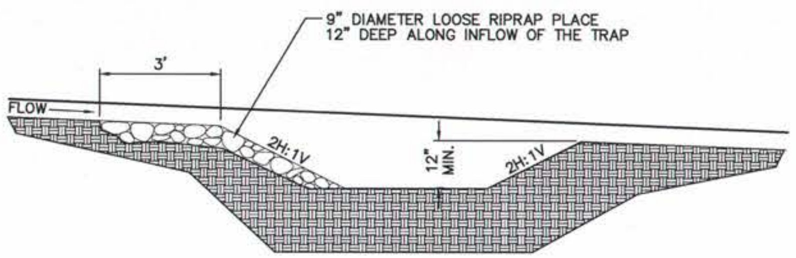


Title: Utah Water Rights	
Bruin Point Mine DOGM Permit Application	Proj No: 24585638
	Figure: 9
American Sands Energy Corp	Date: February 2015
	URS

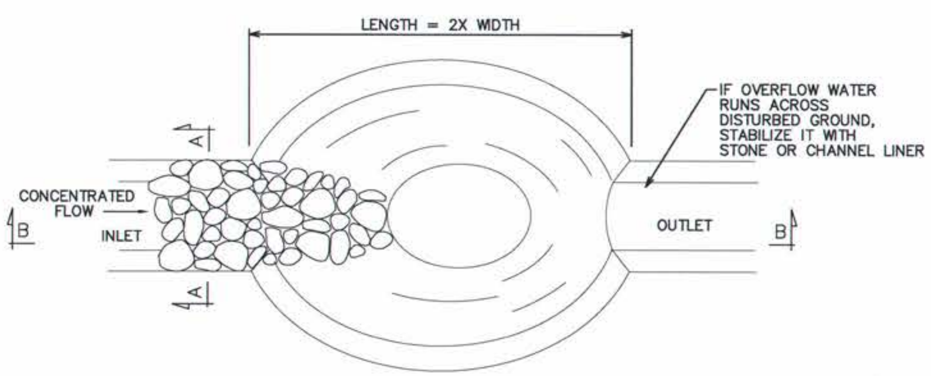
SEDIMENT TRAP



SECTION A–A



SECTION B–B

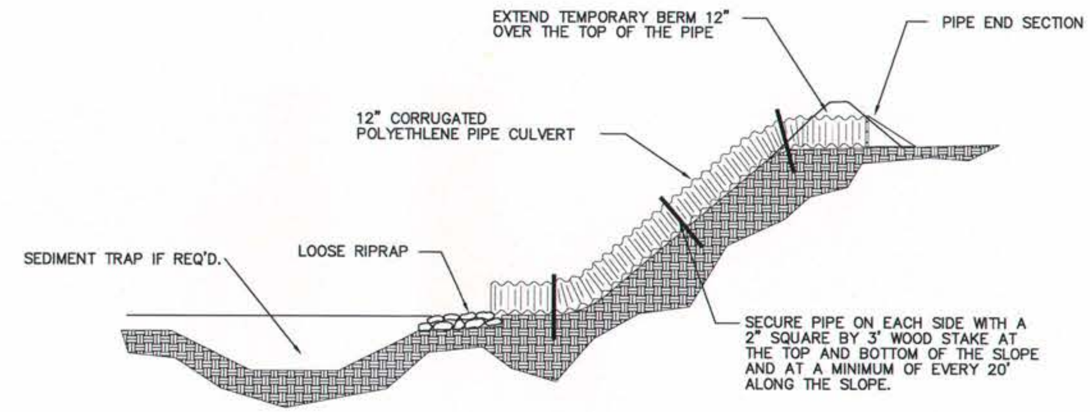


PLAN VIEW

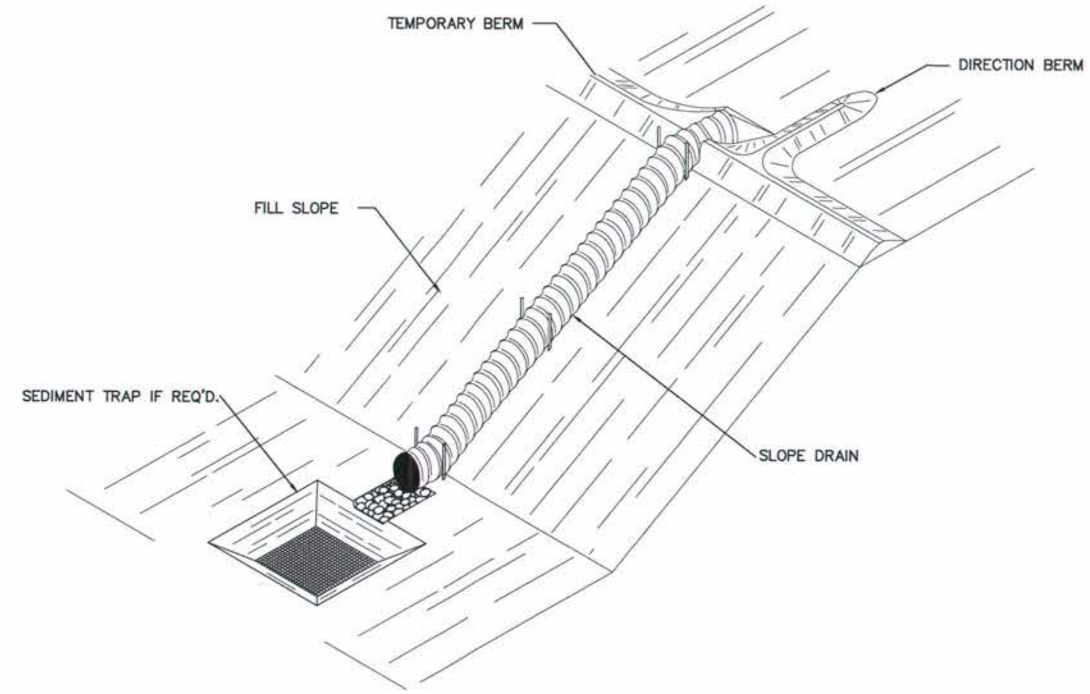
NOTES FOR SEDIMENT TRAPS:

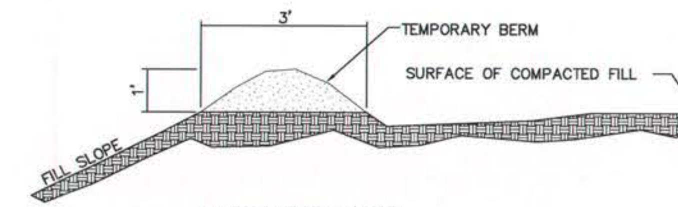
1. PLACE SEDIMENT TRAPS AT LOCATIONS SHOWN ON THE PLANS OR AS DIRECTED BY THE OPERATOR.
2. IDENTIFY THE STORAGE CAPACITY OF EACH SEDIMENT TRAP IN THE PROJECT PLAN SET.
3. CONSTRUCT TRAP LENGTH TWICE AS LONG AS THE WIDTH.
4. MAINTAIN A PROPERLY FUNCTIONING SEDIMENT TRAP THROUGHOUT CONSTRUCTION OR UNTIL DISTURBED AREAS CONTRIBUTING TO THE BASIN HAVE BEEN PAVED OR SEEDED AND MULCHED.
5. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA APPROVED BY THE OPERATOR. STABLE AREA MAY BE LOCATED UP GRADIENT WITHIN THE DRAINAGE AREA FOR THE BASIN BEING CLEARED OUT AS TO MINIMIZE NET LOSS OF SOILS WITHIN THAT DRAINAGE AREA.
6. 9" RIPRAP LAYER WILL BE TWO TIMES THE 9" RIPRAP FOR LOWER FLOWS, AND INCREASE IN THICKNESS AS FLOW INCREASES.

SLOPE DRAIN AND TEMPORARY BERM



SLOPE DRAIN SECTION





TEMPORARY BERM

NOTES FOR TEMPORARY BERM:

1. COMPACT THE RIDGE OF EXISTING SOIL TO PROVIDE A NON–ERODIBLE BERM THAT DIVERTS STORM RUNOFF FROM RECENTLY CONSTRUCTED SLOPES. REPAIR ANY EROSION OF THE BERM IMMEDIATELY.
2. TEMPORARY BERMS ARE TYPICALLY USED IN CONJUNCTION WITH SLOPE DRAINS.

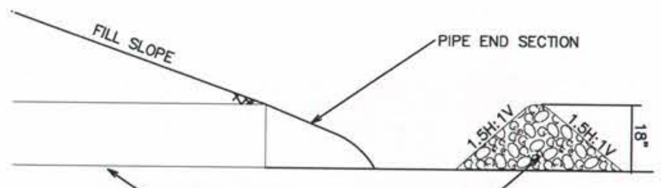
NOTES FOR SLOPE DRAIN:

1. COMPACT THE SOIL SURFACE AND BERMS AROUND THE ENTRANCE TO THE PIPE END SECTION TO PREVENT WATER FROM UNDERMINING THE PIPE AND ERODING THE SLOPE. REPAIR ANY EROSION AROUND THE INLET, OUTLET OR SLOPE IMMEDIATELY.
2. SECURE THE PIPE TO THE GROUND EVERY 20' TO PREVENT PIPE MOVEMENT AND SUBSEQUENT FAILURES DURING STORM EVENTS.
3. USE WATER–TIGHT FITTINGS AT ALL SLOPE DRAIN CONNECTIONS.
4. EXTEND THE SLOPE DRAIN AS REQUIRED TO COINCIDE WITH THE HEIGHT OF THE EMBANKMENT.
5. EXTEND THE DRAIN A MINIMUM OF 3' BEYOND THE TOE OF THE SLOPE AND PROVIDE OUTLET PROTECTION.
6. 50 PERCENT OF THE RIPRAP TO BE BETWEEN 6" AND 8" WITH A MAXIMUM SIZE OF 12" AND A MINIMUM SIZE OF 4".
7. IF A SEDIMENT TRAP CANNOT BE CONSTRUCTED AT THE PIPE OUTLET PROVIDE A SEDIMENT TRAPPING DEVICE BEFORE THE PIPE INLET.
8. MAINTAIN SLOPE DRAINS UNTIL SLOPES HAVE BEEN PERMANENTLY STABILIZED. REMOVE SLOPE DRAINS AS DIRECTED BY THE OPERATOR.

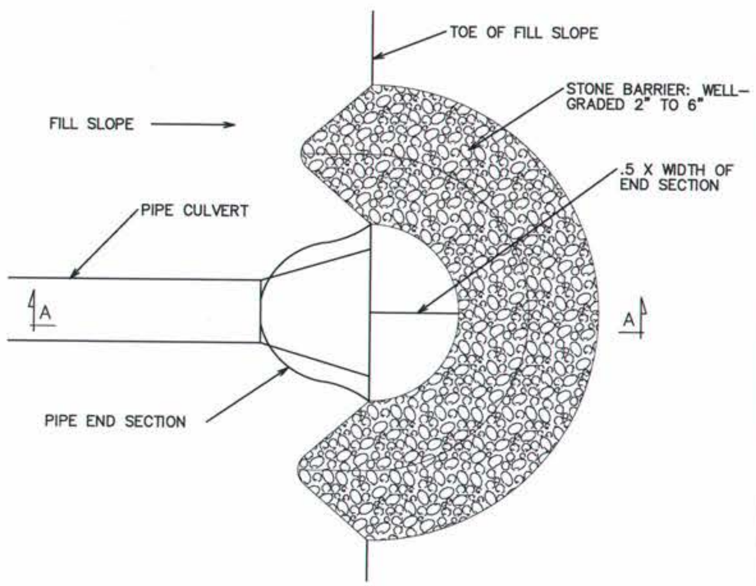
*PLACEMENT OF BMPs WILL BE DETERMINED AT TIME OF CONSTRUCTION

Title: Typical Erosion Control Details (BMPS) Sheet 1 of 2	
Bruin Point Mine DOGM Permit Application	Proj No: 24585638
	Figure: 10A
American Sands Energy Corp	Date: FEB 2015
	URS

PIPE INLET BARRIER



SECTION A–A



PLAN VIEW

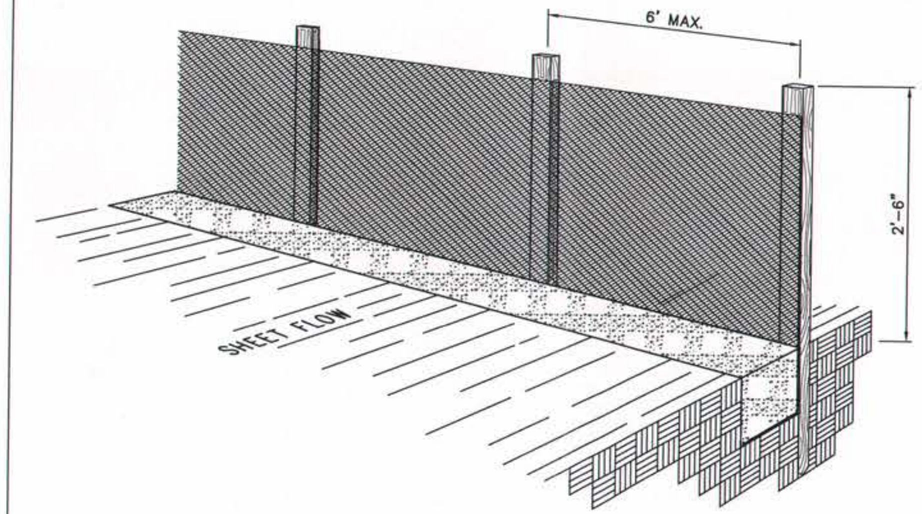
NOTES FOR PIPE INLET BARRIER:

1. PLACE PIPE INLET BARRIERS AT LOCATIONS SHOWN ON THE PLANS OR AS DIRECTED BY THE OPERATOR.
2. MAINTAIN A PROPERLY FUNCTIONING SEDIMENT BARRIER THROUGHOUT CONSTRUCTION.
3. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA APPROVED BY THE OPERATOR.
4. WHEN SURROUNDING AREAS HAVE BEEN SEEDED AND MULCHED, REMOVE THE STONE BARRIER BY SPREADING THE STONE ALONG THE CUT DITCH.
5. AN 18" MINIMUM DIAMETER FIBER ROLL MAY BE USED AS A SUBSTITUTE FOR THE STONE BARRIER.

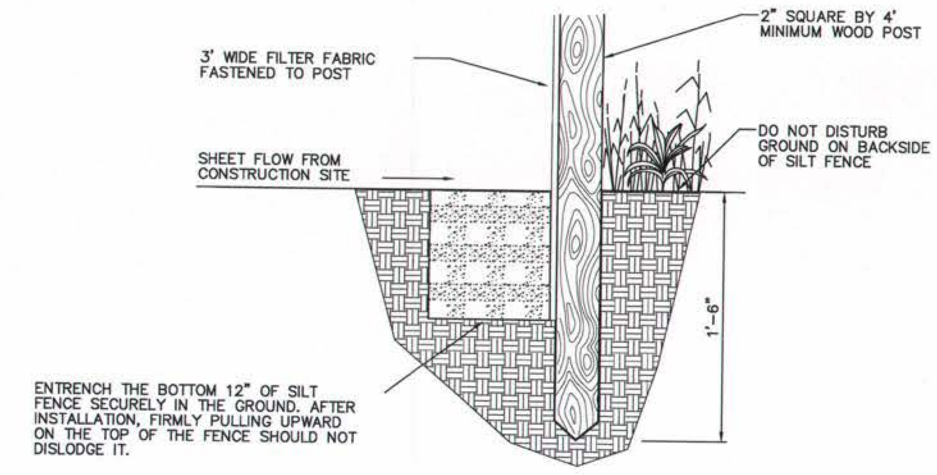
NOTES FOR CHECK DAMS:

1. PLACE A CHECK DAM AT EVERY TWO–FOOT DROP IN ELEVATION ALONG THE CUT DITCH.
2. A 9" TO 12" DIAMETER FIBER ROLL CAN BE USED IN PLACE OF THE 18" ROLL PROVIDED A ROLL IS INSTALLED AT EVERY ONE-FOOT DROP IN ELEVATION ALONG THE CUT DITCH.
3. PLACE CHECK DAMS PERPENDICULAR TO THE FLOW LINE OF THE DITCH.
4. DO NOT PLACE CHECK DAMS ACROSS NATURAL STREAM BEDS.
5. DO NOT USE STONE CHECK DAMS WITHIN CLEAR ZONES.
6. CONSTRUCT CHECK DAMS SO THAT WATER DOES NOT FLOW AROUND THE ENDS OF THE DAM.
7. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA AS DIRECTED BY THE OPERATOR.
8. AFTER SURROUNDING AREAS HAVE BEEN SEEDED AND MULCHED, SPREAD ROCK FROM CHECK DAMS TO LINE THE CUT DITCH AND BREAK APART FIBER ROLLS AND SPREAD THE STRAW OVER SEEDED AREAS.

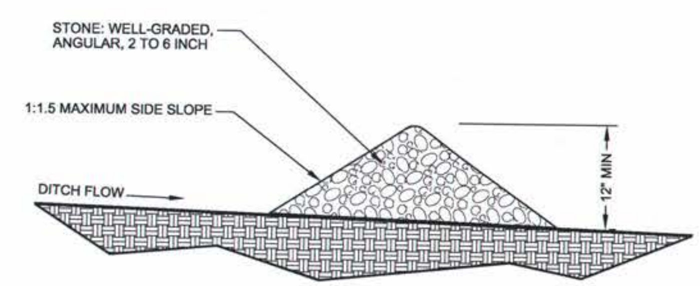
SILT FENCE



PERSPECTIVE VIEW

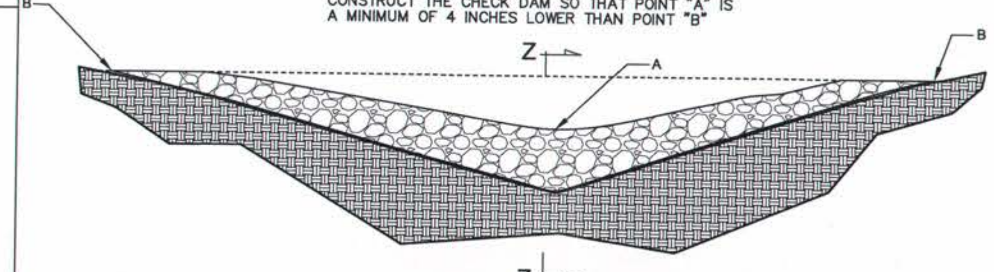


SECTION



SECTION Z - Z

CONSTRUCT THE CHECK DAM SO THAT POINT "A" IS A MINIMUM OF 4 INCHES LOWER THAN POINT "B"



STONE CHECK DAM

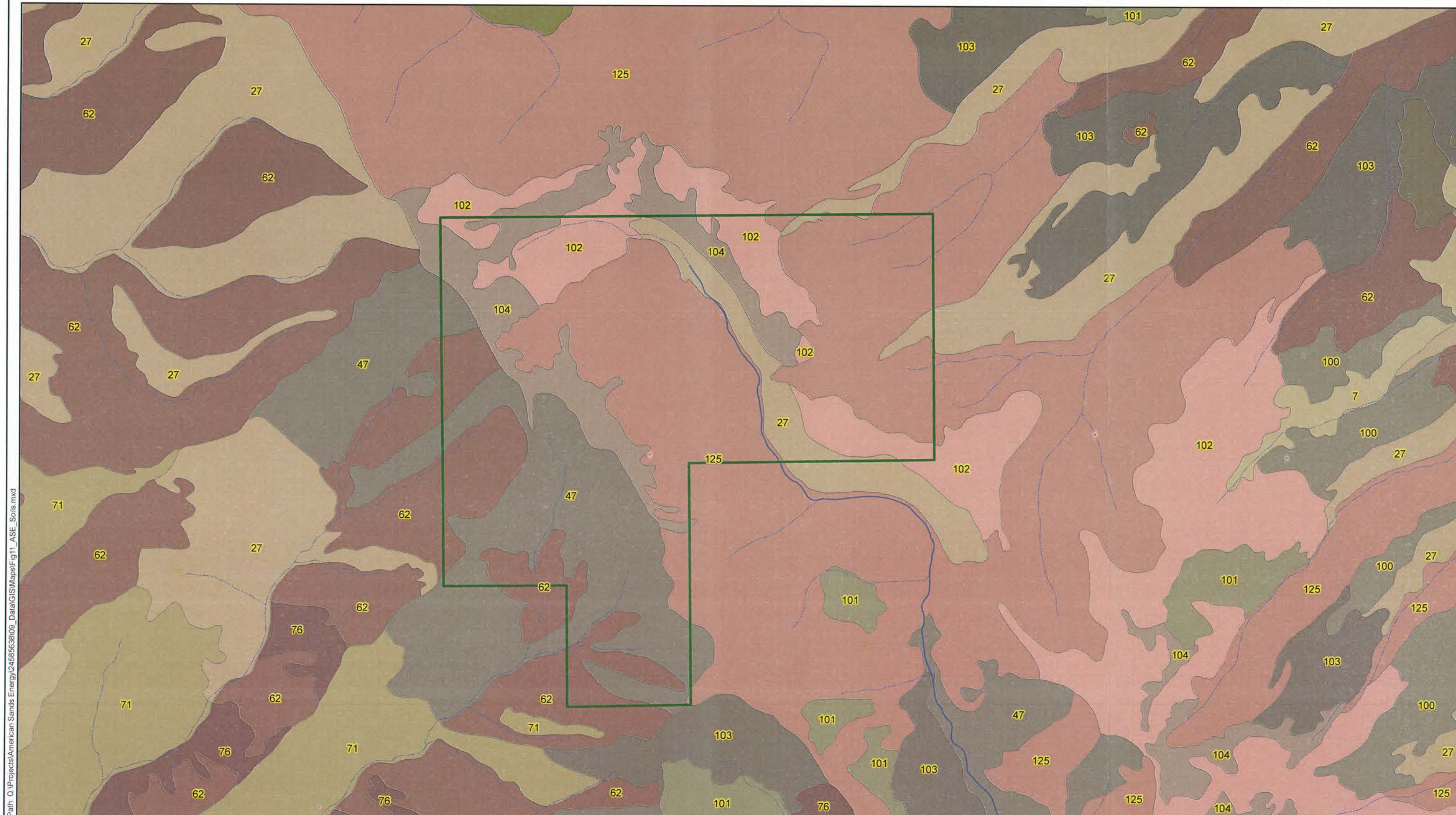
NOTES FOR SILT FENCE:

1. WHERE PERMITTED, POSITION THE SILT FENCE 5' BEYOND THE TOE OF SLOPE.
2. TO AVOID CREATING LOW POINTS ALONG THE SILT FENCE, ALIGN THE FENCE ALONG THE CONTOUR AS MUCH AS POSSIBLE. WHERE EXCESSIVE RUNOFF WILL ACCUMULATE AT A LOW POINT, PROVIDE AN OPENING IN THE FENCE AND INSTALL A SEDIMENT TRAP.
3. WHEN EXCAVATING THE TRENCH, USE MACHINERY THAT WILL MINIMIZE DISTURBANCE.
4. TO PREVENT RUNOFF FROM FLOWING AROUND THE ENDS OF THE SILT FENCE, RUN THE ENDS OF THE FENCE UP SLOPE.
5. DO NOT PLACE SILT FENCE ACROSS POTENTIAL CONCENTRATED FLOWS (e.g., PIPE OUTLETS, DRAINAGE CHANNELS, CUT DITCHES).
6. AVOID USING SPLICES ALONG THE FENCE AS MUCH AS POSSIBLE. IF A SPLICE IS NECESSARY, BEFORE POUNDING IN THE END POSTS, OVERLAP THE END POSTS AND TWIST 180 DEGREES.
7. MAINTAIN A PROPERLY FUNCTIONING SILT FENCE THROUGHOUT THE DURATION OF THE PROJECT OR UNTIL DISTURBED AREAS HAVE BEEN VEGETATED.
8. WHEN A STORM EVENT DEPOSITS SEDIMENT BEHIND THE FENCE, REMOVE THE SEDIMENT AND PLACE IT IN A STABLE AREA APPROVED BY THE OPERATOR.
9. IN AREAS THAT HAVE BEEN SEEDED AND MULCHED, REMOVE SILT FENCE UNLESS THEY ARE PROTECTING A WETLAND OR WATER BODY.
10. SILT FENCE INSTALLATION AS SPECIFIED BY THE MANUFACTURER.
11. SILT FENCE WILL BE MAINTAINED ON AN ONGOING BASIS.

*PLACEMENT OF BMPs WILL BE DETERMINED AT TIME OF CONSTRUCTION

Title: Typical Erosion Control Details (BMPS) Sheet 2 of 2	
Bruin Point Mine DOGM Permit Application	Proj No: 24585638
	Figure: 10B
American Sands Energy Corp	Date: FEB 2015
	URS

Path: Q:\Projects\American Sands Energy\24585638\09_Data\GIS\Maps\Fig11_ASE_Soils.mxd



Perennial Stream	
Intermittent Stream	
Lease Boundary	

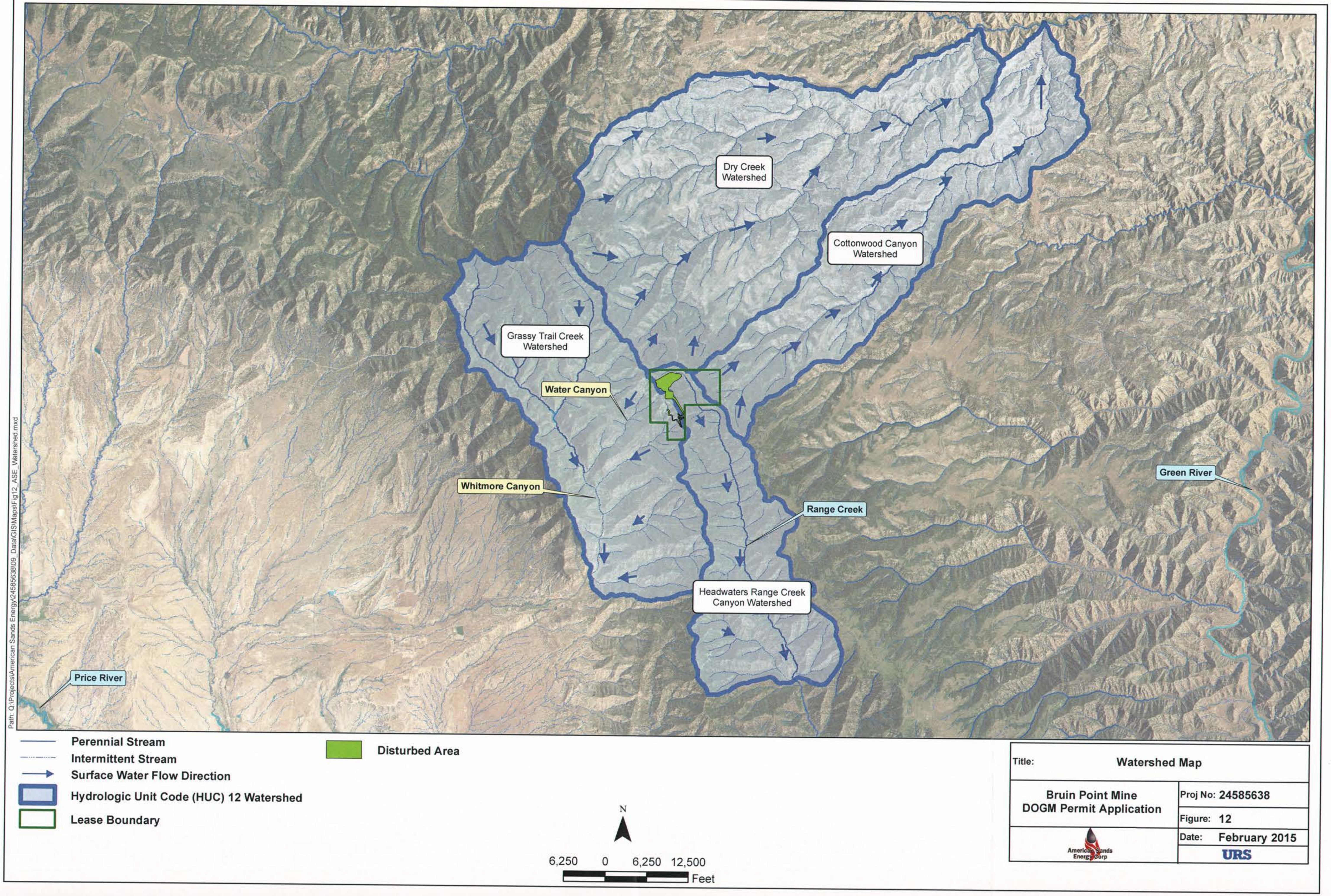
Unit	Description
27	Doney family-Podo complex
47	Guben-Rock outcrop complex
62	Hernandez family, 3 to 8 percent slopes
71	Pathead extremely bouldery fine sandy loam, 40 to 70 percent slopes
76	Perma family-Datino complex
100	Senchert loam, 3 to 15 percent slopes
101	Senchert loam, 30 to 50 percent slopes
102	Senchert-Senchert family complex
103	Senchert-Toze family complex
104	Senchert family, 3 to 15 percent slopes
125	Uinta-Toze families complex

Soil Data Source: NRCS, http://soildatamart.nrcs.usda.gov/ssurgometadata.aspx

N

1,000 0 1,000 2,000 Feet

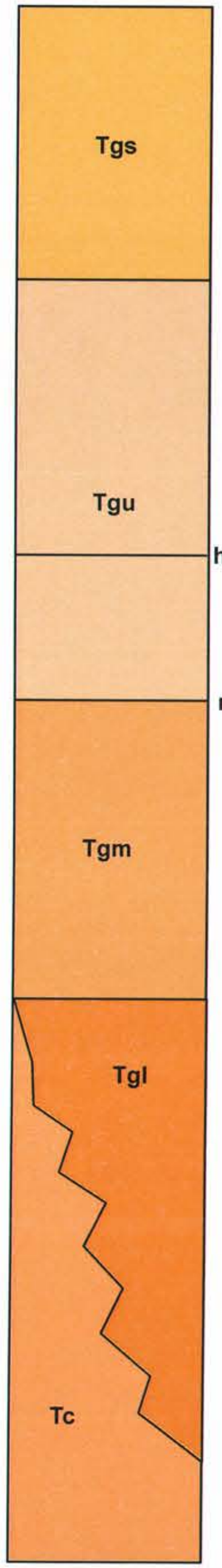
Title:	Soil Map Unit Designation
Bruin Point Mine DOGM Permit Application	Proj No: 24585638
	Figure: 11
American Sands Energy Corp	Date: February 2015
	URS



Path: Q:\Projects\American Sands Energy\24585638\09_Data\GIS\Maps\Fig12_ASE_Watershed.mxd
Dry Creek Watershed
Cottonwood Canyon Watershed
Grassy Trail Creek Watershed
Water Canyon
Whitmore Canyon
Range Creek
Headwaters Range Creek Canyon Watershed
Green River
Price River
Perennial Stream
Intermittent Stream
Surface Water Flow Direction
Hydrologic Unit Code (HUC) 12 Watershed
Lease Boundary
Disturbed Area
N
6,250 0 6,250 12,500
Feet
Title: Watershed Map
Bruin Point Mine
DOGM Permit Application
Proj No: 24585638
Figure: 12
Date: February 2015
American Sands Energy Corp
URS

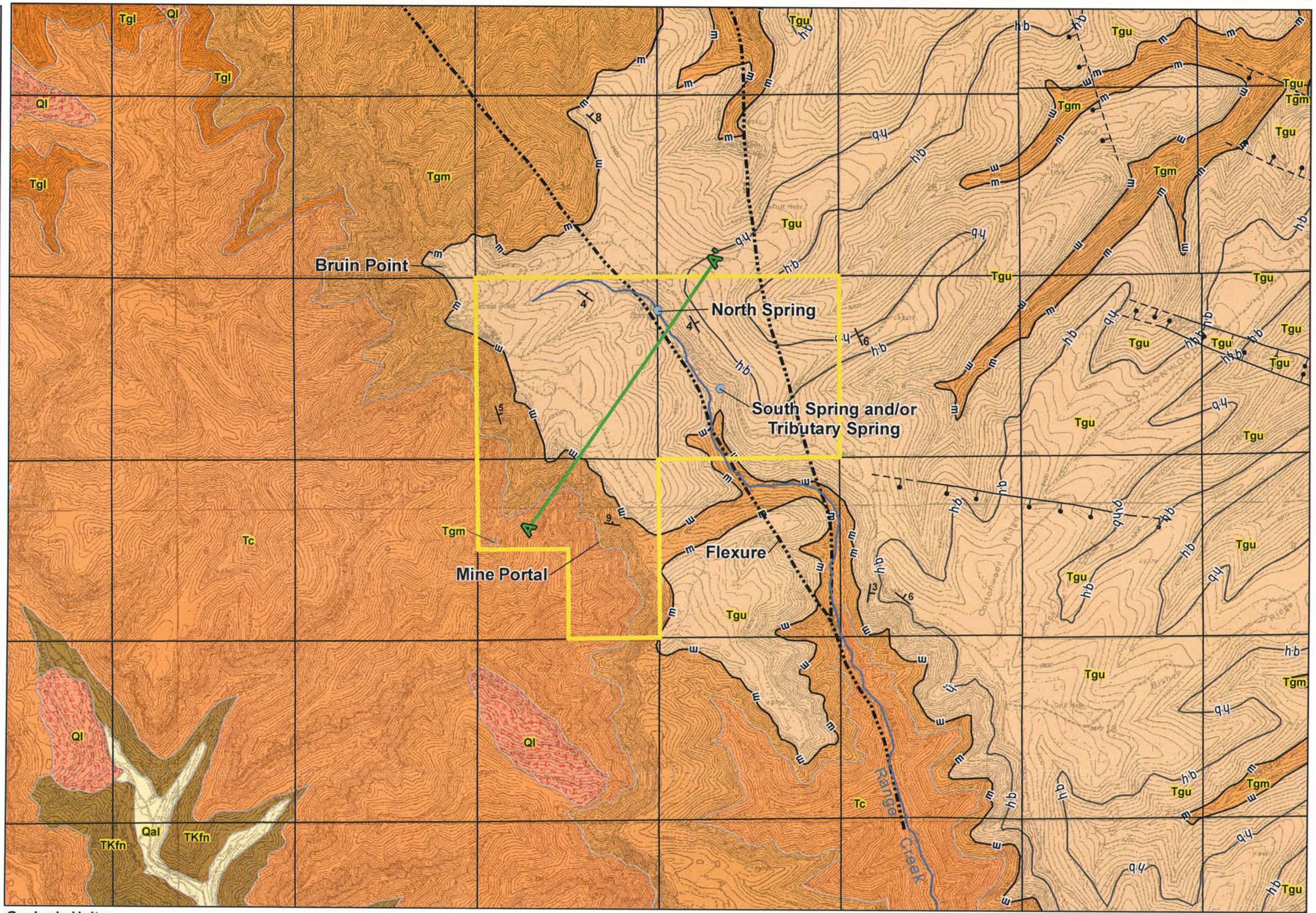
Path: Q:\Projects\American Sands Energy\24585638\09_Data\GIS\Maps\Fig13_ASE_Geology.mxd

Typical Site Stratigraphic Column



hb Horsebench Sandstone Bed
m Top of Mahogany Bed

Reference: Geologic map and stratigraphic column complied from Regional Map Sunnyside, Tar Sands, Carbon County, Utah, 1990. Calkin, WM. S. and Geologic map of Price 30'x60' quadrangle Carbon, Duchesne, Uinta, Utah, and Wasatch counties, Utah, 1990. Weiss, M. P., Witkind, C. J., and Cashion, W. K., USGS 1-1981



Geologic Units

- Qal — Alluvium
- Ql — Landslide deposits
- Tgu — Upper member of the Green River Formation
- Tgm — Middle member of the Green River Formation
- Tgl — Lower member of the Green River Formation
- Tc — Colton Formation
- TKfn — Flagstaff Limestone and North Horn Formation

Spring

Fault
Dashed where approximately located, ball rests on downthrown block

Contact - Approximately Located or Inferred
m — Top of Mahogany Bed
hb — Horsebench Sandstone Bed

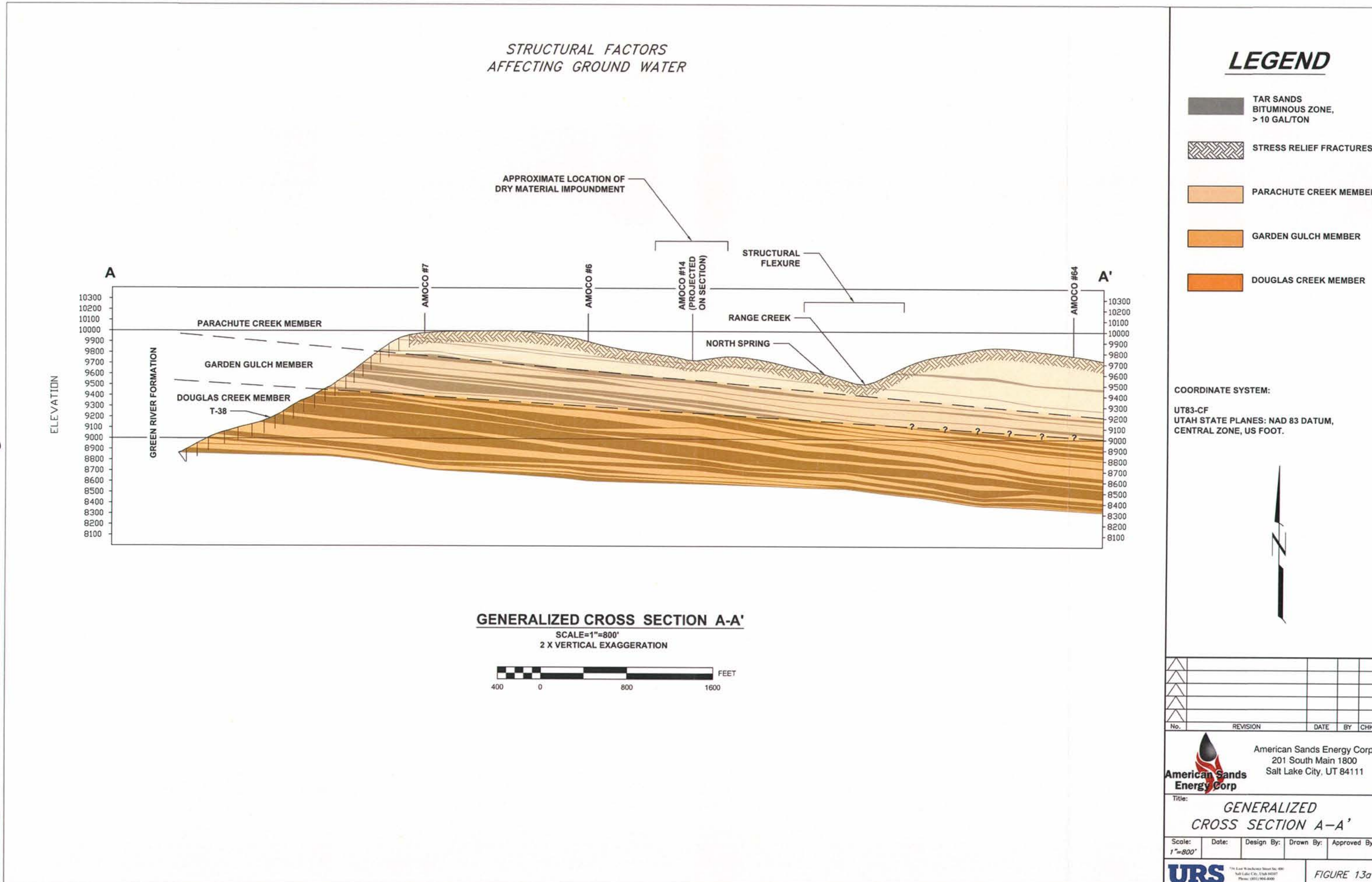
Strike and Dip

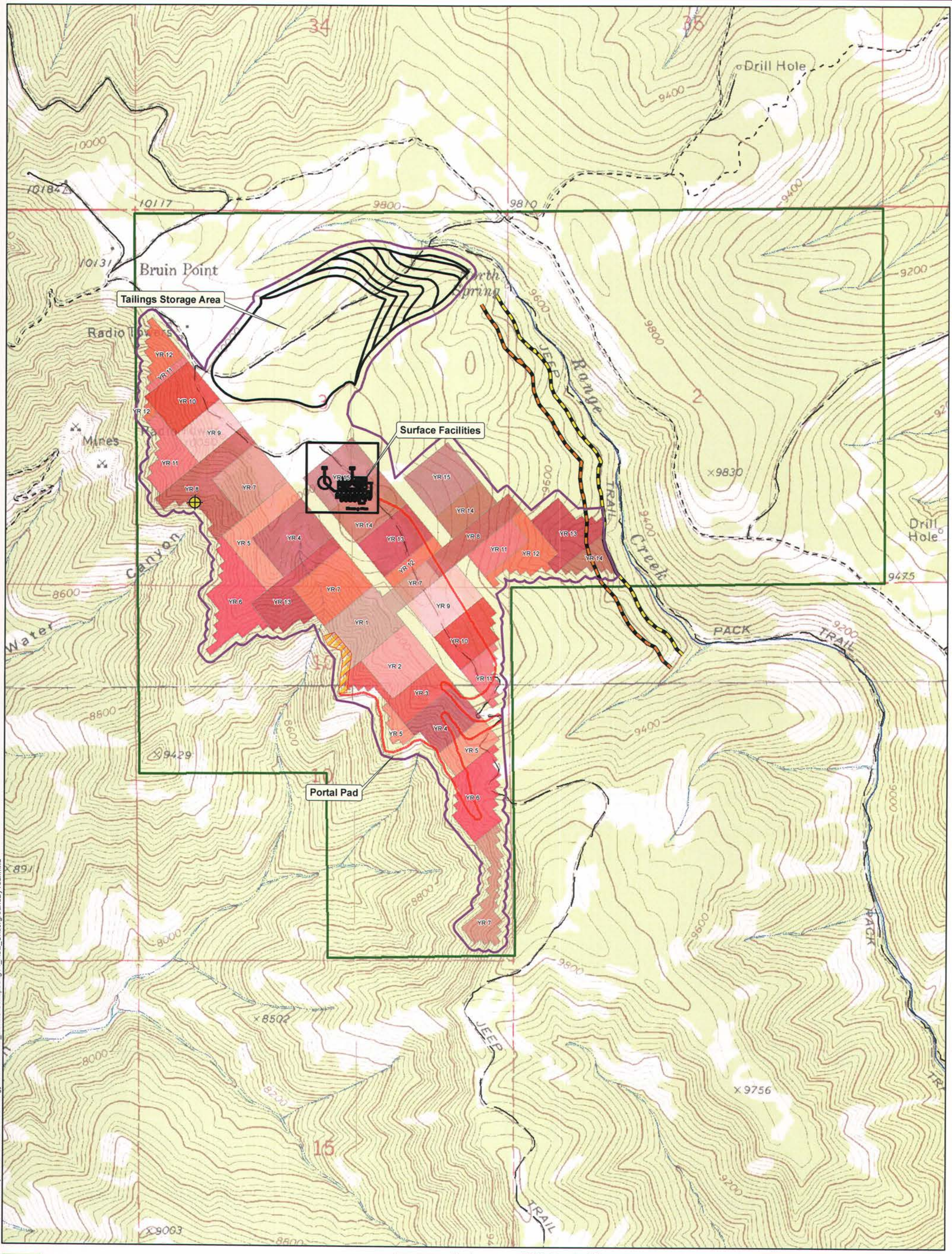
Lease Boundary

N

1,500 0 1,500 3,000 Feet

Title:	Natural Surface Geologic Map
Bruin Point Mine DOGM Permit Application	Proj No: 24585638
	Figure: 13
American Sands Energy Corp	Date: February 2015
	URS


STRUCTURAL FACTORS
AFFECTING GROUND WATER
APPROXIMATE LOCATION OF
DRY MATERIAL IMPOUNDMENT
STRUCTURAL
FLEXURE
A
A'
AMOCO #7
AMOCO #6
AMOCO #14
(PROJECTED
ON SECTION)
AMOCO #64
RANGE CREEK
NORTH SPRING
PARACHUTE CREEK MEMBER
GARDEN GULCH MEMBER
DOUGLAS CREEK MEMBER
T-38
GREEN RIVER FORMATION
ELEVATION
10300
10200
10100
10000
9900
9800
9700
9600
9500
9400
9300
9200
9100
9000
8900
8800
8700
8600
8500
8400
8300
8200
8100
GENERALIZED CROSS SECTION A-A'
SCALE=1"=800'
2 X VERTICAL EXAGGERATION
400
0
800
1600
FEET
LEGEND
TAR SANDS
BITUMINOUS ZONE,
> 10 GAL/TON
STRESS RELIEF FRACTURES
PARACHUTE CREEK MEMBER
GARDEN GULCH MEMBER
DOUGLAS CREEK MEMBER
COORDINATE SYSTEM:
UT83-CF
UTAH STATE PLANES: NAD 83 DATUM,
CENTRAL ZONE, US FOOT.
N
No.
REVISION
DATE
BY
CHKD
American Sands Energy Corp
American Sands Energy Corp.
201 South Main 1800
Salt Lake City, UT 84111
Title:
GENERALIZED
CROSS SECTION A-A'
Scale:
1"=800'
Date:
Design By:
Drawn By:
Approved By:
URS
FIGURE 13a



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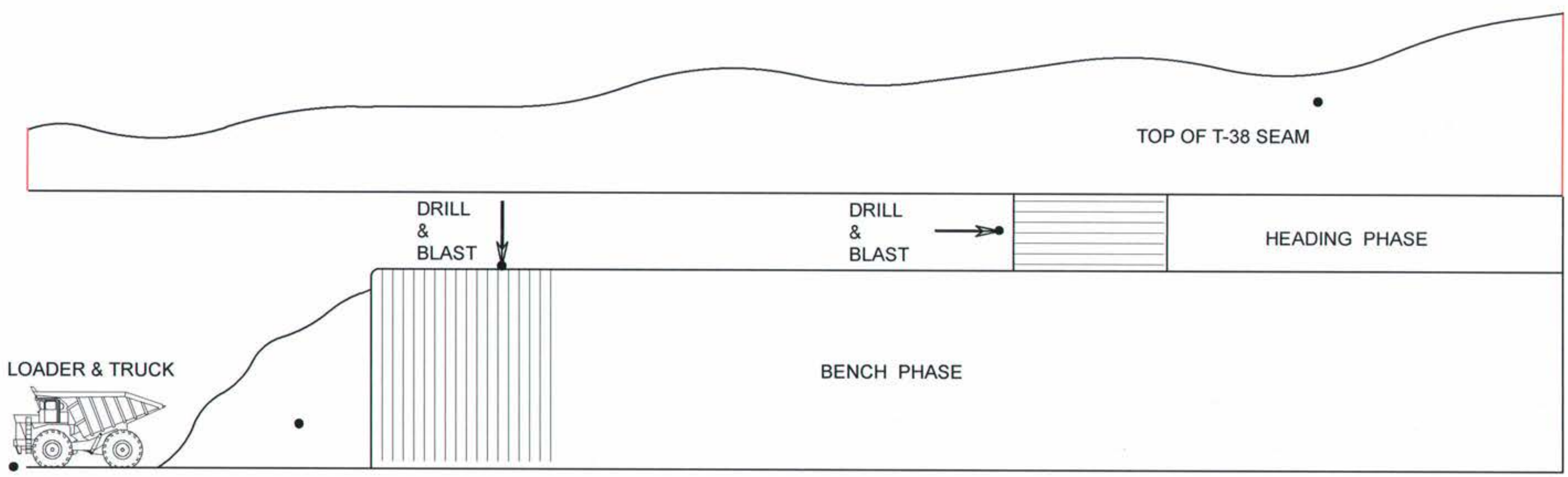
Lease Boundary
Mine Haul Road
Perennial Stream
Intermittent Stream
Mine Vent
Land Affected
Top Soil Removal
Portal Pad
Improved Road
Dirt Road
Road (Conditions Unknown)
YR ** Underground Mining by Year (Approx. 400 Acres)
250' Adequate Buffer from Range Creek
500' Adequate Buffer from Range Creek

N

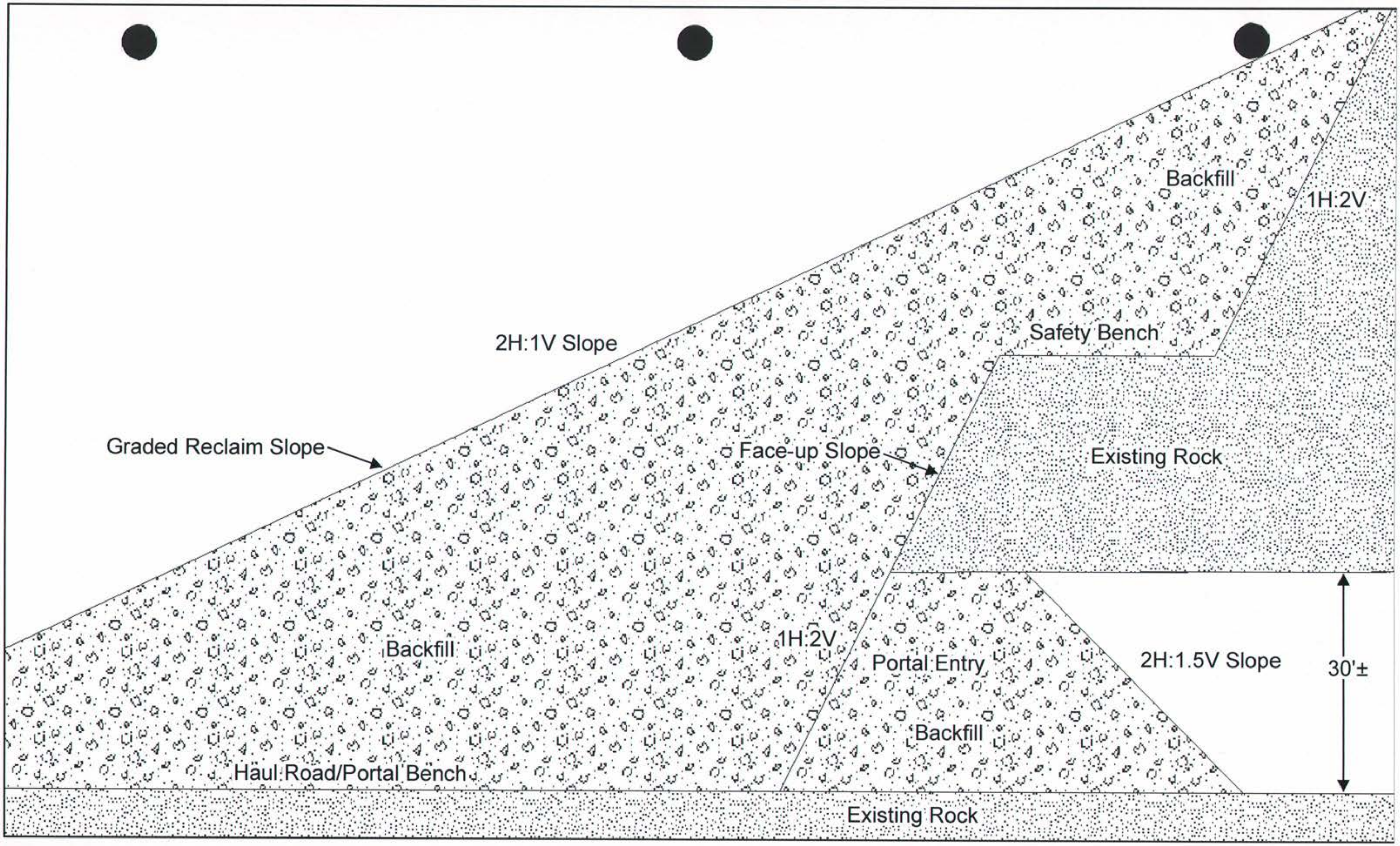
625 0 625 1,250 Feet

Title: Underground Mine Plan Map by Year	
Bruin Point Mine DOGM Permit Application	Proj No: 24585638
	Figure: 14
American Sands Energy Corp	Date: February 2015
	URS



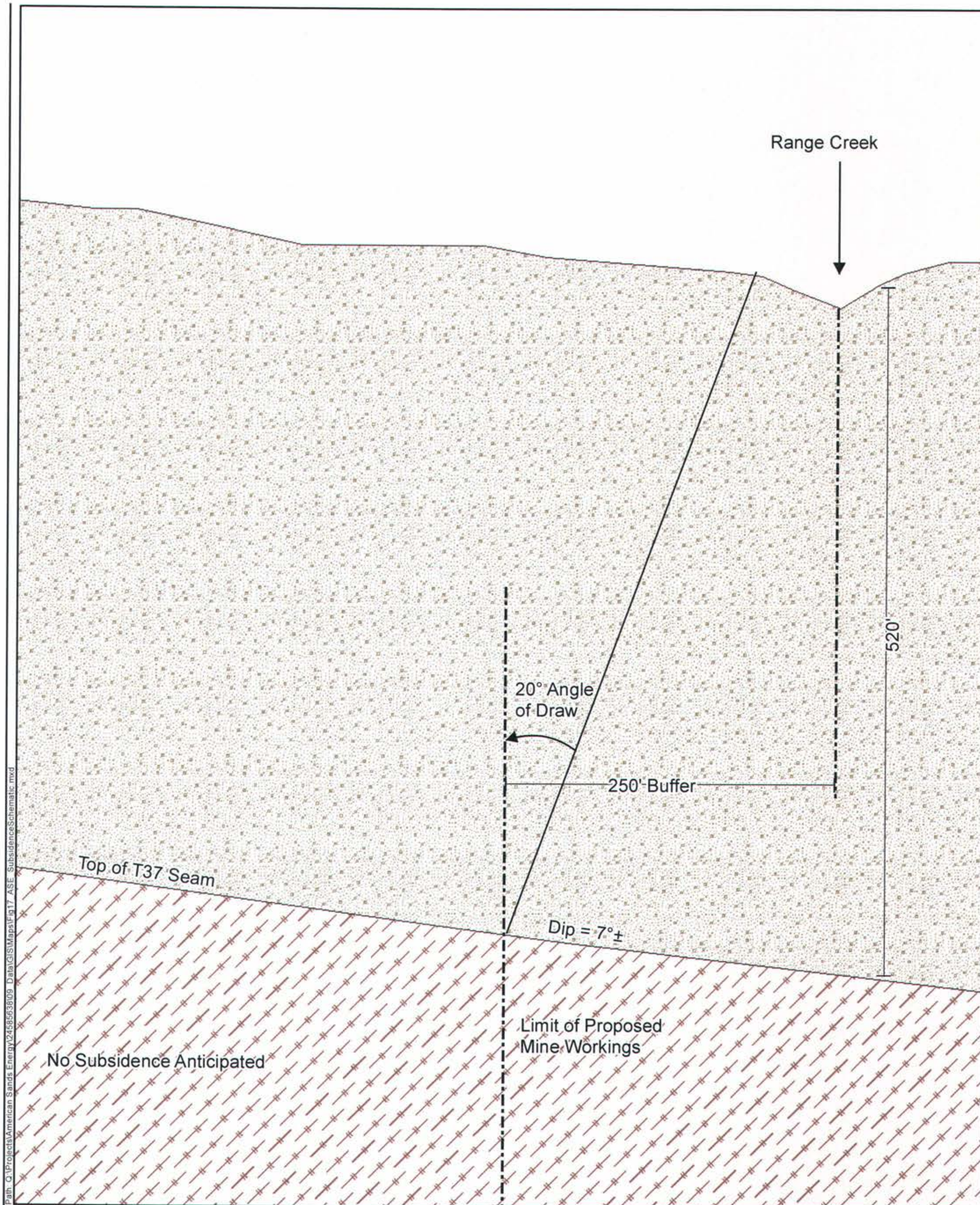
Not to Scale

Title: Typical Mining Sequence	
Bruin Point Mine DOGM Permit Application	Proj No: 24585638 Figure: 15
American Sands Energy Corp	Date: May 2014 URS



1 in = 20 ft

Title:	Typical Portal Entry Closure	
Bruin Point Mine DOGM Permit Application	Proj No: 24585638	
	Figure: 16	
American Sands Energy Corp	Date: February 2015	
	URS	



1 in = 100 ft

50 0 50 100 Feet

Title: **Subsidence Schematic**	
Bruin Point Mine **DOGM Permit Application**	Proj No: **24585638**
	Figure: **17**
American Sands Energy Corp	Date: **February 2015**
	URS

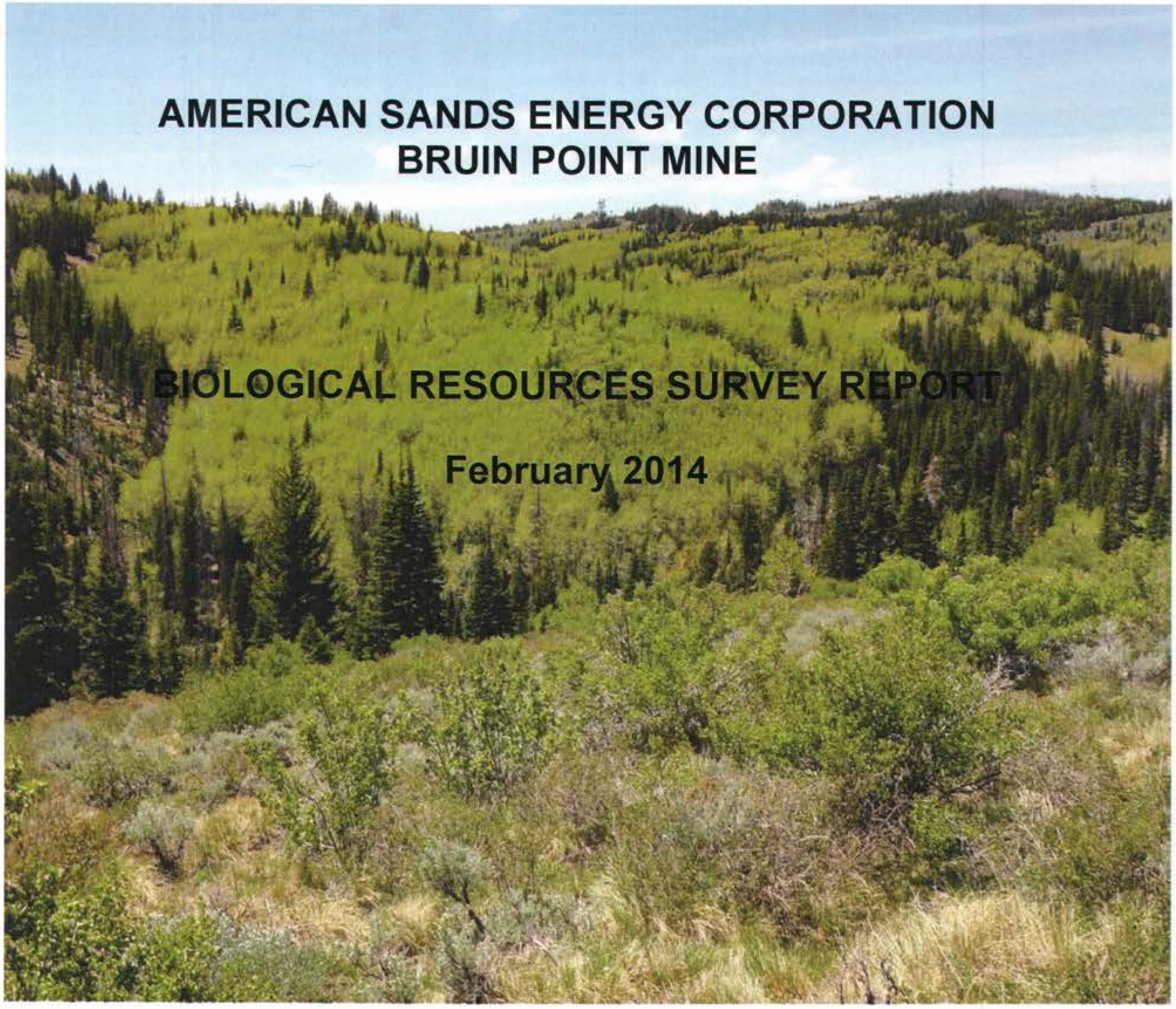
APPENDIX A

Biological Resources Survey Report and Raptor Survey Report

AMERICAN SANDS ENERGY CORPORATION
BRUIN POINT MINE

BIOLOGICAL RESOURCES SURVEY REPORT

February 2014



American Sands Energy Corporation
4760 South Highland Drive, Suite 341
Salt Lake City, Utah 84117
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Report Prepared by:

JBR Environmental Consultants, Inc.
8160 South Highland Drive
Sandy, Utah 84093

(801) 943-4144

Table of Contents

American Sands Energy Corporation
Proposed Bruin Point Mine
Biological Survey Report

Introduction

This report has been prepared to support the Notice of Intention (NOI) by American Sands Energy Corporation (ASEC) to commence large mining activities, to be submitted for review to the Utah Division of Oil, Gas and Mining (DOGM).

Under the Utah regulations for large mining operations (R647-4-106.7), the operations plan in the NOI must provide a description of existing vegetative communities and cover levels, sufficient to establish revegetation success standards at 70 percent of pre-mining vegetative cover.

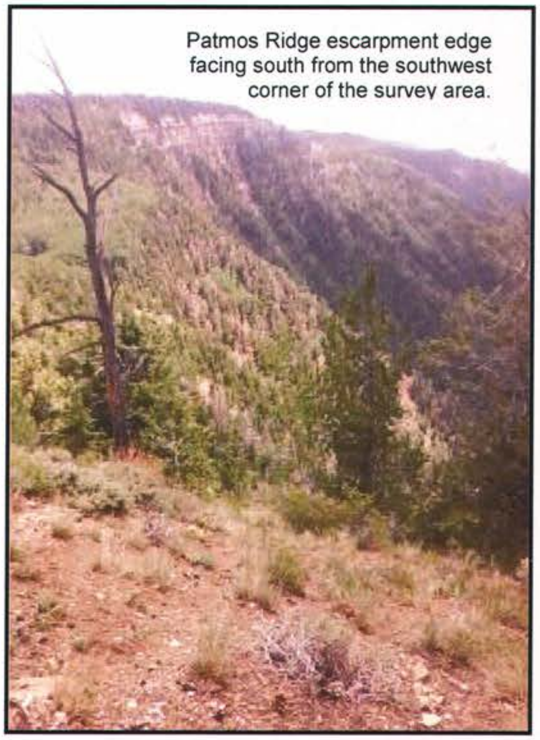
The proposed ASEC project area is located approximately five miles northeast of Sunnyside, Utah, in Carbon County, on Patmos Ridge just south of Bruin Point (located at 39° 38' 38.87"N, 110° 20' 53.06"W). It is accessed by Carbon County's Whitmore Canyon Road and Water Canyon Road. The ASEC project area encompasses Sections 2, 3, and the N½ and SE¼ of Section 10, Township 14S Range 14E (**Figure 1, Appendix A**).

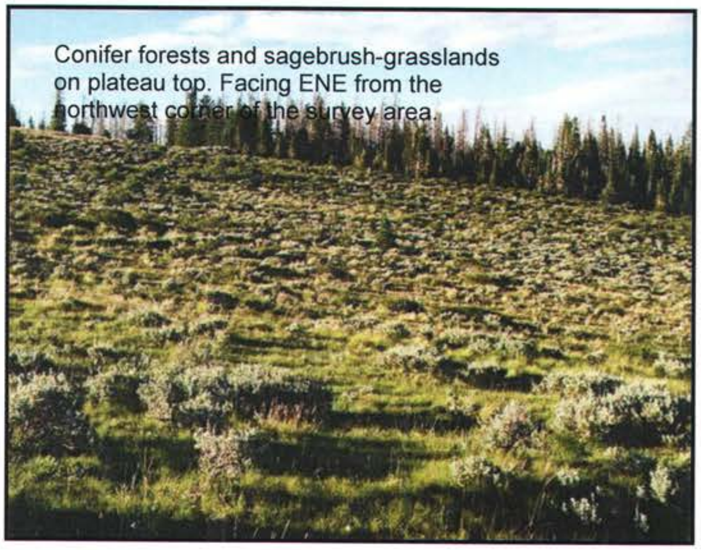
The "survey area" for biological resources is contained within the project area and includes, roughly, the W½ of Section 2, most of Section 3, and the E½ NE¼ of Section 10. The survey area is shown on **Figure 1** in **Appendix A**, and described below.

Survey Area General Description

Landform and Vegetation

The survey area is located between 9,000 and 10,040 feet above mean sea level at the boundary between the Wasatch and Uinta Mountains and the Colorado Plateaus Ecoregions. As shown in the photo below, the plateau on which the survey area is located is dominated by mixed conifer forests (mostly Engelmann spruce [*Picea engelmanii*] and sub-alpine fir [A*bies lasiocarpa*]), open grassland-shrublands, and occasional aspen (*Populus tremuloides*) stands. Some previously logged areas are currently dominated by grasses.


Patmos Ridge escarpment edge facing south from the southwest corner of the survey area.


Conifer forests and sagebrush-grasslands on plateau top. Facing ENE from the northwest corner of the survey area.

As shown in the photo above, the south and west side of the survey area drops steeply off the plateau into the headwaters of Water Canyon, which drains into Whitmore Canyon (**Figure 1, Appendix A**) above the town of Sunnyside, UT and eventually to the Price River. This very steep and generally west-facing escarpment rises roughly 3,500 feet above the canyon floor.

Geology

The survey area is within the Green River Formation. The upper member (Tgu – on plateau), containing the Mahogany and Horse Bench beds, and middle member (Tgm – on upper escarpment) are present within the survey area (UGS 2012).

Soils

Soils within the survey area are comprised predominantly of the Senchert family, which is associated with natural grassland areas, and the Uintah-Toze families complex, which is associated with the naturally wooded areas of the survey area (NRCS 2009). Soil type boundaries are shown on **Figure 2** in **Appendix A**.

The Senchert family soils are found on plateaus and ridges and are generally 20 to 40 inches deep. Parent material is derived from colluvium and slope alluvium over residuum weathered from sandstone and shale. Soils are well-drained and organic matter is as high as eight percent. The soils are in the High Mountain Loam (Thurber fescue) ecological site (R048AY515UT) (NRCS 2009).

The Uinta-Toze families complex soils are generally 40 to 60 inches or deeper. They are found on mountain slopes of 35 to 70 percent. Parent material of both soil families is derived from colluviums derived from sandstone, shale and siltstone. Soils are well-drained and organic matter is as high as eight percent. Both soil families are in the High Mountain Loam (Engelmann spruce) ecological site (R048AY532UT) (NRCS 2009).

Water

The headwaters of Range Creek, which flows near the eastern boundary of the survey area (**Figure 1, Appendix A**), and eventually into the Green River, are located within the project area boundary. However, Range Creek is not within the area proposed for surface disturbance.

Vegetation Survey - Methodology

Vegetation Community Overview

Prior to leaving for the field, a high-quality aerial photo was reviewed to identify general vegetation community areas. Three vegetation communities were differentiated using the aerial photo: mixed conifer (MC), aspen (Asp), and grass/shrub (GS). Once in the field, the photo was compared to actual field vegetation conditions by looking across the survey area from a high point near the project area's northwest corner (see "Overvw ENE" on **Figure 3** in **Appendix A**). It was determined that some areas that appeared to be mixed conifer in the photo included many aspen trees, thus forested areas were more mixed than the aerial photo suggested. For this reason, "mixed conifer/aspen" (MC/A) was added as a fourth vegetation community. "Steep slope" was added as a fifth community due to the unique mix of vegetation on these areas as observed from the high point.

Vegetation Community Sampling

JBR Botanist Leanna Ballard and Biologist Marit Sawyer collected vegetation data on July 25 and 26, 2012 at the ASEC survey area. A combination of 100-foot transects, 20-foot diameter circle plots, and photo points were used to characterize vegetation in the survey area. The 100-foot transects were used to measure cover in open areas. Some of these areas had been previously logged and had regenerated to grass or shrub cover. The 100-foot transects were also used to measure cover under open aspen stands and on steep side-slopes located just below (west of) the escarpment edge of Patmos Ridge. The 20-foot diameter circle plots were used to characterize areas of thick, mixed-conifer or mixed-conifer-aspen forest that contained little to no understory growth. The circle plots also provided information on the size and density of trees. In addition to the data collected from walking transects and circle plots, photos were taken within the survey area to add to the vegetation community characterizations.

The locations of each transect, circle plot, and photo point are shown on **Figure 3** in **Appendix A.** A list of all plant species observed in the survey area and references used to key plants out to species are contained in **Appendix B**. All photos taken in the survey area are contained in **Appendix C**.

Determining sampling locations

Based on the aerial photo and observing the survey area from a high point, general sampling areas were identified and marked onto the aerial photo so that all vegetation types would be sampled. Exact sampling locations were determined on the ground by driving/walking to the general sampling areas (using the aerial photo as a map). When a general sampling area was reached, a random number between 1 and 100 and a random direction were selected. Surveyors walked that prescribed number of steps in the prescribed direction to the sampling area, which was a 100-foot transect or 20-foot diameter circle, depending on the vegetation community. Due to the open, grassy character of previously logged areas of Douglas-fir, transect data was collected from areas that were previously logged.

In total within the survey area, sixteen 100-foot transects were sampled (six in aspen communities; eight in grass-shrub communities; two on steep slopes) and four circle plots were sampled (three in mixed conifer communities; one in a mixed conifer/aspen community). Eight additional photo points were taken: two in mixed conifer communities, two in mixed conifer/aspen communities, two in previously logged areas, and two at high-elevation forest/grassland interface.

100-foot transects

A 100-foot tape was stretched in a random direction and an observation was made at 5-foot intervals so that 20 observations were made per transect. Only 19 observations were made at one transect (GS-1). Observations were recorded as being rock, bare ground, litter (including logs), or vegetation. Vegetation was recorded as grass, forb, or shrub/tree. Vegetation cover was determined by dividing the number of "vegetation" (grass, forb, or shrub/tree) observations out of the 20 total. Genus and/or species was recorded whenever possible. All unknown plant samples were collected and identified later (sources in **Appendix B**). A GPS point was collected at one end of each transect. Transect photos are included in **Appendix C**. Original data sheets are provided in **Appendix D**.

Circle plots

A tape was extended from a centerpoint to 10 feet and the observer walked in a circle with tape extended. All trees located within this 20-foot diameter circle were recorded by species, estimated diameter at breast height (dbh) if 4 inches in diameter or larger, and estimated height if over 4 feet tall. General observations of understory species were recorded. Vegetation cover was not estimated within circle plots because in general, circle plots (i.e., densely forested areas) contained little understory vegetation. A GPS point was collected at the center of each circle plot and photos were taken in the four cardinal directions (contained in **Appendix C**).

Photo points

Photographs were taken in a number of locations within the survey area to capture characteristics of the vegetation where transects or circle plots were deemed impractical or redundant. Photo points were used instead of circle plots within four forested sampling locations: two within mixed conifer and two within mixed conifer/aspen. Photos were also taken to capture notable landscape features found within the survey area, such as Range Creek (Photos 51-53, **Appendix C**). Between one and four photos were taken at each photo point location. A GPS point was collected at each photo point location, with the exception of two overview photos taken north of transect GS-2, taken to characterize a portion of the survey area where access was impractical (the southeast corner of the survey area). All photos are contained in **Appendix C**.

Vegetation Survey - Findings

Vegetation Community Overview

Final community boundaries were determined using the aerial photo, the survey area overview, and observations made on the ground. Final boundaries are displayed on an infrared background to highlight the visual appearance of forest vs. shrub/grass cover (**Figure 4** in **Appendix A**).

The most common understory species observed in the survey area (within transects) are listed in **Table 1**. Only species encountered in at least three different transects were included. Relative occurrence was determined by dividing the number of hits across all transects by the total number of hits across all transects of that vegetation type (shrub, forb, or grass). Overall, across 16 transects, nine shrub species, at least 24 forb species, and at least 18 grass species were encountered. **Appendix D** contains a more detailed account of species observed in each transect and their frequency.

Table 1: Common Understory Species along Transects in the Survey Area

Common name *Scientific name*	Total hits (all transects)	Relative occurrence within **type** (shrub, forb, or grass)	# transects encountered (out of 16)
SHRUBS	**42**		
Mountain snowberry *Symphoricarpos oreophillus*	13	31%	4
Mountain big sagebrush *Artemisia tridentata* var. *vasayana*	11	26%	3
Gooseberry currant *Ribes cerneum*	8	19%	3
FORBS	**71**		
Silvery lupine *Lupinus argenteus*	11	15%	5
Dandelion *Taraxacum officinale*	10	14%	6
Common yarrow	9	13%	5

Achillea millefolium			
Alpine leafybract aster *Symphyotrichum foliaceum* var. *foliaceum*	6	8%	3
GRASSES	**77**		
Mountain brome *Bromus carinatus* var. *marginatus*	11	14%	7
Kentucky bluegrass *Poa pratensis*	10	13%	3
Thurber fescue *Festuca thurberiana*	10	13%	3

Vegetation Community Sampling

<u>Aspen Communities</u>: These areas were open aspen stands with few to no conifer trees and an open, grassy understory. Average percent vegetation cover in the aspen community was 57 percent; cover ranged from 45 to 75 percent across the six transects (**Table 2**). Litter cover (= non vegetative) was 38 percent overall; bare ground accounted for five percent (**Table 2**). Transect locations are shown on **Figure 3** in **Appendix A**; photos of each transect are in **Appendix C**.

Table 2: Aspen Transect Data (# Hits) and Cover Calculations

Life Form	Asp-1	Asp-2	Asp-3	Asp- 4	Asp-5	Asp-6	Average (per transect)	Percent Cover (all transects)
Shrubs/trees	**2**	**5**	**5**	**4**	**3**	**0**	**3.17**	**16**
Forbs	**2**	**3**	**7**	**4**	**2**	**7**	**4.17**	**21**
Grasses	**8**	**5**	**3**	**1**	**5**	**2**	**4.00**	**20**
Litter	8	5	5	10	7	11	7.67	38
Rock	0	0	0	0	0	0	0.00	--
Bare Ground	0	2	0	1	3	0	1.00	5
TOTAL VEG HITS (out of 20)	12	13	15	9	10	9	11.33	100
Percent Vegetation Cover	**60**	**65**	**75**	**45**	**50**	**45**	**57**	

Grass-shrub Community: These areas were dominated by grasses, sagebrush, gooseberry currant, or snowberry, or a combination of these plants. Average percent vegetation cover in the grass-shrub community was 66 percent; percent cover ranged from 30 to 95 percent across the eight transects (**Table 3**). Litter cover accounted for 16 percent overall; rock or bare ground accounted for 17 percent (**Table 3**). Transect locations are shown on **Figure 3** in **Appendix A**; photos of each transect are in **Appendix C**.

Table 3: Grass-Shrub Transect Data (# Hits) and Cover Calculations

Life Form	GS- 1	GS-2	GS-3	GS-4	GS-5	GS-6	GS-7	GS-8	Average (per transect)	Percent Cover (all transects)
Shrubs/trees	**0**	**7**	**1**	**0**	**3**	**6**	**0**	**0**	**2.13**	**11**
Forbs	**1**	**9**	**4**	**5**	**1**	**4**	**6**	**7**	**4.63**	**23**
Grasses	**15**	**3**	**7**	**1**	**9**	**5**	**6**	**6**	**6.50**	**33**
Litter	3	1	5	2	4	5	3	3	3.25	16
Rock	0	0	0	11	3	0	1	0	1.88	9
Bare Ground	1	0	3	1	0	0	4	4	1.63	8
TOTAL VEG HITS	16	19	12	6	13	15	12	13	13.25	100
Percent Vegetation Cover	**80**	**95**	**60**	**30**	**50**	**40**	**65**	**60**	**66**	

Steep Slope Community: This community was characterized by very shallow, rocky soils and was dominated by trees and shrubs, primarily limber pine (*Pinus flexilis*) and Douglas fir (*Pseudotsuga menziesii*). Because of the nature of transects, the numerous large trees present in this community are under-represented in the data. Average percent vegetation cover in the Steep Slope community was 40 percent, as one transect was 30 percent and the other was 50 percent (**Table 4**). Steep slope transect locations are shown in **Figure 3** in Appendix A ("Slope 1" and "Slope 2"); photos of each transect are in **Appendix C**.

Table 4: Steep Slope Transect Data (# Hits) and Cover Calculations

Life Form	Slope 1	Slope 2	Average (per transect)	Percent Cover (all transects)
Shrubs/trees	**2**	**4**	**3.00**	**15**
Forbs	**3**	**6**	**4.50**	**22.5**
Grasses	**1**	**0**	**0.50**	**2.5**
Litter	4	6	5.00	25
Rock	8	3	5.50	27.5
Bare Ground	2	1	1.50	7.5
TOTAL	6	10	8.00	100
Percent Vegetation Cover	**30**	**50**	**40**	

Mixed Conifer Community: Three circle plots (Circle Plots MC-1, MC-2, and MC-3) and two photo points (MC-4 and MC-5) describe the five sampling locations within the Mixed Conifer Community.

Stands included a mix of Engelmann spruce (*Picea engelmannii*), sub-alpine fir (*Abies lasiocarpa*), and Douglas fir (*Pseudotsuga menziesii*) in either large, dense stands or smaller tree islands. East-facing slopes of mixed conifer stands were located in the Montane life zone and supported medium to large Douglas fir. Much of this forest area had been logged previously. Two photo points (PP3 and PP4, **Appendix C**) describe previously logged areas.

The highest elevations of the survey area, on the west side and on top of the plateau, were within the Subalpine life zone, and supported conifers consisting almost exclusively of Engelmann spruce and subalpine fir (where circle plot data was collected). The top of the plateau had not been logged and did not appear to have saleable timber, as trees were small in size due to the exposure and high elevation. As shown in Tables 5a through 5c and corresponding photos in **Appendix C**, conifer trees were growing beneath the aspen canopy.

Within the understory of Circle Plot MC-1, gooseberry currant and snowberry were most common shrubs observed, and Engelmann's fleabane was most common forb. Within the understory of Circle Plot MC-2, Engelmann's fleabane, Fendler meadowrue, violet, and woody groundsel were common forbs. Ground juniper was common in understory of Circle Plot MC-3.

Mixed Conifer/Aspen Community: One circle plot (Circle Plot MC/A-1) and two photo points (MC/A-2 and MC/A-3) describe the three sampling locations within the Mixed Conifer/Aspen Community.

In these areas, stands were dense and conifer and aspen were so intermingled that it was difficult to determine whether aspens or conifers were dominant (see photo points MC/A-2 and MC/A-3 in **Appendix C**). Within the understory of Circle Plot MC/A-1, aspen regrowth was the most common species. Thirty eight young trees were counted within this plot (**Table 5d**).

Data from the four circle plots is shown in **Tables 5a through 5d** below. Circle plot locations are shown on **Figure 3**. Photos are contained in **Appendix C**.

Table 5a: Circle Plot MC-1

Tree species	Height (ft)	Number of trees	DBH (in)
Aspen	70	1	8
Engelmann spruce	15	1	4
Aspen	80	1	8
dead Engelmann spruce		1	7
Aspen	70	1	8
Trees less than 4 feet high and/or 4 inches DBH			
Subalpine fir		12	<4"
Aspen		2	<4"

Table 5b: Circle Plot MC-2

Tree species	Height (ft)	Number of trees	DBH (in)
Aspen	40	1	5
Engelmann spruce	20	1	4
Aspen	40	1	4
Trees less than 4 feet high and/or 4 inches DBH			
Subaplpine fir		3	<4"
Aspen		2	<4"

Table 5c: Circle Plot MC-3

Tree species	Height (ft)	Number of trees	DBH (in)
Aspen	80	1	9
Engelmann spruce	35	1	4
Engelmann spruce	10	1	4
Aspen	80	1	9
Aspen	25	1	4
Engelmann spruce	25	1	4
Engelmann spruce	35	1	4
Aspen	50	1	7
Trees less than 4 feet high and/or 4 inches DBH			
Subalpine fir		3	<4"
Aspen		1	<4"

Table 5d: Circle Plot MC/A-1

Tree species	Height (ft)	Number of trees	DBH (in)
Aspen	60	1	6
Aspen	60	1	7
Trees less than 4 feet high and/or 4 inches DBH			
Aspen		16	<4"
Aspen		22	<4"

Vegetation Survey – Rare Plant Review

A literature review of rare plant species of Carbon County was conducted based upon soils and ecological site types, at elevations of 7,500 feet and higher. Based upon the site conditions, there are four species that have a slight possibility to occur within the project area: the Federally listed endangered Uinta Basin hookless cactus (*Sclerocactus wetlandicus*) as well as the Federally proposed listing for Graham Beardtongue (*Penstemon grahamii*), the State sensitive Giant helleborne (*Epipactis gigantean*), and the State sensitive Coal cliffs sweetvetch (*Hedysarum occidentale*).

Vegetation Survey - Summary

Overall, plant diversity was high within the survey area and consisted of native or highly naturalized (Kentucky bluegrass, dandelion) species. Average total vegetation cover across all sixteen transects was 56 percent. To meet the DOGM standard of reclamation cover being 70 percent of the native vegetation cover, total vegetation cover in reclamation would need to be at least 39 percent.

No sensitive plant species were observed during the vegetation survey. At this time, no additional survey work is required or planned. Although the four rare plants listed above are not likely to occur in the project area, it is possible that DOGM may require additional surveys.

Wildlife Habitat Review

During the vegetation survey described above, JBR assessed habitat types and potential for occurrence of Federally listed, proposed, and candidate wildlife species managed under the Endangered Species Act (ESA) of 1973 (as amended) by the U.S. Fish and Wildlife Service (USFWS). The Carbon County list of Federally protected species includes four fish species that would not be expected in the project area, the greater sage-grouse (*Centrocercus urophasianus*), black-footed ferret (*Mustela nigripes*) (extirpated), and gray wolf (*Canis lupus*) (UDWR 2012). The UDWR has mapped sage grouse brood rearing/crucial winter habitat and elk summer/crucial fawning habitat over the project area northeast of the ridge line. The Cold Springs Wildlife Management Area (WMA) lies just to the north of the project area. The Range Creek WMA lies to the south of the project area.

Habitat types and potential for occurrence of Utah sensitive species were also assessed. The Utah sensitive species list for Carbon County includes several raptors including bald eagle (*Haliaeetus leucocephalus*), burrowing owl (*Athene cunicularia*), ferruginous hawk (*Buteo regalis*), and northern goshawk (*Accipiter gentilis*). The list also includes fish species which would not be expected to occur in the project area, the kit fox (*Vulpes macrotis*), white-tailed prairie dog (*Cynomys leucurus*), long-billed curlew (*Numenius Americanus*), western toad (*Bufo boreas*), Townsend's big-eared bat (*Corynorhinus townsendii*), and western red bat (*Lasiurus blossevillii*). Table 6 summarizes the habitat observations and likelihood of occurrence for Federally listed, proposed, and candidate wildlife species within the project area.

Table 6: Habitat Observations and Probability of Occurrence of Federally Listed TEC Species

Species	Federal Status	Probability of Occurrence	Habitat Observations
Uinta Basin Hookless Cactus (*Sclerocactus wetlandicus*)	Threatened	Very Low	The project area has an elevation range of 9,000 to 10,040 feet amsl. Populations of Uinta Basin Hookless Cactus are known from 4,500 to 6,600 feet amsl.
Graham Beardtongue (*Penstemon grahamii*)	Threatened Proposed	Very Low	The project area has an elevation range of 9,000 to 10,040 feet amsl. Populations of Uinta Basin Graham Beardtongue are known from 4,600 to 6,700 feet amsl.
Humpback Chub (*Gila cypha*)	Endangered	None	No suitable bodies of water present in the project area.

Species	Federal Status	Probability of Occurrence	Habitat Observations
Bonytail (*Gila elegans*)	Endangered	None	No suitable bodies of water present in the project area.
Colorado Pikeminnow (*Ptychocheilus lucius*)	Endangered	None	No suitable bodies of water present in the project area.
Razorback Sucker (*Xyrauchen texanus*)	Endangered	None	No suitable bodies of water present in the project area.
Greater Sage-grouse (*Centrocercus urophasianus*)	Candidate	Low	The greater sage-grouse is found at elevations ranging from 4,000 to over 9,000 feet amsl, and are highly dependent on sagebrush for cover and food. There are some patches of sagebrush/grassland on the upper plateau in the project area but not extensive cover. Due to the limited sagebrush cover in the project area, it is possible but not probable that greater sage-grouse would occur.
Black-footed Ferret (*Mustela nigripes*)	Endangered Extirpated	None	The black-footed ferret is considered extirpated. Populations of black-footed ferrets were reintroduced in the Coyote Basin of Uintah County in 1999, however these populations have been classified as "nonessential-experimental" by the USFWS (UDWR, 2005).
Gray Wolf (*Canis lupus*)	Endangered	Very Low	There is an extremely slight and unlikely possibility that wolves could pass through the area.

Table 7 summarizes the habitat observations and likelihood of occurrence for Utah sensitive species for Carbon County.

Table 7: Habitat Observations and Probability of Occurrence of Utah Sensitive Species for Carbon County

Species	State Status	Probability of Occurrence	Habitat Observations
Bald Eagle (*Haliaeetus leucocephalus*)	SPC	Very Low	Unlikely nesting habitat. Possible fly-overs may occur in the winter months.
Black-Footed Ferret (*Mustela nigripes*)	S-ESA	None	The black-footed ferret is considered extirpated. Populations of black-footed ferrets were reintroduced in the Coyote Basin of Uintah County in 1999, however these populations have been classified as "nonessential-experimental" by the USFWS (UDWR, 2005).
Bluehead Sucker (*Catostomus*	CS	None	No suitable bodies of water present in the project area.

Species	State Status	Probability of Occurrence	Habitat Observations
discobolus)			
Bonytail (*Gila elegans*)	S-ESA	None	No suitable bodies of water present in the project area.
Burrowing Owl (*Athene cunicularia*)	SPC	Very Low	Requires deeper soil for burrowing. Very unlikely to occur in the project area.
Colorado Pikeminnow (*Ptychocheilus lucius*)	S-ESA	None	No suitable bodies of water present in the project area.
Colorado River Cuttroat Trout (*Oncorhynchus clarkia pleuriticus*)	CS	None	No suitable bodies of water present in the project area.
Ferruginous Hawk (*Buteo regalis*)	SPC	Low	Due to elevation, nesting is unlikely. Possible foraging may occur in the project area.
Flannelmouth Sucker (*catostomus latipinnis*)	CS	None	No suitable bodies of water present in the project area.
Greater Sage-Grouse (*Centrocercus Urophasianus*)	S-ESA	Low	The greater sage-grouse is found at elevations ranging from 4,000 to over 9,000 feet amsl, and are highly dependent on sagebrush for cover and food. There are some patches of sagebrush/grassland on the upper plateau in the project area but not extensive cover. Due to the limited sagebrush cover in the project area, it is possible but not probable that greater sage-grouse would occur.
Humpback Chub (*Gila cypha*)	S-ESA	None	No suitable bodies of water present in the project area.
Kit Fox (*Vulpes macrotis*)	SPC	Very Low	The Kit fox requires deeper soils conductive to burrowing, and prefers lower elevations than is found in the project area.
Long-billed Curlew (*Numenius americanus*)	SPC	None	This is a shorebird, but also utilizes open, flat grasslands, agricultural fields, and even desert-like landscapes at lower elevations. No such habitat exists in the project area.
Northern Goshawk (*Accipiter gentilis*)	CS	Moderate	Prefers thick forest with multiple canopy layer, but has been found in less dense pinyon-juniper areas. Habitat exists in the project area.
Razorback Sucker (*Xyrauchen texanus*)	S-ESA	None	No suitable bodies of water present in the project area.
Roundtail Chub (*Gila rubusta*)	CS	None	No suitable bodies of water present in the project area.
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	SPC	High	Fairly common to the area. Likely to occur in the project area.
Western Red Bat (*Lasiurus blossevillii*)	SPC	Very Low	Prefers to live very near water, of which there is little in the project

Species	State Status	Probability of Occurrence	Habitat Observations
			area. More suitable habitat exists outside of the project boundary.
Western Toad (*Bufo boreas*)	SPC	Very Low	Prefers to live very near water, of which there is little in the project area. More suitable habitat exists outside of the project boundary.
White-tailed Prairie-dog (*Cynomys leucurus*)	SPC	Very Low	The White-tailed Prairie-dog requires deeper soils conductive to burrowing, and prefers lower elevations than is found in the project area.

S-ESA = Federally-listed or candidate species under the Endangered Species Act
SPC = Wildlife Species of concern
CS = Species receiving special management under a Conservation Agreement in order to preclude the need for Federal listing.

Wildlife Habitat Summary

General wildlife observations were made within the vegetation survey area. Habitats were reviewed to assess the likelihood that Federally listed or State sensitive species would occur in the area. No Federally listed TEC species are likely to occur within the project area. Of the Utah sensitive species, only the Northern Goshawk and the Townsend's Big-eared Bat have a moderate to high potential to occur within the project area. Sage grouse may occur, however habitat is limited. Many raptors, other birds, big game, and a variety of mammals are likely to utilize the types of habitats in this area.

Raptor nesting surveys should be conducted between March and July according to the USFWS protocol. DOGM may request that bat presence/absence data be collected. This data could be initially gathered during the raptor survey period.

References Cited

Natural Resources Conservation Service (NRCS). 2009. Soil Survey Geographic (SSURGO) Database. Available online at http://soildatamart.nrcs.usda.gov.

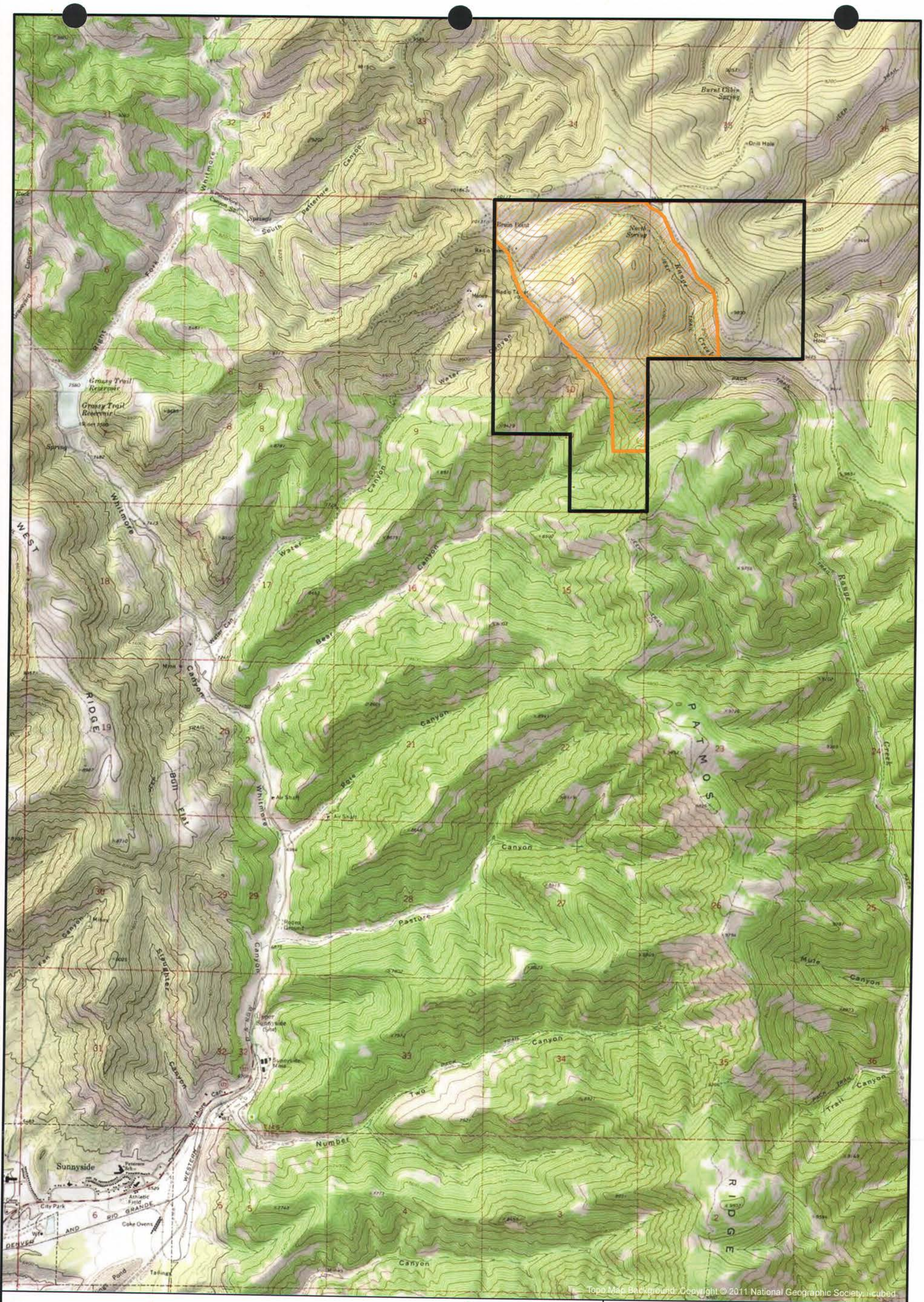
Utah Division of Wildlife Resources (UDWR). 2012. County Lists of Utah's Federally Listed Threatened (T), Endangered (E), and Candidate (C) Species. Last Updated on January 12, 2012.

Utah Division of Wildlife Resources (UDWR). 2011. Utah's State Listed Species by County. Last Updated on March 29, 2011.

Utah Division of Wildlife Resources (UDWR). 2005. Utah Vertebrate Animals Information Database: Black-Footed Ferret Species Information. Available online at http://dwrcdc.nr.utah.gov/rsgis2/Search/Display.asp?FlNm=mustnigr.

Utah Geological Survey (UGS). 2012. Interactive Geologic Maps. Available online at http://geology.utah.gov/maps/geomap/interactive/viewer/index.html

Appendix A
Figures



Legend

Project Area

Vegetation Survey Area

N

4,000 2,000 0 4,000 Feet

GREEN RIVER RESOURCES
VEGETATION SURVEY

FIGURE 1
PROJECT LOCATION MAP

JBR

DRAWN BY	NF	DATE DRAWN	10/9/2012
SCALE	1 in = 4,000 feet		

This document is for reference purposes only and should not be used as a legal document. JBR makes no guarantees to the accuracy of the data contained herein or any loss resulting therefrom.

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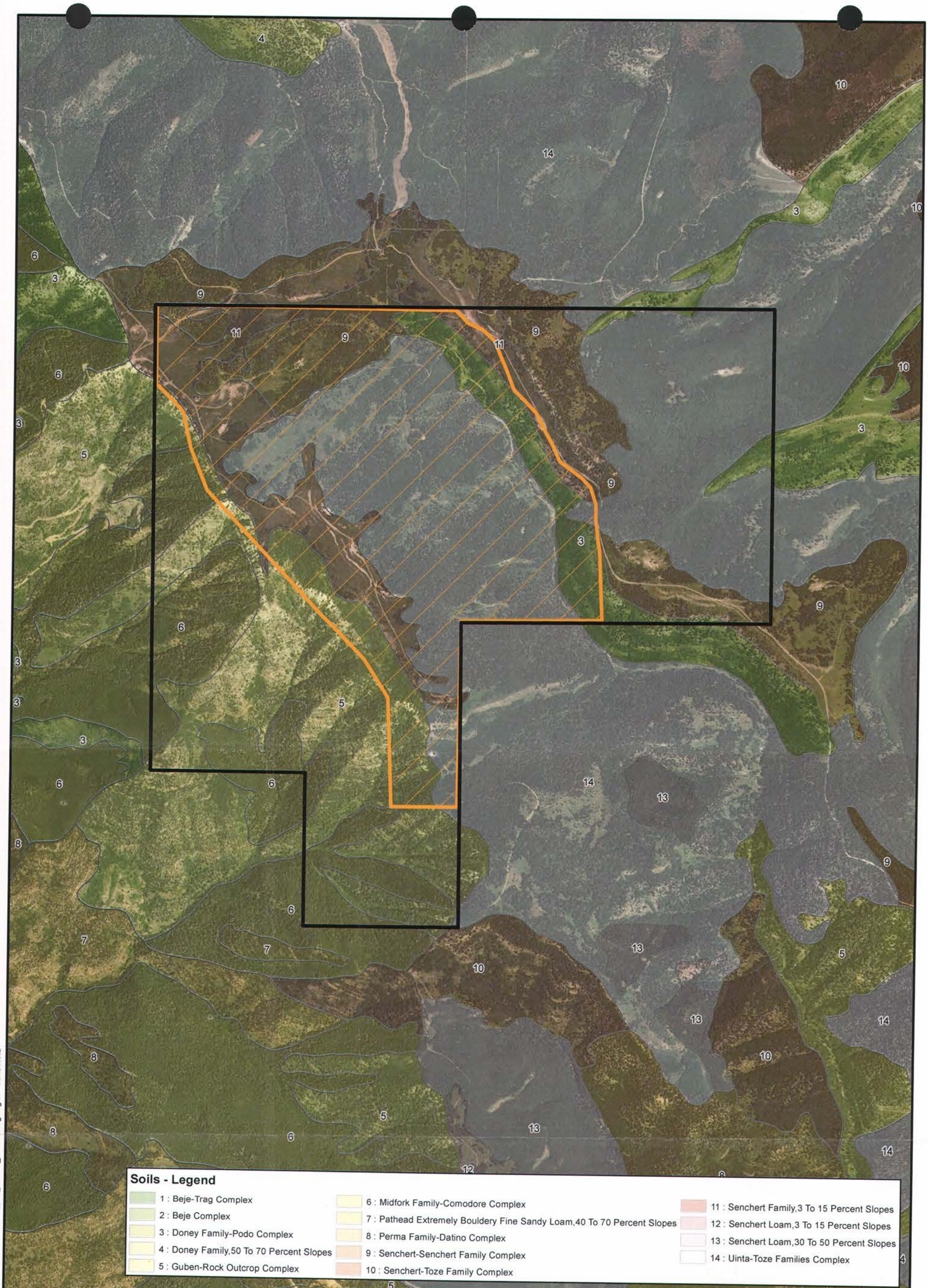

Legend

Project Area

Vegetation Survey Area

Soils data: NRCS Soils retrieved from Utah AGRC

2,000 1,000 0 2,000 Feet

N

GREEN RIVER RESOURCES
VEGETATION SURVEY

FIGURE 2
SOILS

JBR

DRAWN BY NF | DATE DRAWN 10/9/2012

SCALE 1 in = 2,000 feet

Path: M:\STATES\UT\Clients\Green_River_Resources\Sunnyside_Tar_Sands_Permitting\Fig 2 - Soils.mxd

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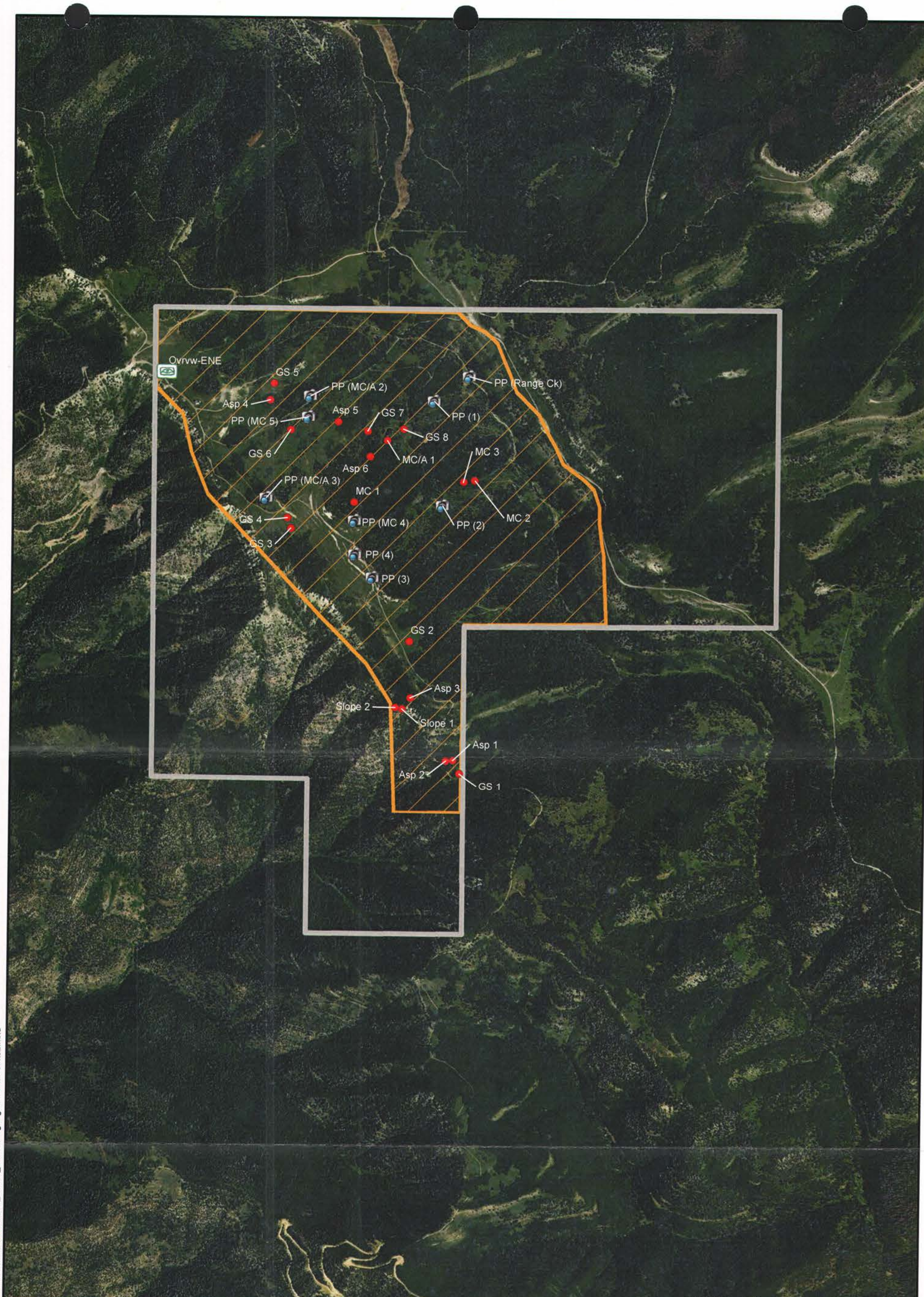

Legend

- Photo Point
- Overview
- Transect or Circle Plot
- Project Area
- Vegetation Survey Area

N

2,000 1,000 0 2,000 Feet

GREEN RIVER RESOURCES
VEGETATION SURVEY

FIGURE 3
DATA POINTS

JBR

DRAWN BY	NF	DATE DRAWN	10/9/2012
SCALE	1 in = 2,000 feet		

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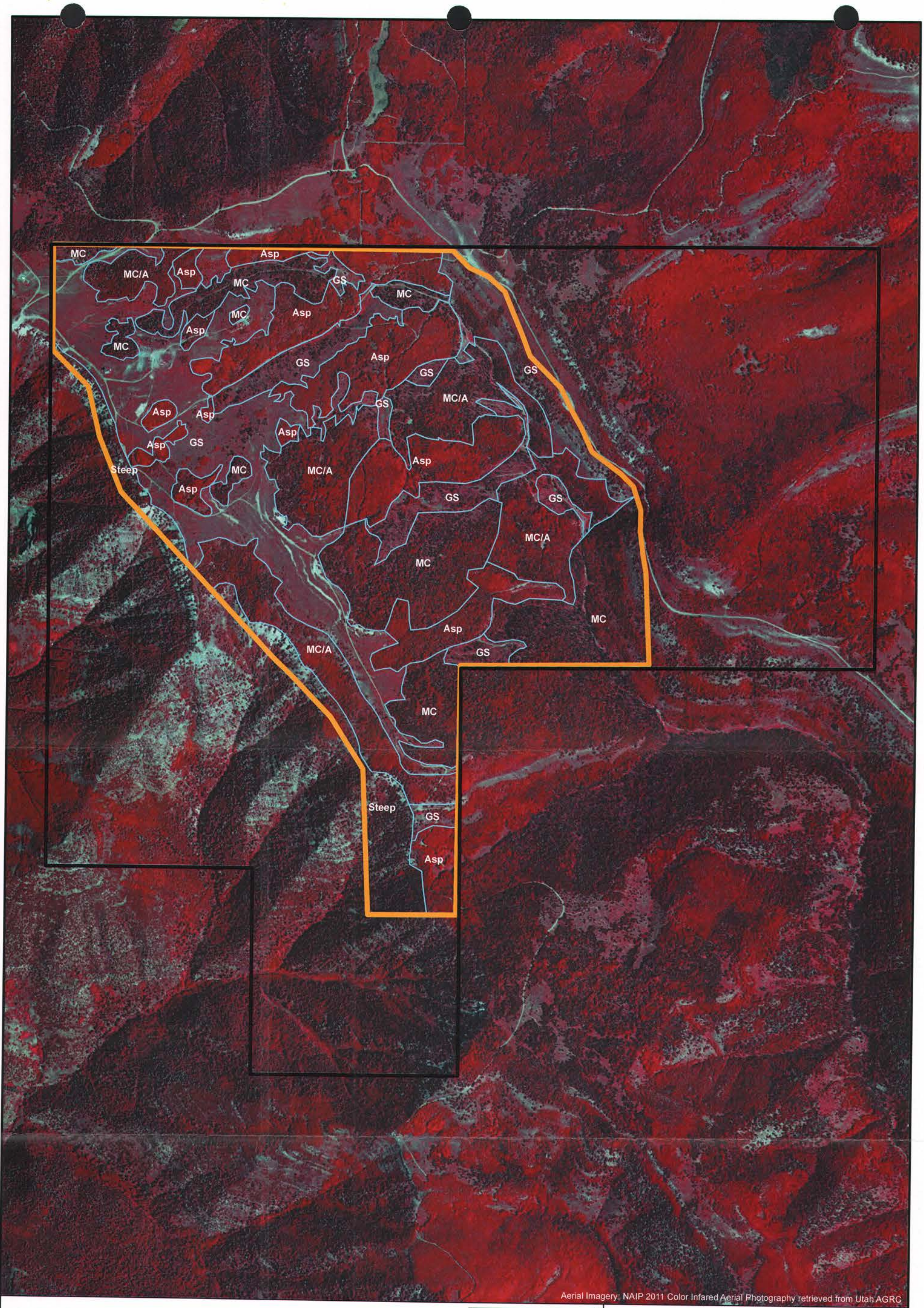

Legend

Project Area

Vegetation Survey Area

Vegetation Community

MC = Mixed Conifer
MC/A = Mixed Conifer/Aspen
Asp = Aspen
GS = Grass-Shrub
Steep = Steep Slope

N

1,500 750 0 1,500 Feet

GREEN RIVER RESOURCES
VEGETATION SURVEY

FIGURE 4
VEGETATION COMMUNITIES

JBR

DRAWN BY NF	DATE DRAWN 10/9/2012
SCALE 1 in = 1,500 feet	

Path: M:\STATES\UT\Clients\Green_River_Resources\Sunnyside_Tar_Sands_Permitting\MXDs\Fig 4 Vegetation.mxd

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Appendix B
Species Observation List and Taxonomic References

The list below shows all species observed during the survey.

Family	Scientific species name	Common name	NRCS Symbol	Location(s)
TREE/SHRUB species				
Pinaceae	*Abies lasiocarpa*	Subalpine fir	ABLA	Aspen-mixed conifer; major cover type
Rosaceae	*Amelanchier utahensis*	Utah serviceberry	AMUT	Open, rocky slopes near limber pine
Asteraceae	*Artemisia tridentata* var. *vasayana*	Mountain big sagebrush	ARTRV	Lower elevations of survey area; major cover type
Cupressaceae	*Juniperus communis*	Ground juniper	JUCO6	Open, rocky slopes near limber pine
Cupressaceae	*Juniperus occidentalis*	Western juniper	JUOC	Open, rocky slopes
Berberidaceae	*Mahonia repens*	Oregon grape	MARE	Open, rocky slopes near limber pine
Celastraceae	*Pachistima myrsinites*	Mountain lover	PAMY	Lower elevations on rocky slopes
Pinaceae	*Picea engelmanii*	Engelmann spruce	PIEN	Highest elevations in aspen-conifer dominating north and east-facing slopes
Pinaceae	*Pinus flexilis*	Limber pine	PIFL	Lower elevations on bare, rocky slopes
Salicaceae	*Populus tremuloides*	Aspen	POTR	Major species; co-dominant with mixed conifer
Pinaceae	*Pseudotsuga menziesii*	Douglas fir	PSME	Lower elevations on bare, rocky slopes
Grossulariaceae	*Ribes cerneum*	Gooseberry currant	RICE	Openings in aspen-conifer
Grossulariaceae	*Ribes montigenum*	Alpine prickly currant	RIMO2	Aspen-conifer
Rosaceae	*Rosa woodsii*	Wood's rose	ROWO	Aspen-conifer
Rosaceae	*Rubus idaeus*	Red raspberry	RUID	Old clear-cuts in aspen-conifer
Caprifoliaceae	*Sambucus racemosa*	Red elderberry	SANIC5	Edge of old clear-cuts in aspen-conifer
Caprifoliaceae	*Symphoricarpos oreophillus*	Mountain snowberry	SYOR2	Co-dominant in mountain big sage communities
FORBS (Herbaceous Species)				
Asteraceae	*Achillea millefolium*	Common yarrow	ACMI	
Asteraceae	*Agoseris aurantiaca*	Orange agoseris	AGAU	

Family	Scientific species name	Common name	NRCS Symbol	Location(s)
Primulaceae	*Androsace septentrionalis*	pygmyflower rockjasmine	ANSE	Uncommon aspen understory
Rosaceae	*Antennaria rosea*	Rosy pussytoes	ANRO	Open rocky sagebrush
Asteraceae	*Arnica cordifolia*	Heartleaf arnica	ARCO9	Shady aspen-conifer
Fabaceae	*Astragalus tenellus*	Pulse milkvetch	ASTE5	Aspen-conifer
Liliaceae	*Calochortus gunnisonii*	Gunnison's mariposa lily	CAGU	Edge between sagebrush-grass and aspen-conifer
Scrophulariaceae	*Castelleja flava*	Yellow paintbrush	CAFL	Shady aspen-conifer
Scrophulariaceae	*Castelleja linarifolia*	Wyoming paintbrush	CALI	Open sagebrush
Asteraceae	*Chaenactis douglasii*	Douglas dustymaiden	CHDOD	Open, rocky sites within sagebrush/grass communities
Asteraceae	*Chamaechaen-actis scaposa*	Fullstem	CHSC	Open, rocky sites within sagebrush/grass communities
Chenopodiaceae	*Chenopodium fremontii* var. *fremontii*	Fremont's goosefoot	CHFRF	Edges of aspen-conifer
Asteraceae	*Cirsium undulatum*	Wavyleafed thistle	CIUN	Openings in sagebrush-grass
Polemoniaceae	*Collomia linearis*	Collomia	COLI	Common along disturbed paths in aspen-fir
Scrophulariaceae	*Collinsia parviflora*	Maiden blue eyed Mary	COPA3	Disturbed clearcuts
Brassicaceae	*Descurainia californica*	Sierra tansymustard	DECA6	Disturbed
Asteraceae	*Erigeron aphanactis*	Rayless shaggy fleabane	ERAP	Open, rocky sites within sagebrush/grass communities
Asteraceae	*Erigeron engelmannii*	Engelmann's fleabane	EREN	Aspen-conifer
Asteraceae	*Erigeron speciosus*	Oregon fleabane	ERSP	Aspen-conifer
Polygonaceae	*Eriogonum alatum*	Winged buckwheat	ERAL	Open, rocky sagebrush-grass

Family	Scientific species name	Common name	NRCS Symbol	Location(s)
Polygonaceae	*Eriogonum brevicaule*	Shortstem buckwheat	ERBR	Dry, rocky, open sites near limber pine
Polygonaceae	*Eriogonum umbellatum*	Sulphur-flower buckwheat	ERUM	Open, rocky sagebrush-grass
Rosaceae	*Fragaria vesca* ssp. *bracteata*	Woodland strawberry	FRVEB2	Openings in aspen-conifer
Gentianaceae	*Frasera speciosa*	Elkweed	FRSP	Openings in sagebrush-grass
Gentianaceae	*Gentianella amarella* ssp. *heterosepala*	Autumn dwarf gentian	GEAMH	Aspen-conifer
Gentianaceae	*Gentianopsis thermalis*	Rocky Mountain fringed gentian	GETH	Shady aspen-conifer
Geraniaceae	*Geranium fremontii*	Sticky purple cranesbill	GEVI2	Open slopes
Geraniaceae	*Geranium richardsonii*	Richardson's geranium	GERI	Shady aspen-conifer
Asteraceae	*Heliomeris multiflora* var. *multiflora*	Showy goldeneye	HEMUM	Openings in aspen-conifer
Polemoniacea	*Ipomopsis aggregata*	Scarlet gilia	IPAG	Common forb in open sagebrush-grass
Fabaceae	*Lathyrus pauciflorus*	Fewflower pea	LAPA5	Aspen understories
Brassicaceae	*Lesquerella hemiphysaria*	Intermountain bladderpod LEHE3	LEHE3	Openings in sagebrush-grass
Apiaceae	*Ligusticum porteri*	Porter's licorice-root	LIPO	Aspen understories
Linaceae	*Linum lewisii*	Blue flax	LILE	Openings in sagebrush-grass
Linaceae	*Linum kingii*	King flax	LIKI	Open, rocky sites in sagebrush
Fabaceae	*Lupinus argenteus*	Silvery Lupine	LUAR3	Aspen/Mixed Conifer community
Fabaceae	*Lupinus sericeus*	Silky lupine	LUSE4	Open rocky slopes
Lamiaceae	*Monardella odoratissima*	Mountain monardella	MOOD	Open sagebrush, very common
Hydrophyllaceae	*Nemophila breviflora*	Great Basin nomophila	NEBR	Disturbed
Apiaceae	*Osmorhiza depauperata*	bluntseed sweetroot	OSDE	Aspen understory
Apiaceae	*Osmorhiza occidentalis*	western sweetroot	OSOC	Aspen understory

Family	Scientific species name	Common name	NRCS Symbol	Location(s)
Scrophulariaceae	*Penstemon barbatus var. torreyi*	Barbed throat penstemon	PEBAT	Open rocky slopes
Scrophulariaceae	*Penstemon commarrhenus*	Dusty penstemon	PECO	Openings in aspen-conifer
Scrophulariaceae	*Penstemon pachyphyllus*	Thickleafed penstemon	PEPA	Openings in aspen-conifer
Hydrophyllaceae	*Phacelia hastata*	Silky phacelia	PHHA	Openings in aspen-conifer
	Polemonium pulcherrimum	Skunkleaf Jacobs ladder	POPU3	Aspen understory
Rosaceae	*Potentilla anserina*	Silverweed	POAN	Moist areas near drainages
Rosaceae	*Potentilla concinna*	Elegant cinquefoil	POCO13	Sagebrush-grass
Rosaceae	*Potentilla glandulosa*	Sticky cinquefoil	POGL	Sagebrush-grass
Rosaceae	*Potentilla gracilis*	Slender cinquefoil	POGR9	Openings in sagebrush-grass
Caryophyllaceae	*Pseudostellaria jamesiana*	tuber starwort	PSJA2	Disturbed
Asteraceae	*Senecio canus*	Wooly groundsel	SECA	Open dry slopes
Asteraceae	*Senecio integerrimus*	Western groundsel	SEIN	Aspen-conifer
Asteraceae	*Stenotus acaulis*	Stemless goldenweed	STAC	Open, rocky sagebrush-grass
Asteraceae	*Symphyotrichum foliaceum* var. *foliaceum*	Alpine leafybract aster	SYFOF	Both sagebrush and aspen communities
Asteraceae	*Taxacarum officinale*	Dandelion	TAOF	Open, disturbed
Ranunculaceae	*Thalictrum fendleriana*	Fendler meadowrue	THFE	Common aspen understory
Violaceae	*Viola adunca*	Hooked spur violet	VIAD	Shady aspen-conifer
GRASSES & GRASS-LIKES				
Cyperaceae	*Carex bella*	Pretty sedge	CABE3	Aspen-mixed conifer
Cyperaceae	*Carex egglestonii*	Eggleston's sedge	CAEG	Aspen-mixed conifer
Cyperaceae	*Carex* geyeri	Elk sedge	CAGE2	Aspen-mixed conifer
Cyperaceae	*Carex microptera*	Small-awned sedge	CAMI7	Aspen-mixed conifer

Family	Scientific species name	Common name	NRCS Symbol	Location(s)
Cyperaceae	*Carex norvegia*	Norway sedge	CANO2	Shaded subalpine meadows
Cyperaceae	*Carex rostrata var. utriculata*	Beaked sedge	CAUT	Moist shaded subalpine meadows
Cyperaceae	*Carex tahoensis*	Dryland or Tahoe sedge	CATA	Moist sage/grass meadows
Poaceae	*Achnatherum columbiana*	Columbia needlegrass	ACNE9	Sagebrush/grass Less common than ACLE9
Poaceae	*Achnatherum lettermanii*	Letterman's needlegrass	ACLE9	Sagebrush/grass Common native mountain grass
Poaceae	*Achnatherum hymenoides*	Indian ricegrass	ACHY	Uncommon in sagebrush openings
Poaceae	*Agrostis scabra*	Ticklegrass	AGSC	Uncommon; sagebrush
Poaceae	*Alopecurus pratensis*	Meadow foxtail	ALPR	Range Creek spring
Poaceae	*Bromus carinatus* var.*marginatus*	Mountain brome	BRCA5	Sagebrush/grass
Poaceae	*Elymus glaucus*	Blue wildrye	ELGL	Barren slopes
Poaceae	*Elymus lanceolatus*	Thickspike wheatgrass	ELLA3	Sagebrush/grass
Poaceae	*Festuca arizonica*	Arizona fescue	FEAR2	Aspen and sagebrush/grass
Poaceae	*Festuca arundinaceae*	Tall fescue	FEAR	Aspen-conifer
Poaceae	*Festuca thurberiana*	Thurber fescue	FETH	High mountain bunchgrass in sagebrush/grass
Poaceae	*Hesperostipa comata*	Needle and thread	HECO26	Open sagebrush/grass
Poaceae	*Hesperostipa lettermanii*	Letterman's needlegrass	HELE	Open sagebrush/grass
Poaceae	*Hesperostipa nelsonii*	Nelson's needlgegrass	HENE	Openings in clear-cuts
Poaceae	*Koeleria cristata*	Junegrass	KOCR	
Poaceae	*Leymus salinus* ssp. *salinus* -	Saline wildrye	LESAS	Open sagebrush/grass and open, rocky slopes
Poaceae	*Pleuraphis jamesii*	James' galleta	PLSA	Open sagebrush/rocky
Poaceae	*Poa fendleriana*	Muttongrass	POFE	Open sagebrush/grass
Poaceae	*Poa nervosa*	Wheeler bluegrass	PONE2	Openings in aspen-conifer

Family	Scientific species name	Common name	NRCS Symbol	Location(s)
Poaceae	*Poa nevadensis*	Nevada bluegrass	PONE3	Sagebrush/grass
Poaceae	*Poa pratensis*	Kentucky bluegrass	POPR	Open/disturbed
Poaceae	*Poa secunda*	Sandburg bluegrass	POSE	Sagebrush/grass
Poaceae	*Pseudoreoeg-neria spicata var. spicata*	Bluebunch wheatgrass	PSSPS	Aspen-conifer
Poaceae	*Trisetum spicatum*	Spike trisetum	TRSP2	Open sagebrush/grass

Taxonomic References

The following references were used to identify plants observed or collected during the field survey.

Albee, B.J.; L.M. Shultz, S. Goodrich. 1988. *Atlas of the Vascular Plants of Utah.* Utah Musueum of Natural History Occasional Publication No. 7. Salt Lake City.

Craighead, John J., F.C. Craighead, R.J. Davis. 1963. *A field Guide to Rocky Mountain Wildflowers*. Houghton Mifflin Company. Boston.

Cronquist, A., A.H. Holmgren, N.H. Holmgren, J.L. Reveal. *2005. Intermountain Flora: Vascular Plants of the Intermountain West, U.S.A.* Vol. 3, Part B. Fabales by Rupert C. Barneby. New York.

Cronquist, A., A.H. Holmgren, N.H. Holmgren, J.L. Reveal. 2005. *Intermountain Flora: Vascular Plants of the Intermountain West, U.S.A.* Vol. 2, part B: Subclasss Dilleniidea. New York Botanical Garden. New York.

Cronquist, A., A.H. Holmgren, N.H. Holmgren, P. Holmgren. 1997. *Intermountain Flora: Vascular Plants of the Intermountain West, U.S.A.* Vol. 3, part A: Subclasss Rosidae (except Fabales). New York Botanical Garden. New York.

Cronquist, A., A.H. Holmgren, N.H. Holmgren, P. Holmgren. 1984. *Intermountain Flora: Vascular Plants of the Intermountain West, U.S.A.* Vol. 4 Subclass Asteridae (except Asteraceae). New York Botanical Garden. New York.

Cronquist, A., Holmgren, A.H., Holmgren, N.H. Holmgren, J.L. Reveal, P. Holmgren. 1998. *Intermountain Flora: Vascular Plants of the Intermountain West, U.S.A.* Vol. 6: The Monocotyledons. New York Botanical Garden. New York.

Cronquist, A., A.H Holmgren, N.H. Holmgren, J.L. Reveal. 1972. *Intermountain Flora:*

Vascular Plants of the Intermountain West, U.S.A. Vol. 1. New York Botanical Garden. New York.

Flora of North America Editorial Committee, eds. 1993+. *Flora of North America: North of Mexico.* 16+ vols. Vol. 1, 1993; Vol. 2, 1993; Vol. 3, 1997; Vol. 4, 2003; Vol. 5, 2005; Vol. 7, 2010; Vol. 8, 2009; Vol. 19, 2006; Vol. 20, 2006; Vol. 21, 2006; Vol. 22, 2000; Vol. 23, 2002; Vol. 24, 2007; Vol. 25, 2003; Vol. 26, 2002; Vol. 27, 2007. Oxford University Press, U.S.A.

Holmgren, N.H., P.K. Holmgren and A. Cronquist. 2005. *Intermountain flora: Vascular Plants of the Intermountain West, U.S.A.* Vol. 2B, Subclass Dilleniidae. New York Botanical Garden. 488 pp. New York.

Hurd, Emerenciana G. et al. 1998. *Field Guide to Intermountain Sedges*, USDA Rocky Mountain Research Station. General Technical Report RMRS-GTR-10. Ogden, Utah.

Kartesz, J.T. 2011. *North American Plant Atlas.* Available at The Biota of North America Program (BONAP), http://www.bonap.org/MapSwitchboard.html. Accessed 31 July 2012 [maps generated from Kartesz, J.T. 2010. Floristic Synthesis of North America, Version 1.0. BONAP website (in press)]. Chapel Hill, N.C.

Kershaw, Linda, A. MacKinnon, J. Pojar. 1998. *Plants of the Rocky Mountains.* Lone Pine Publishing, Edmonton, Alberta and Vancouver, British Columbia, Canada and Renton, WA, USA.

Merrit, Joel et al., 2000. *Noxious Weeds Field Guide for Utah.* Utah State University Press, Logan, UT.

Mueggler, W. F. 1988. *Aspen Community Types of the Intermountain Region.* USDA For. Ser. Gen. Tech. Rep. INT-250, 135p. Intermountain Research Station, Ogden Utah.

Mueggler, W.F. 1985. "Vegetation Associations" *In*: DeByle, Norbert V., R.P. Winokur, editors. *Aspen: Ecology and management in the western United States.* USDA Forest Service General Technical Report RM-119. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo. p. 45-55.

Parker, Karl G., L.R. Mason, J.F. Vallentine. 1979. *Utah Grasses.* Cooperative Extension Service, Utah State University, Logan, Utah.

Shaw, Richard J. 1995. *Utah Wildflowers: A Field Guide to Northern and Central Mountains and Valleys.* Utah State University Press, Logan, UT.

Shaw, Richard J. 1989. *Vascular Plants of Northern Utah.* Utah State University Press, Logan, UT.

Taylor, Ronald J.1992. *Sagebrush Country*: A Wildflower Sanctuary. Mountain Press Publishing Company, Missoula MT.

USDA, NRCS. 2010. The PLANTS Database, National Plant Data Center, Baton Rouge, LA. Accessed on line at http://plants.usda.gov, 30 August 2012.

Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins [eds]. 2003. *A Utah flora*, third edition, revised. Brigham Young University, Provo, Utah. 912 pp.

Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins [eds]. 2008. *A Utah flora*, fourth edition, revised. 2004-2008 summary monograph. Brigham Young University, Provo, Utah. 1019 pp.

Whitson, Tom D., et al. 1991. *Weeds of the West*. University of Wyoming, Laramie, WY.

APPENDIX C
Photos: Transects, Circle Plots, and additional Photo Points

GRASS-SHRUB TRANSECTS

Photo 1: Overview of saddle at south end of survey area. See Map Point GS 1 near south end of survey area.

Photo 2: Grass-shrub Transect # 1, near south end of survey area. See Map Point GS 1.

Photo 3: Grass- shrub Transect #2. See Map Point GS 2, near south end of survey area.

Photo 4: Grass-shrub Transect #3, on west side of plateau. See Map Point GS 3.

Photo 5: Grass-shrub Transect #4. See Map Point GS 4, on plateau near GS 3.

Photo 6: Grass-shrub Transect #5. See Map Point GS 5, on plateau near north end.

Photo 7: Grass-shrub Transect #6, on plateau in old burn area that likely had more spruce-fir growing there prior to the fire. See Map Point GS 6, south of point GS 5.

Photo 8: Grass-shrub Transect #7, on plateau. See Map Point GS 7, near center of plateau.

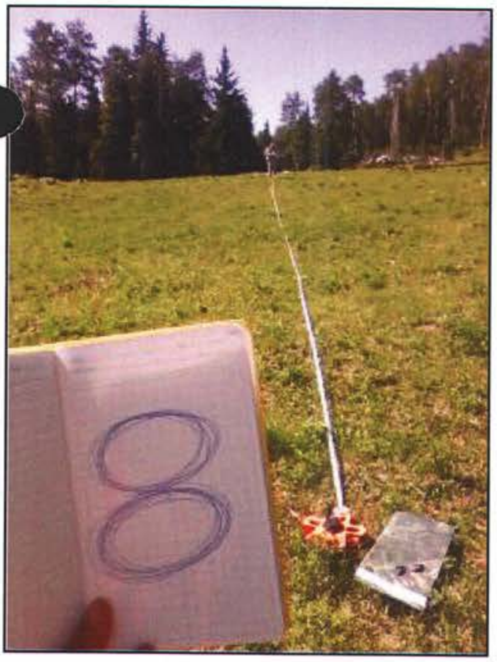


Photo 9: Grass-shrub Transect #8, on slope above Range Creek in previously logged area – location was used to gather logs and slash. See Map Point GS 8, near center of plateau and just east of point GS 7.

ASPEN TRANSECTS

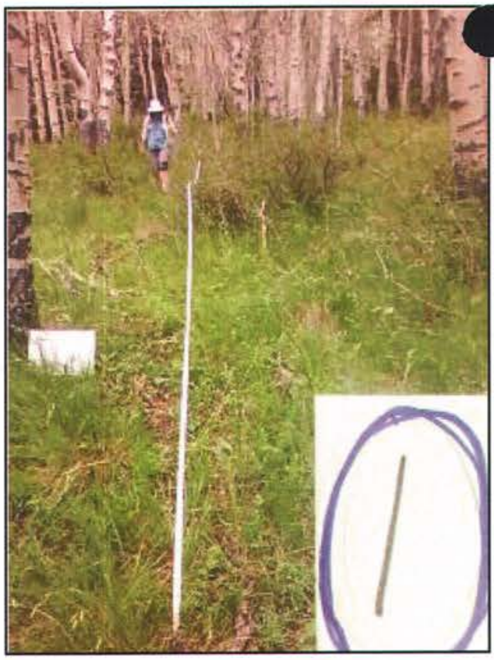


Photo 10: **Aspen Transect #1, on south-facing slope. See Map Point Asp 1 at south end of survey area.**

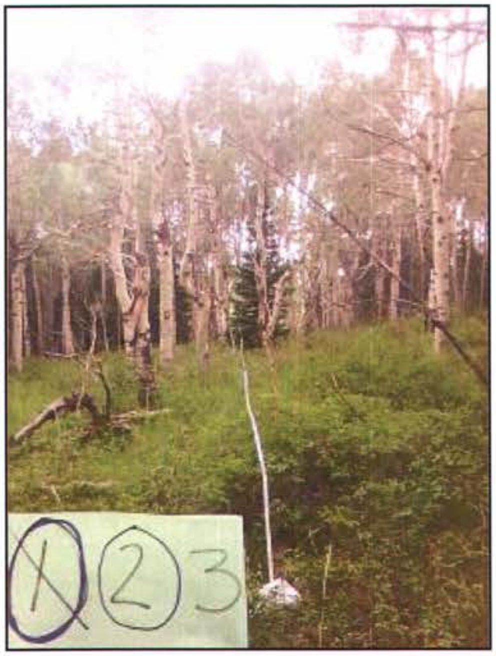


Photo 11: Aspen Transect #2, on south-facing slope. See Map Point Asp 2, at south end of survey area.

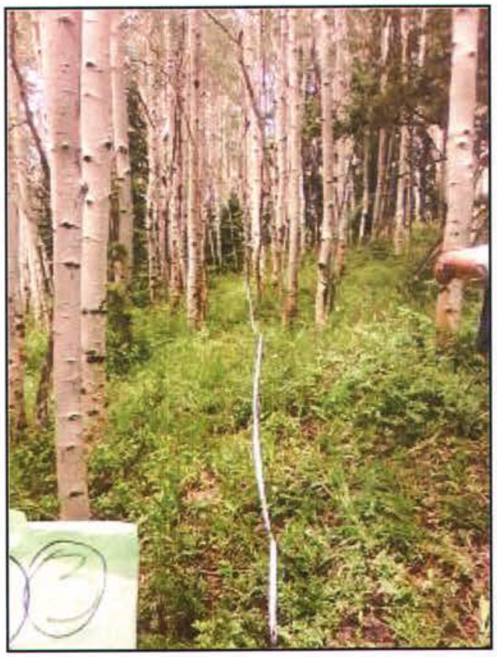


Photo 12: Aspen Transect #3, at south end of survey area on west-facing slope. See Map Point Asp 3.

Photo 13: Aspen Transect #4. See Map Point Asp 4, on plateau near northwest corner.

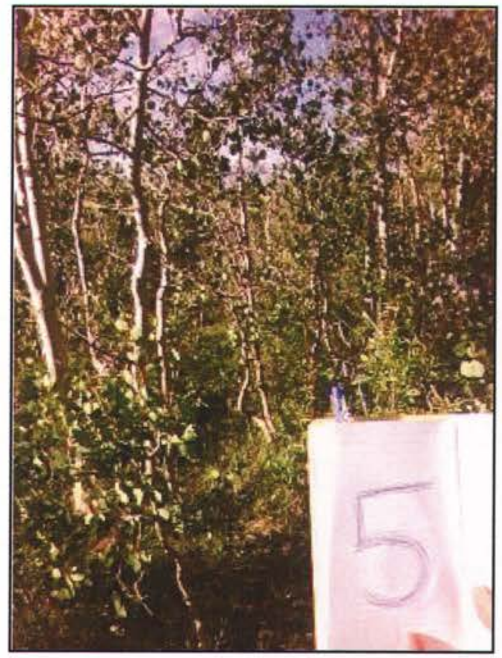


Photo 14: Aspen Transect #5. See Map Point Asp 5, on plateau just northwest of survey area center.

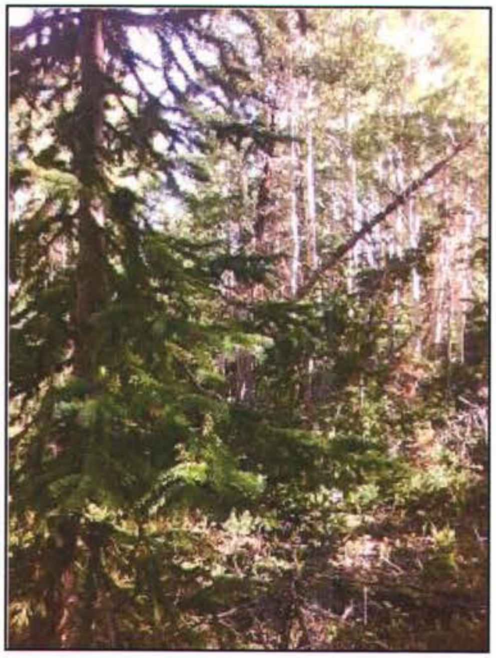
Photo 15: Aspen Transect #6. This transect is on an old logging road within an aspen community that was being invaded by spruce-fir, which are visible in the background. See Map Point Asp 6, on plateau near center of survey area.

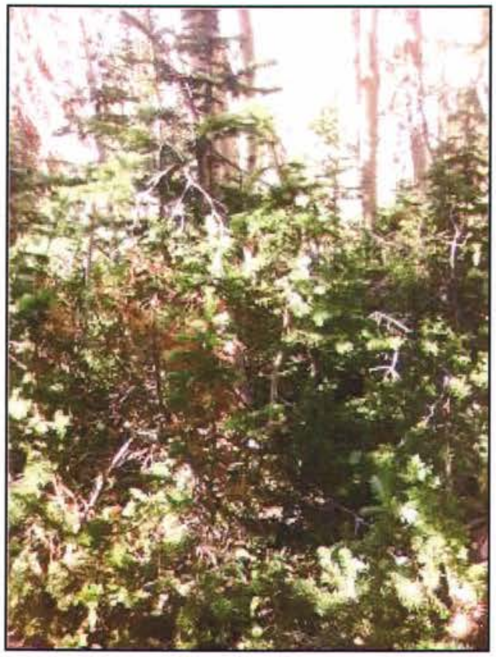
STEEP SLOPE TRANSECTS

Photo 16: Steep Slope Transect #1. See Map Point Slope 1, near south end of survey area on south-facing slope, looking west.

Photo 17: Steep Slope Transect #2. See Map Point Slope 2, on south-west facing slope, looking north, next to point Slope 1.

MIXED CONIFER and MIXED CONIFER-ASPEN CIRCLE PLOTS and PHOTO POINTS





Photos 18 - 21: Circle Plot MC 1: L to R, Top to Bottom: Looking north, east, south and west, near center of survey area.

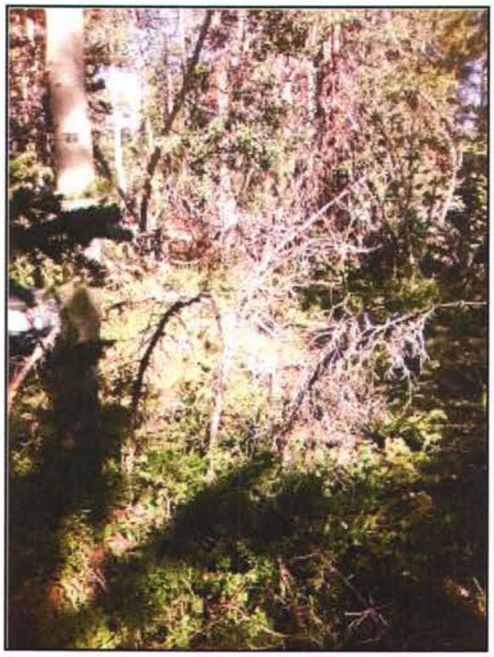
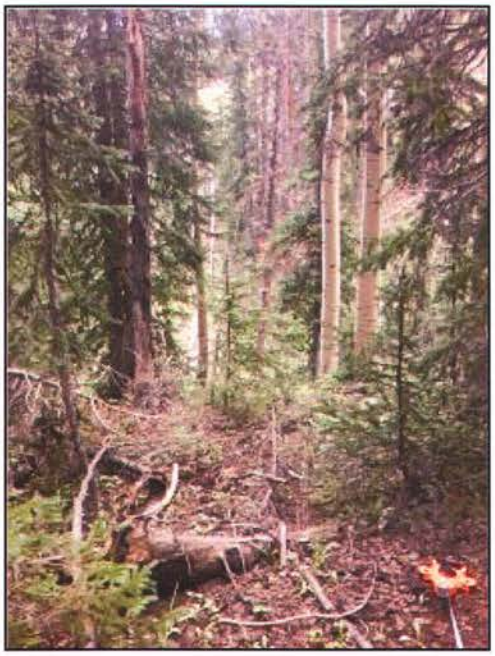
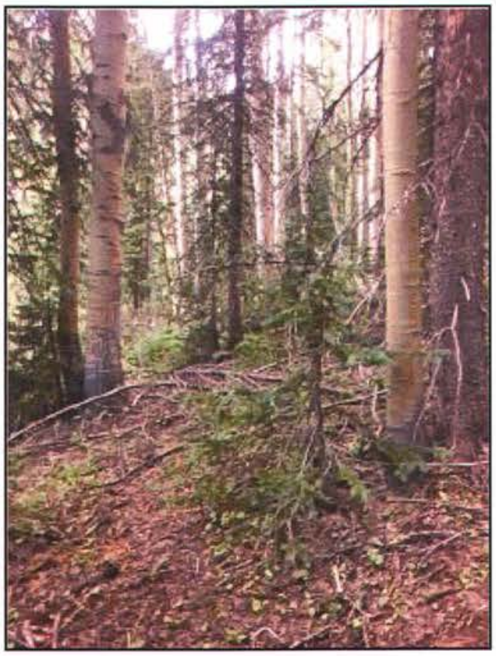
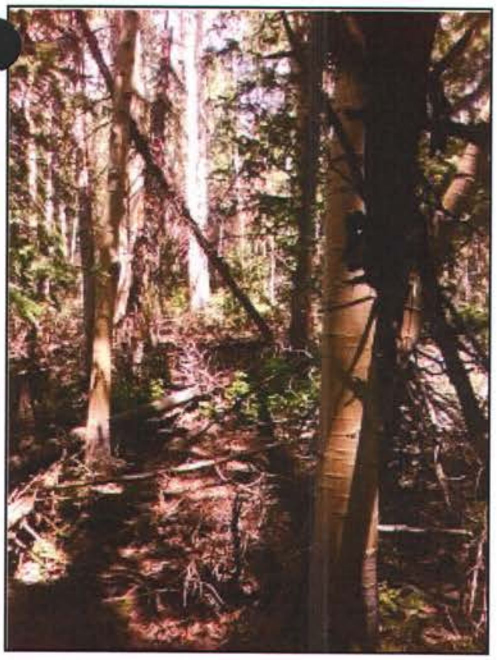



Photo 22-25: Circle Plot MC 2: on east facing slope not far above Range Creek



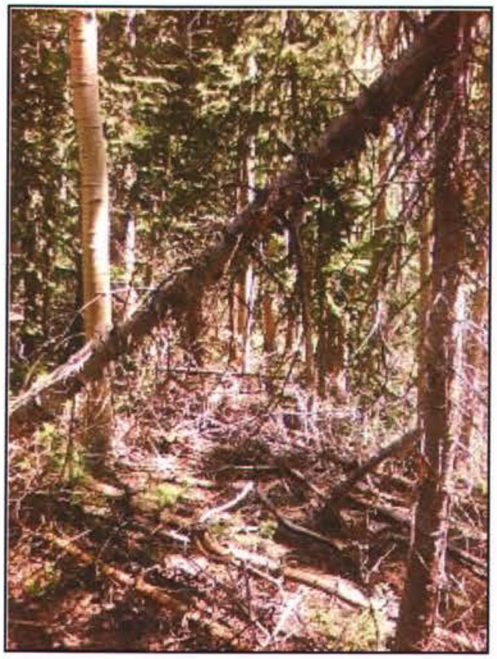
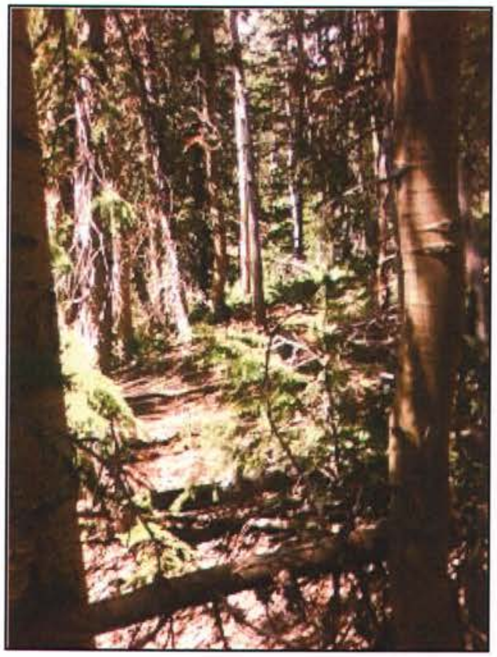
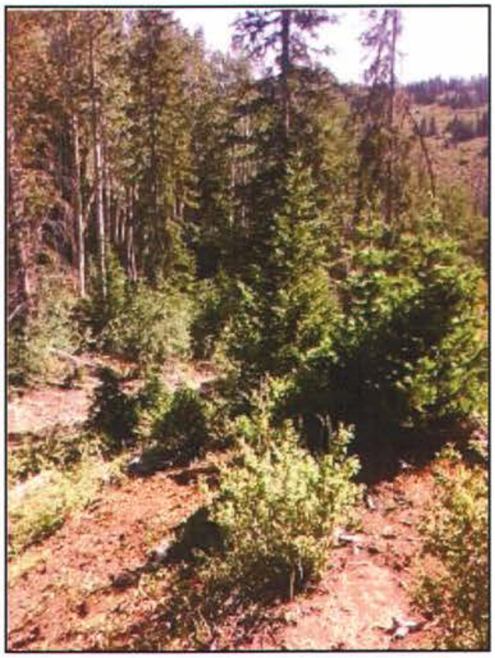


Photo 26-29: Circle Plot MC 3: on east-facing slope above Range Creek and below clear cut areas.

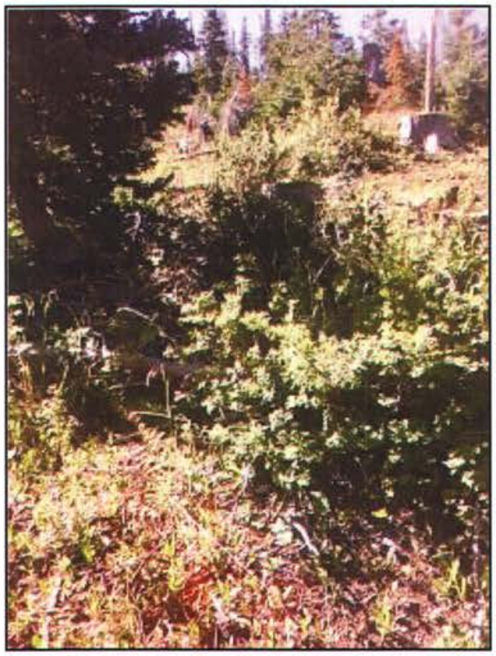


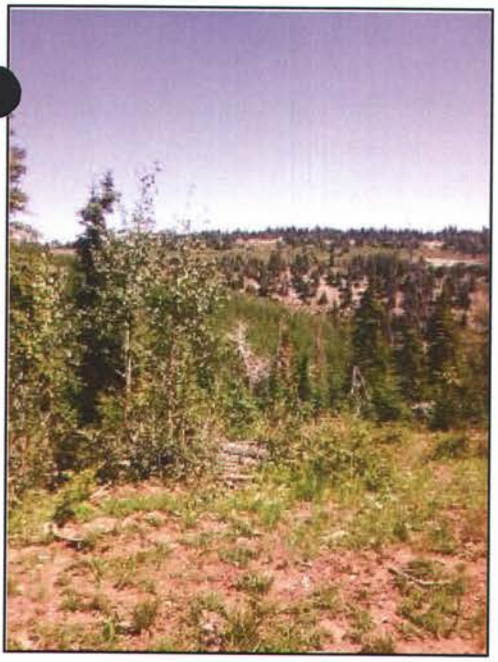
Photos 30-33: Photo Point MC 4: From L to R, Top to Bottom, looking north, east, south, and west from within mixed conifer stand, near center of survey area.

Photo 34: Photo Point MC 5: Looking northward through spruce-fir forest on top of plateau, toward northwest corner of survey area.

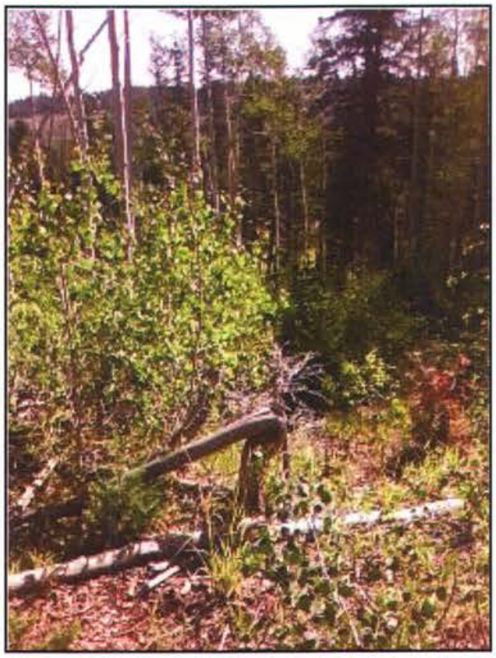
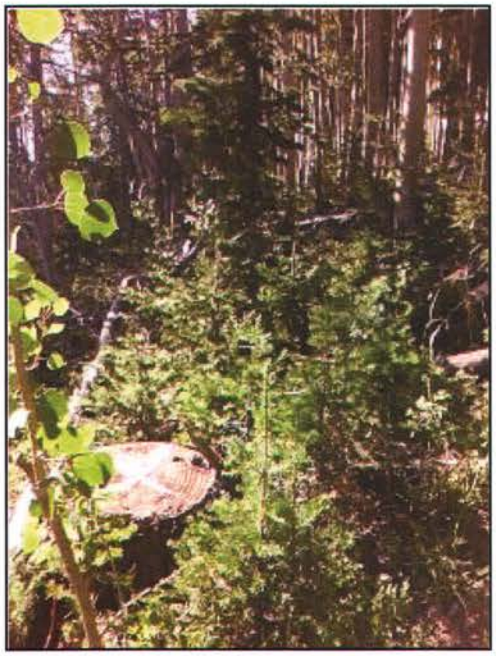


Photos 35-38: Photo Point 1 LOGGED AREA: Regenerating logged area Looking R – L, Top to Bottom - north, east, south and west. Just north of center of survey area.





Photos 39-40: Photo Point 2 LOGGED AREA: Logged area used for piling slash and logging roads. Looking north and south. Just south of center of survey area.


Photos 41-44: Circle Plot MC/A 1: L to R, Top to Bottom: Looking north, east, south and west near center of survey area.

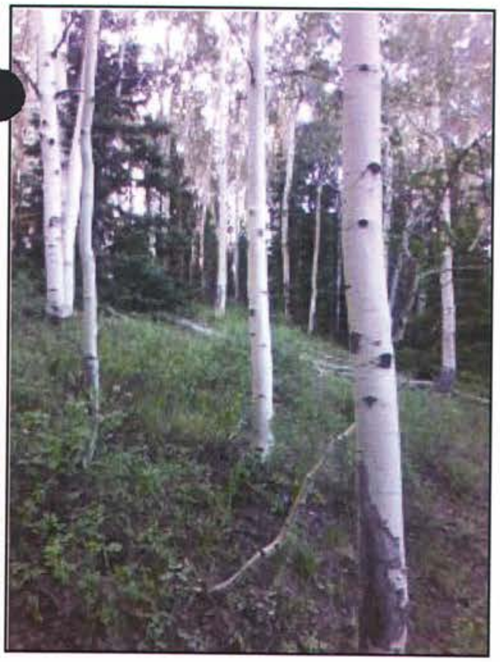


Photo 45: Photo Point MC/A2: Looking north at open aspen that is invaded with spruce-fir and contains little understory growth compared to "pure" aspen stands and thus transect data was not collected.

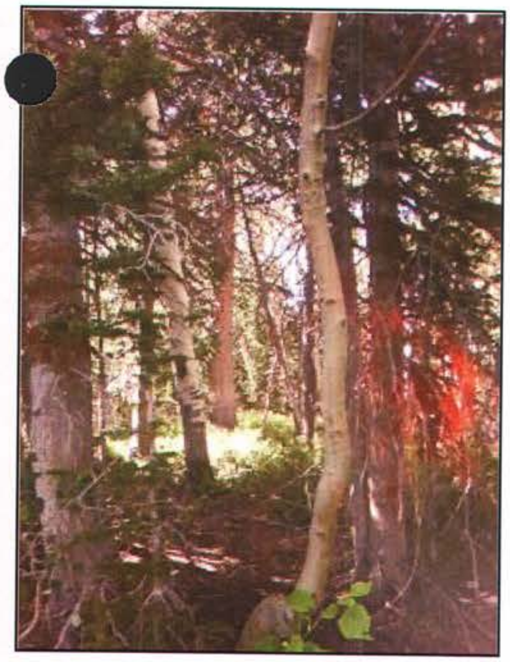


Photo 46: Photo Point MC/A3: Looking northwest into islands of mixed conifer and aspen trees, in northeast corner of lower survey area parcel.

Photo 47: Photo Point 3: Looking north toward proposed Plant Site in southwest corner of northern survey area parcel. The bare area in the foreground is a dirt road.

Photo 48: Photo Point 4: Looking east toward proposed Plant Site, in southwest corner of northern survey area parcel. The bare area in the foreground is a natural barren spot.

Photo 49: General View looking northeast from north of Map Point GS 2.

Photo 50: General View looking east from north of Map Point GS 2.

Photo 51: Photo Point Range Creek: Looking upstream. Note spring-fed water in bottom left of photo.

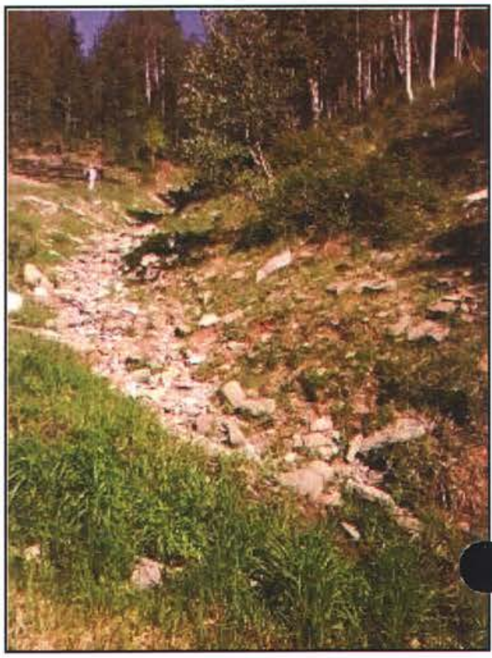


Photo 52: Photo Point Range Creek just above where spring flow enters. Range Creek has a defined bed and bank.

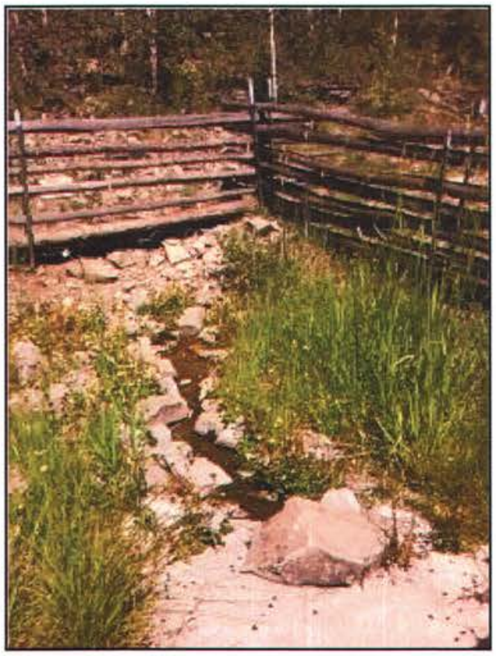


Photo 53: Photo Point Range Creek: Spring, flow from which is visible in Photo 52 above. The spring has been developed for cattle grazing.

Appendix D
Vegetation Transects: Complete Results and Data Sheets

	Asp 1	Asp 2	Asp3	Asp 4	Asp 5	Asp 6		GS 1	GS 2	GS 3	GS 4	GS 5	GS 6	GS 7	GS 8	
Shrubs																
1 Snowberry	2	3	2	2												
2 Subalpine fir		2	2													
3 Woods rose			1													
4 Aspen				1	1											
5 Gooseberry currant				1	2								5			
6 American raspberry													1			#
7 Mountain big sagebrush							# Hits		7	1		3				Sh
8 Ground juniper							Shrubs									in (
9 Western juniper							in Aspen									S
9 species							19									
Forbs																
1 Fewflower pea	1															
2 Western sweet root	1		1													
3 Meadowrue		1		1												
4 Tuber starwort		1														
5 Senecio sp.		1						1								
6 Lupinus sp.			3	1		5						1			1	
7 Pagumpa milkvetch			1													
8 Penstemon sp.																
9 Dandilion			2	1		1							1	3	2	
10 Colomia				1												
11 Gentian sp					1											
12 Viola sp					1											
13Mountain monardella									1							
14 Potentilla gracilis									7							
15 Achillea millifolia									1	2			3	1	2	
16 Flax										1						
17 Sulphur-flower buckwheat											1					
18 Rosy pussytoes											1			1		
19 Silverweed cinquefoil											3					
20 Alpine leafybract aster										1						
21 Hairy or Woody aster (Aster sp)														1		#
22 Unknown Forb						1	# Hits									Fo
23 Unknown Annual 1							Forbs								1	in (

n pen								1	Shrub			Slope	1
5									37			9	Total 71 hits
													2
			2		1		2						5
	7												8
		2											10
													1
										1			3
	2						1	1					6
								1					1
		1	2		1	3							11
	3						3	4					10
			1										1
					6	2							10
													2
	1			1					# Hits			# Hits	2
lits	2								Grasses			Grasses	2
sses			1						in Grass			in Steep	1
n pen			1		1				Shrub			Slope	2
4									52			1	Total 77 hits
	16	19	12	6	13	15	12	13		6	10		190

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR__________________ Date: _25 July 2012_______________

#1 Aspen__ Total Points/Transect___20__ Transect Length __100 feet________

Location:_See map
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
SYOR2 Symphoricarpos oreophillus	2
Total Shrubs	
Forbs	**# Hits**
LAPA5 Fewflower pea, Lathyrus paciflorus	1
OSOC , western sweetroot, Osmorhyza occidentalis	1
Total Forbs	
Grasses	**# Hits**
HECOC9 – Heterostipa comata, needleandthread	1
FEAR, Festuca arizonica	1
FETH, F. thurberi	3
LESAS, Leyus salinus	2
CAMI, Carex microchaeta, small-awned sedge	1
Total Grasses	
Other	**# Hits**
Litter	8
Rock	
Bare Ground	
Total Number of Points (10 or 20)	20

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR__________________ Date: _25 July 2012______________

#2 Asp Total Points/Transect___20__ Transect Length __100 feet________
Location:_See map
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
SYOR	3
ABLA	2
Total Shrubs	
Forbs	**# Hits**
THFE, Thalictrum fendleri, meadowrue	1
PSJA2, Pseudostellaria jamesiana, tuber starwort	1
SEIN, Senecio integerrimus, western groundsel	1
Total Forbs	
Grasses	**# Hits**
FETH, Festuca thuberi	5
Total Grasses	
Other	**# Hits**
Litter	5
Rock	
Bare Ground	2
Total Number of Points (10 or 20)	20

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR__________________ Date: _25 July 2012______________

#3 Aspen__ Total Points/Transect___20__ Transect Length __100 feet________

Location:_SEE MAP
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
Symphoricarpos oreophlilus	2
Abies lasiocarpa	2
Rosa woodsii	1
Total Shrubs	
Forbs	**# Hits**
Lupinus argenteus	3
As eng – Astragalus ensiformis, pagumpa milkvetch	1
Osmorhiza occidentalis	1
Taraxicum officianale	2
Total Forbs	
Grasses	**# Hits**
Bromus marginatus	2
Stipa comata	1
Total Grasses	
Other	**# Hits**
Litter	5
Rock	0
Bare Ground	0
Total Number of Points (10 or 20)	20

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR________________ Date: _25 July 2012_____________

#4 Aspen__ Total Points/Transect___20__ Transect Length __100 feet________

Location:_SEE MAP

Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
Symphoricarpos oreophlilus	2
Populus tremuloides	1
Ribes montigenum	1
Total Shrubs	
Forbs	**# Hits**
Colomia	1
Lupinus argenteus	1
Osmorhiza occidentalis	1
Taraxicum officianale	1
Total Forbs	
Grasses	**# Hits**
Bromus marginatus	1
Total Grasses	
Other	**# Hits**
Litter	10
Rock	
Bare Ground	1
Total Number of Points (10 or 20)	20

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR________________ Date: _25 July 2012______________

#5 Aspen__ Total Points/Transect___20__ Transect Length __100 feet________

Location:_SEE MAP
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
Ribes montagenum	2
Populus tremuloides	1
Total Shrubs	

Forbs	# Hits
Gentian sp	1
Viola sp	1
Total Forbs	

Grasses	# Hits
Poa sp	2
Bromus marginatus	1
Fescue sp	1
Carex sp	1
Total Grasses	

Other	# Hits
Litter	7
Rock	
Bare Ground	3
Total Number of Points (10 or 20)	20

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR__________________ Date: _25 July 2012______________

#6 Aspen__ Total Points/Transect___20__ Transect Length __100 feet________

Location:_SEE MAP
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
Total Shrubs	
Forbs	**# Hits**
Lupinus argenteus	1
Taraxicum officinale	1
Lupine	4
Unknown Forb	1
Total Forbs	
Grasses	**# Hits**
Calamagrostis sp.	2
Total Grasses	
Other	**# Hits**
Litter	11
Rock	0
Bare Ground	0
Total Number of Points (10 or 20)	20

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR__________________ Date: _25 July 2012_______________

Transect #:_1 G-S Total Points/Transect___20__ Transect Length __100 feet________
Location:__See map_
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
Total Shrubs	
Forbs	**# Hits**
SEIN, Senecio integerrimus	1
Total Forbs	
Grasses	**# Hits**
POPR, Poa pratensis	3
CATA, Carex	2
TRSP2, Trisetum spicatum	2
FEAR, Festuca arizonica	7
KOCR, Koelaria cristata (now K macrantha), prairie junegrass	1
Total Grasses	
Other	**# Hits**
Litter	3
Rock	
Bare Ground	1
Total Number of Points (10 or 20)	20

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR__________________ Date: _25 July 2012________________

#:2 G-S Total Points/Transect___20__ Transect Length __100 feet________

Location:__ See map_ Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
ARTV	7
Total Shrubs	

Forbs	# Hits
POGR, potentilla gracilis	7
MOOD	1
ACMI Common yarrow	1
Total Forbs	

Grasses	# Hits
FETH	2
BRMA	1
Total Grasses	

Other	# Hits
Litter	1
Rock	
Bare Ground	
Total Number of Points (10 or 20)	

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR________________ Date: _25 July 2012______________

#3 G-S Points/Transect___20__ Transect Length __100 feet________
Location:_See map__
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
ARTRV	1
Total Shrubs	
Forbs	**# Hits**
SYFOF, symphyotrichum folaceum, alpine leafybract aster	1
LILE3, Linum lewisii	1
ACMI, Achillea millifolia	2
Total Forbs	
Grasses	**# Hits**
PONE3, Poa secunda, Sandberg bluegrass	1
HELE, Letterman's needlegrass	2
AGSC, Agrostis scabra, rough bentgrass	1
BRMA, Bromus marginatus, mountain brome	2
PLJA, Pleuraphis jamesii, James' galleta	1
Total Grasses	
Other	**# Hits**
Litter	5
Rock	
Bare Ground	3
Total Number of Points (10 or 20)	20

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR___________________ Date: _25 July 2012_______________

#4 G-S_#4_Total_69__ Total Points/Transect___20__ Transect Length __100 feet________
Location:_See map
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
Total Shrubs	

Forbs	# Hits
ERUM, Erigonum umbellatum, sulphur-flower buckwheat	1
ANRO, Antennaria rosea, rosy pussytoes	1
POAN, potentilla anserine, silverweed cinquefoil	3
Total Forbs	

Grasses	# Hits
KOCR, koelaria cristata, prairie junegrass	1
Total Grasses	

Other	# Hits
Litter	2
Rock	11
Bare Ground	1
Total Number of Points (10 or 20)	20

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR___________________ Date: _25 July 2012_______________

#5 G-S__ Total Points/Transect___20__ Transect Length __100 feet________

Location:_SEE MAP 331˚_S end of project area
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
ArTr Vas (Mountain big sagebrush)	3
Total Shrubs	
Forbs	**# Hits**
Lupine broad leafed (Lupinus argenteus?)	1
Total Forbs	
Grasses	**# Hits**
Bromus marginatus	1
PLJA (Pleuraphis jamesii, James' galleta)	1
Stipa nelsonii or lettermani	1
Poa sp	6
Total Grasses	
Other	**# Hits**
Litter	4
Rock	0
Bare Ground	3
Total Number of Points (10 or 20)	20

Vegetation Survey Form (Line Transect)

Property:___GRR___________________ Date: _25 July 2012_______________

#6 G-S__ Total Points/Transect___20__ Transect Length __100 feet________

Location:_SEE MAP
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
ArTr Vas Mountain big sagebrush	0
Ribes montagenum (gooseberry currant)	5
Rubus ideaus (American raspberry)	1
Total Shrubs	
Forbs	**# Hits**
Achillea millifolia	3
Taraxicum officinale	1
Total Forbs	
Grasses	**# Hits**
Bromus marginatus	3
Poa sp	2
Total Grasses	
Other	**# Hits**
Litter	5
Rock	
Bare Ground	
Total Number of Points (10 or 20)	20

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR________________ Date: _25 July 2012______________

#7 G-S__ Total Points/Transect___20__ Transect Length __100 feet________

Location:_SEE MAP
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
Total Shrubs	
Forbs	**# Hits**
Achillea millefolia	1
Taraxicum officinale	3
Antenaria rosea	1
Hairy aster	1
Total Forbs	
Grasses	**# Hits**
Stipa sp	2
Poa pratensis	3
Carex sp.	1
Total Grasses	
Other	**# Hits**
Litter	3
Rock	1
Bare Ground	4
Total Number of Points (10 or 20)	20

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR_________________ Date: _25 July 2012______________

#8 G-S__ Total Points/Transect___20__ Transect Length __100 feet________

Location:_SEE MAP
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
Total Shrubs	
Forbs	**# Hits**
Achillea millefolia	2
Taraxicum officinale	2
Lupinus argenteus	1
Unknown Annual 1	1
Unknown Annual 2	1
Total Forbs	
Grasses	**# Hits**
Poa pratensis	4
Carex sp.	1
Carex gracilis	1
Total Grasses	
Other	**# Hits**
Litter	3
Rock	
Bare Ground	4
Total Number of Points (10 or 20)	20

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR_________________ Date: _25 July 2012_____________

#1 Steep Slope Total Points/Transect___20__ Transect Length __100 feet________
Location:_See map
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
Symphoricarpos oreophilis	2
Total Shrubs	
Forbs	**# Hits**
Woody aster sp	1
Penstemon sp	1
Lupinus sericeus	1
Total Forbs	
Grasses	**# Hits**
Rye grass (Saline wild rye?)	1
Total Grasses	
Other	**# Hits**
Litter	4
Rock	8
Bare Ground	2
Total Number of Points (10 or 20)	20

VEGETATION SURVEY FORM (LINE TRANSECT)

Property:___GRR__________________ Date: _25 July 2012______________

#2 Steep Slope Total Points/Transect___20__ Transect Length __100 feet________
Location:_See map
Observers: Leanna Ballard and Marit Sawyer, JBR environmental consultants

Shrubs	# Hits
Juniperus communis	1
Juniperus occidentalis	1
Symphoricarpos oreophilis	2
Total Shrubs	
Forbs	**# Hits**
Hairy aster	3
Monardilla odorissima (sweet mt mint) (MOOD)	1
Aster sp	1
Lupinus sp – thin leaves	1
Total Forbs	
Grasses	**# Hits**
Total Grasses	
Other	**# Hits**
Litter	6
Rock	3
Bare Ground	1
Total Number of Points (10 or 20)	20

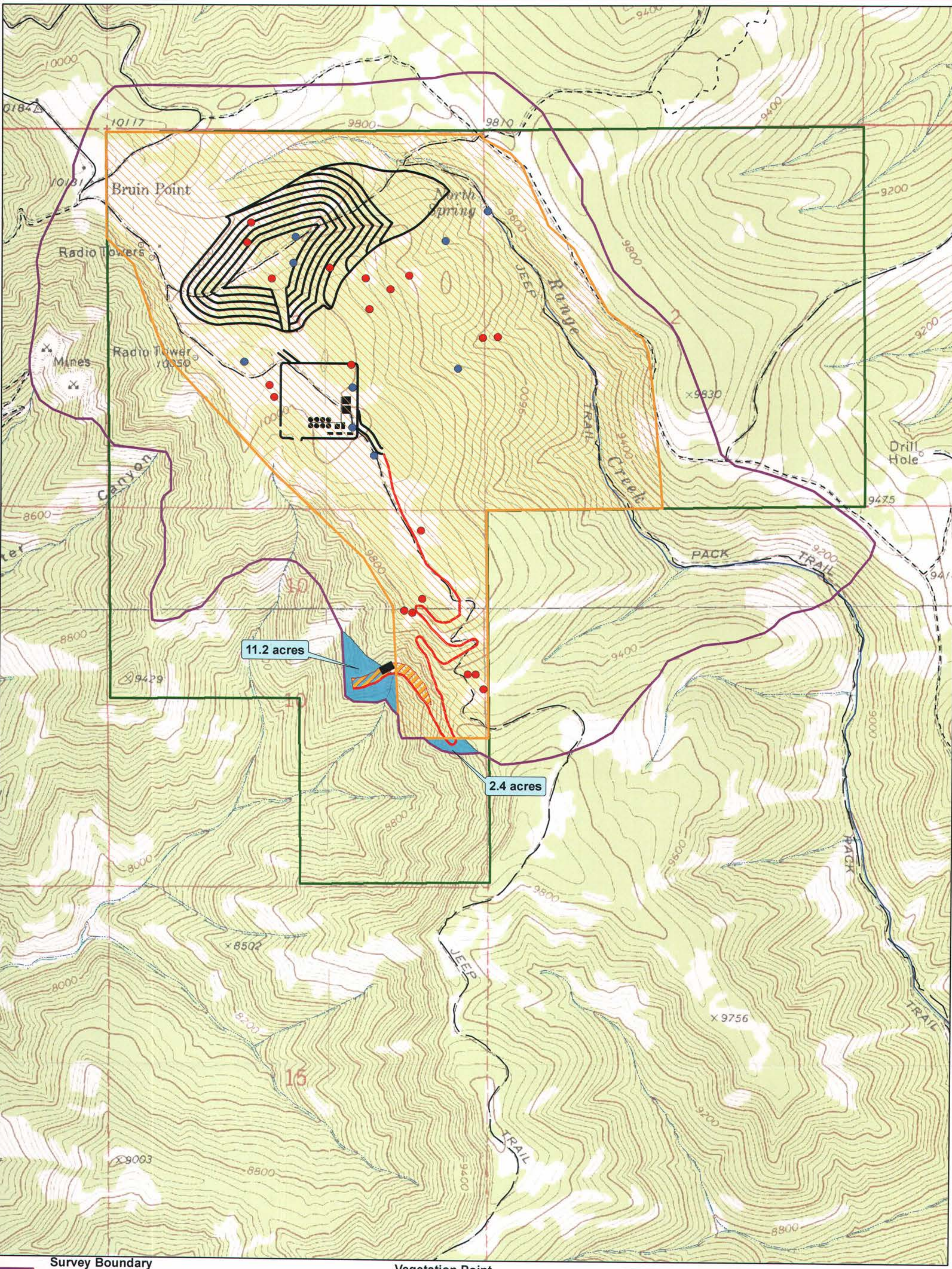
Green River Resources Inc.
Bruin Point Mine
Biological Resources Addendum
September 2014

This addendum has been prepared to support the Notice of Intent (NOI) by American Sands Energy Corporation (ASEC) to commence large mining activities, to be submitted for review to the Utah Division of Oil, Gas and Mining (DOGM). The additional area of impact (API) is approximately 14 acres and was added to the previous survey footprint to include the extension of a road in the southwest corner of the project area (Figure 1). This addendum incorporates information from the previous *Biological Resource Report* prepared by JBR Environmental Consultants, Inc., review of existing google earth maps, and professional judgment.

The API falls within the Steep Slope Vegetation Community. This community was characterized in the previous assessment as having very shallow, rocky soils and dominated by trees and shrubs. From review of the data and mapping of the API, the primary vegetation is limber pine and Douglas fire. The additional API is in a very steep location and falls below the average of 40 percent vegetation cover. No sensitive plants were observed within this vegetation community. Rare plants associated with this vegetation community are not likely to occur in the steeper sloped areas and t e conditions in the API match the previous surveys areas.

Habitat observations and probability of occurrence data for federally listed species was reviewed relative to the additional acreage of the API. No federally listed or State sensitive species are likely to occur within the extended API based on the similarity of the habitat conditions in the API and previously surveyed Steep Slopes Vegetation Community.

The additional approximate 14 acres of additional API has the same vegetation and habitat characteristics, wildlife habitat requirements and potential for federally listed or State sensitive species as observed and recorded for the Steep Slope Vegetation Communities in the JBR Biological Resource Report. The conditions in the API are the relatively the same as the Steep Slope Vegetation Community types that were previously surveyed in the greater project area. However, any additional surveys that may be required prior to construction for the larger areas should be extended into the additional API.



Path: Q:\Projects\American Sands Energy\24585638\09_Data\GIS\Maps\Fig_ASE_AdditionalSurvey_mxd

Survey Boundary (area surveyed outside the permit boundary is referred to as the extended survey area)
Permit Boundary
Vegetation Survey Area
Mine Haul Road
Perennial Stream
Intermittent Stream
Top Soil Removal
Portal Pad
Improved Road
Dirt Road
Road (Conditions Unknown)

Vegetation Point
Photo Point
Transect of Circle Plot
Additional Survey Area (13.6 acres)

N
625 0 625 1,250 Feet

Title:	Biological Resources Addendum
Bruin Point Mine DOGM Permit Application	Proj No: 24585638
	Figure: 1
American Sands Energy Corp	Date: September 2014
	URS

URS

RAPTOR SURVEY REPORT
BRUIN POINT MINE

For

American Sands
Energy Corp

Green River Resources Inc.
201 South Main, #1800
Salt Lake City, UT 84111

August 22, 2014

TABLE OF CONTENTS

TABLES

FIGURES

ACRONYMS

Acronym/Symbol	Definition
BGEPA	Bald and Golden Eagle Protection Act
DOGM	Division of Oil, Gas and Mining
ESA	Endangered Species Act
GAP	National Gap Analysis Program
GRR	Green River Resources Inc.
JBR	JBR Environmental Consultants, Inc.
MBTA	Migratory Bird Treaty Act
NOI	Notice of Intention
UDWR	Utah Division of Wildlife Resources
USDA	U.S. Department of Agriculture
URS	URS Corporation

1.0 INTRODUCTION

This report was prepared to support the Notice of Intention (NOI) by Green River Resources Inc. (GRR) to commence large mining operations, to be submitted for review to the Utah Division of Oil, Gas and Mining (DOGM). Under the Impact Assessment (R647-4-109) the NOI should include impacts to wildlife habitat and threatened, endangered, or sensitive species, and existing soil and plant resources. This report describes the potential impacts to wildlife habitat, and federally listed or sensitive species, specifically raptors.

The proposed GRR project area is located approximately five miles northeast of Sunnyside, Utah, in Carbon County, on Patmos Ridge just south of Bruin Point (located at 39° 38' 38.87"N, 110° 20' 53.06"W). It is accessed via two county roads, Whitmore Canyon Road and Water Canyon Road. The GRR project area is in Sections 2, 3, and the north ½ and southeast ¼ of Section 10, Township 14 South Range 14 East (Figure 1).

2.0 RAPTOR SURVEY AREA DESCRIPTION

The raptor survey was conducted within the permit boundary (Figure 1). The survey area is located between 9,000 and 10,040 feet above mean sea level at the boundary between the Wasatch and Uinta Mountains and the Colorado Plateau Ecoregions. The survey area is approximately 1,554 acres or 2.4 square miles, including relevant parts of Water Canyon and Range Creek. The plateau on which the survey area is located is dominated by mixed conifer forests (mostly Engelmann spruce [*Picea engelmannii*] and subalpine fir [*Abies lasiocarpa*]), open grassland - shrubland, and occasional quaking aspen (*Populus tremuloides*) stands. There are some previously logged areas that are currently dominated by grasses.

The south and west side of the survey area drops steeply off the plateau into the headwaters of Water Canyon, which drains into Whitmore Canyon above the town of Sunnyside, and eventually to the Price River. This very steep and generally west-facing escarpment rises roughly 3,500 feet above the canyon floor. The east side of the project area drops down into Range Creek, which runs north-south through a wooded canyon.

3.0 BACKGROUND AND PREVIOUS WILDLIFE SURVEY INFORMATION

In a past survey conducted by JBR Environmental Consultants, Inc. (JBR) in 2012, (JBR, 2014), the project area was assessed for habitat types and potential for occurrence of federally listed, proposed, and candidate wildlife species managed under the Endangered Species Act (ESA) of 1973 (as amended) and Utah sensitive species. The Carbon County list of federally protected species includes only one raptor species, the Mexican Spotted Owl. Carbon County is on the very north edge of this bird's range, and the designated critical habitat that is mapped in Carbon County does not overlap with the project area. The probability of occurrence is very low for this species and it was not included as a focal species during JBR's survey effort. Nor was it included as a focal species for the current survey. The Mexican Spotted Owl is no longer on the current Carbon County list of federally protected species (UDWR, 2012).

JBR's report identified several raptors included on the Utah sensitive species list for Carbon County: bald eagle (*Haliaeetus leucocephalus*), burrowing owl (*Athene cunicularia*), ferruginous hawk (*Buteo regalis*), and northern goshawk (*Accipiter gentilis*). The habitat observations and likelihood of occurrence for the raptors listed as sensitive species in Carbon County is summarized in Table 1.

Table 1. Habitat Observations and Probability of Occurrence of Raptors listed as Sensitive Species in Carbon County

Species	State Status	Probability of Occurrence	Habitat Observations
Bald Eagle *Haliaeetus leucocephalus*	SPC	Very Low	No potential nesting habitat. Individuals may be observed flying over during migration.
Burrowing Owl *Athene cunicularia*	SPC	Low	Requires deeper soil for burrows. Prefers open grasslands, especially prairie, plains, and savanna.
Ferruginous Hawk *Buteo regalis*	SPC	Very Low	Prefers open, flat, rolling terrain largely devoid of trees except for small groves, riparian corridors, and shelterbelts. Avoids high elevations, forest interiors, narrow canyons, and cliff areas.
Northern Goshawk *Accipiter gentilis*	CS	Moderate	Prefers mature forest with multiple canopy layers, but has been found in less dense pinyon-juniper areas. Habitat exists in the project area.

Acronyms/Symbols:
SPC - Wildlife Species of concern
CS - Species receiving special management under a Conservation Agreement in order to preclude the need for Federal listing.

Following JBR's initial wildlife review and habitat assessment, they recommended conducting an additional survey specifically for raptor species, specifically: Northern goshawk and other nesting raptors have potential to occur in the project area.

4.0 RAPTOR SURVEY METHODOLOGY

URS was contracted to conduct the suggested raptor surveys. The raptor survey methodology was developed to determine occurrence and nesting status of raptor species listed as sensitive in Carbon County, Utah and those protected under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden

Eagle Protection Act (BGEPA). The survey methodology was developed to survey specifically for Northern goshawk, but also generally for other raptor species likely to occur within the project area, which include: red-tailed hawk, sharp-shinned hawk, Cooper's hawk and great-horned owl (Table 2).

Table 2. Raptor Species Listed as Sensitive in Carbon County, Utah and those Protected Under the MBTA or BGEPA, and Their Nesting Habitat

Sensitive Species	Nesting Habitat
Bald Eagle *Haliaeetus leucocephalus*	Mountain and Lowland Riparian
Northern Goshawk *Accipter gentilis*	Mountain and Lowland Riparian, Spruce-fir, Pine, Aspen, Deciduous/Conifer Mixed
Ferruginous Hawk *Buteo regalis*	Arid to semi-arid regions, shrub steppe, grasslands
Burrowing Owl *Athene cunicularia*	Grassland, Dry Meadow, Salt-desert Scrub, Blackbrush, Cresosote-burdage
Protected Species	**Nesting Habitat**
Golden Eagle *Aquila chrysaetos*	Mountain and Lowland Riparian, Spruce-fir, Pinyon-Juniper, Barren (Cliffs)
Peregrine Falcon *Falco peregrinus*	Barren (Cliffs)
Prairie Falcon *Falco mexicanus*	Mountain Riparian, Barren (Cliffs), Urban

Source: UDWR, 2011; UDWR, 2005

The primary goal of the raptor survey was to locate and map all active and inactive cliff, ground, and woodland raptor nest structures in areas potentially influenced by project-related activities. Broadcast acoustical surveys (for Northern goshawk) covered most of the forested areas and pedestrian surveys were used to survey the remaining habitats. The biologist searched for nest structures and individuals and recorded any observation of both. For all observation locations; species, nest status, nest substrate, habitat, and notable behaviors were recorded. The survey focused on sensitive or protected species, but incidental observations of all raptor or other non-raptor sensitive species were recorded. Broadcast acoustical for Northern goshawk and pedestrian survey methods for all raptor species with potential to occur in the project area were used in conjunction to efficiently survey the project area.

Northern goshawk surveys were conducted in suitable habitat in the survey area. Suitable habitat was determined through a desktop analysis using ArcGIS 10.2. National Gap Analysis Program (GAP) landcover data (USGS, 2011) and LANDFIRE vegetation data (Wildland Fire Science et al., 2013) were used to determine areas that contained forested vegetation types (Aspen, mixed-conifer, etc.) and >60% canopy cover (Figure 2). Within suitable habitat, parallel transects were placed 250 meters (m) apart. Along each parallel transect, call stations were located every 200 m. To increase coverage, call station locations on adjacent transects were offset by 100 m. The most important factor in transect and station placement is completeness of coverage. To achieve acceptable confidence in survey results and coverage;

all suitable habitat was within 150 m of a calling station. This method is called the "Kennedy-Stahlecker Protocol", and is the current standard methodology used by the United State Department of Agriculture (USDA) Forest Service (Woodbridge and Hargis, 2006).

The wildlife biologist used binoculars and a broadcast caller (Firefox Wildfire Predator Caller) to broadcast goshawk adult alarm calls and nestling food begging calls at call stations along transect routes to elicit responses from defensive territorial adult goshawks and nestlings. This method was employed because it is efficient, applicable to large areas of land, and can be modified to address difference in project area topography and habitat. A general bird species list was collected during each survey day to provide information on species diversity and richness within the project area.

4.1 Raptor Survey Results

Surveys were conducted June 24 through June 27, 2014. Northern goshawk surveys began the morning of June 24, 2014 in the southwest section of the survey area (Figure 2). A total of 62 call station points out of the expected 74 were surveyed, covering all suitable habitats. Fifteen call points were excluded from the survey because, after onsite observation, the habitat was determined not suitable. Approximately 17 call stations were completed each day. At each call station the Northern goshawk adult alarm call and fledgling food begging call were played. Each call was played because, due to the seasonal timing of the survey, there was potential to find adults either still brooding or with young nestlings, or nests with older nestlings.

The Northern goshawk survey resulted in no observations of individuals or signs of activity (nest, plucking post, whitewash). Although much of the habitat in the survey area is within the range of suitable habitat for Northern goshawk, they prefer mature forests and have home ranges averaging three square miles or more in naturally fragmented habitats (Hasselblad and Bechard, 2007). The survey area is relatively small to support a breeding pair of Northern goshawk. If a nest site occurs close to the permit area, there is potential for a goshawk to include part of the survey area in their home range. However, no signs of goshawks were identified in the survey area.

No sensitive or protected raptor species that could potential occur in the survey area (Table 2), were observed. A total of 21 species of birds were observed (Table 3). Of these, two raptor species (Cooper's hawk and Red-tailed hawk) were observed (Figure 3). The Cooper's hawk was observed perched and foraging in the southern end of the survey area. The area was at the ecotone of aspen and grassland dominated habitats.

There were three observations of Red-tailed hawks, all within the vicinity of Range Creek, on the east side of the survey area. Based on observation all three sightings were of the same bird, or of individual birds that were paired. The first observation was of an adult flying south, following Range Creek Canyon. The second and third observations included an individual responding aggressively, territorially, to the goshawk broadcast call. In both of these observations, the adult Red-tailed hawk came into the call station calling, and remained in the area until the biologist finished the broadcast and left the area. It is assumed that the hawks observed were breeding in the area, although no nest was found during additional searching.

One non-raptor observation was of a female ruffed grouse with at least five chicks. She responded defensively to the biologist when encountered in an aspen grove located in the northern part of the survey area (Figure 3).

Table 3. Bird Species Observed in the Survey Area

Common Name	Scientific Name	Code
Ruby-crowned Kinglet	*Regulus calendula*	RCKI
Brewer's Sparrow	*Spizella breweri*	BRSP
Hermit Thrush	*Catharus guttatus*	HETH
Steller's Jay	*Cyanocitta stelleri*	STJA
Red-tailed Hawk	*Buteo jamaicensis*	RTHA
Clark's Nutcracker	*Nucifraga columbiana*	CLNU
Red-breasted Nuthatch	*Sitta canadensis*	RBNU
Turkey Vulture	*Cathartes aura*	TUVU
Northern Flicker	*Colaptes auratus*	NOFL
Cooper's Hawk	*Accipiter cooperii*	COHA
Western Tanager	*Piranga ludoviciana*	WETA
American Robin	*Turdus migratorius*	AMRO
Common Raven	*Corvus corax*	CORA
Black-headed Grosbeak	*Pheucticus melanocephalus*	BHGR
Ruffed Grouse	*Bonasa umbellus*	RUGR
Pine Siskin	*Spinus pinus*	PISI
Yellow-rumped Warbler	*Setophaga coronata*	YRWA
House Wren	*Troglodytes aedon*	HOWR
Hairy Woodpecker	*Picoides villosus*	HAWO
Mountain Bluebird	*Sialia currucoides*	MOBL
Green-tailed Towhee	*Pipilo chlorurus*	GTTO

5.0 CONCLUSIONS

No federally listed threatened, endangered, or candidate species are likely to occur within the project area. Of the Utah sensitive species, only the Northern goshawk has a moderate to high potential to occur within the project area. There were no Northern goshawks, or signs of goshawks, observed. Two non-federally listed, MBTA protected, species of raptors were observed in the survey area, Cooper's hawk and Red-tailed hawk. A breeding ruffed grouse was noted as an observation of interest.

6.0 REFERENCES

JBR Environmental Consultants, Inc., (JBR), 2014. Biological Resources Survey Report

Hasselblad, K. and M. Bechard, 2007. Male northern goshawk home ranges in the great basin of south-central Idaho. Journal of Raptor Research 41(2):150–155

USGS Gap Analysis Program GAP, 2011. National Land Cover, Version 2.

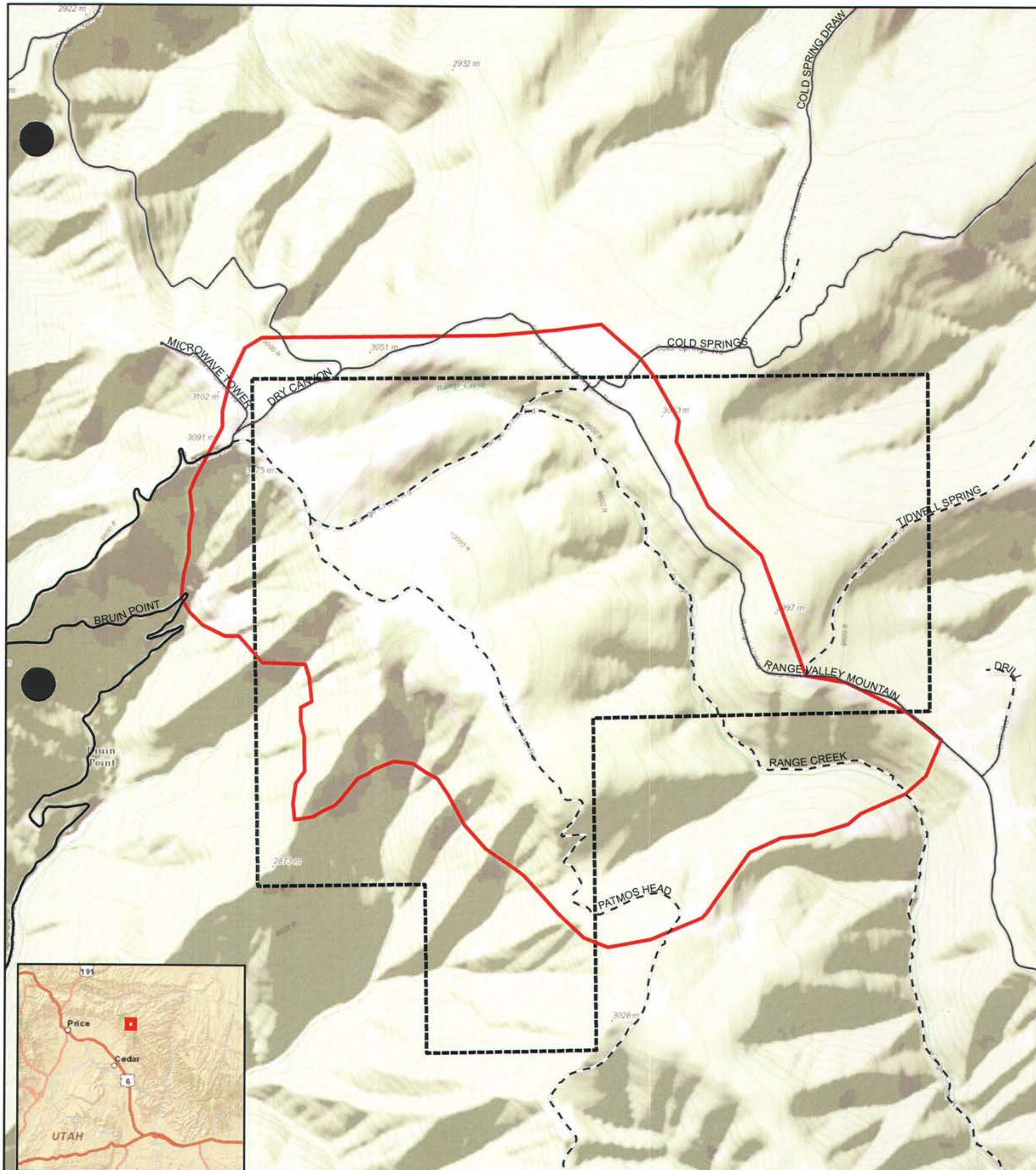
Utah Division of Wildlife Resources (UDWR), 2005. Utah Vertebrate Animals Information Database: Black-Footed Ferret Species Information.
Available online at http://dwrcdc.nr.utah.gov/rsgis2/Search/Display.asp?FlNm=mustnigr.

UDWR, 2012. County Lists of Utah's Federally Listed Threatened (T), Endangered (E), and Candidate (C) Species. Last Updated on January 12, 2012. Available online at http://dwrcdc.nr.utah.gov/ucdc/viewreports/te_cnty.pdf.

UDWR, 2011. Utah's State Listed Species by County. Last Updated on March 29, 2011.

Wildland Fire Science, Earth Resources Observation and Science Center, USGS, 2013. LANDFIRE Existing Vegetation Cover. LANDFIRE 2010 (lf_1.2.0)

Woodbridge, B. and Hargis, C.D., 2006. Northern goshawk inventory and monitoring technical guide. Gen. Tech. Rep. WO-71. Washington, DC: U.S. Department of Agriculture, Forest Service. 80 p.



Legend

Survey Area

Permit Boundary

Roads

Unimproved

Paved

Improved

Access Road

Figure 1. Permit Boundary and Survey Area

American Sands Bruin Point
Raptor Surveys
August 2014

0 0.25 0.5 Miles

URS

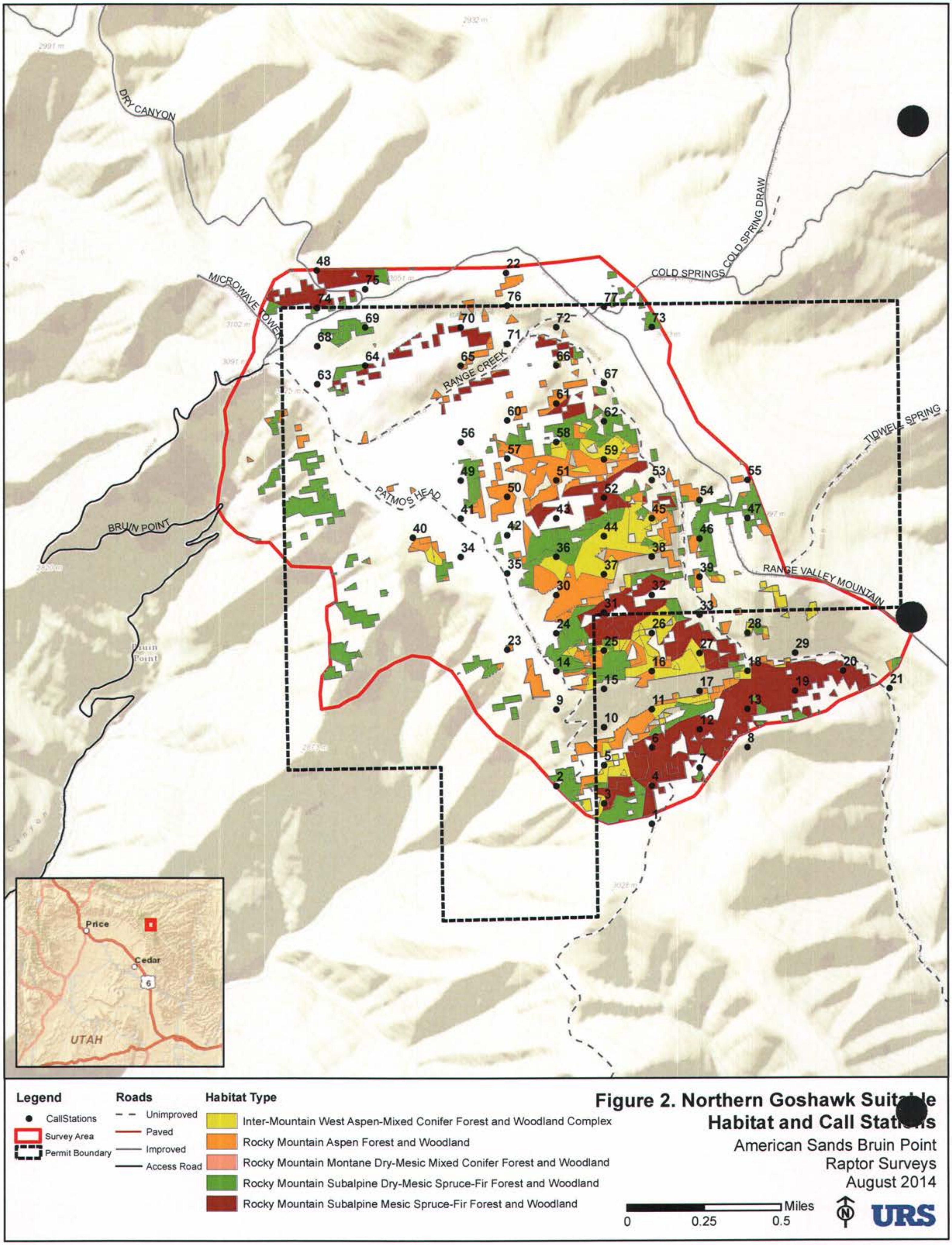
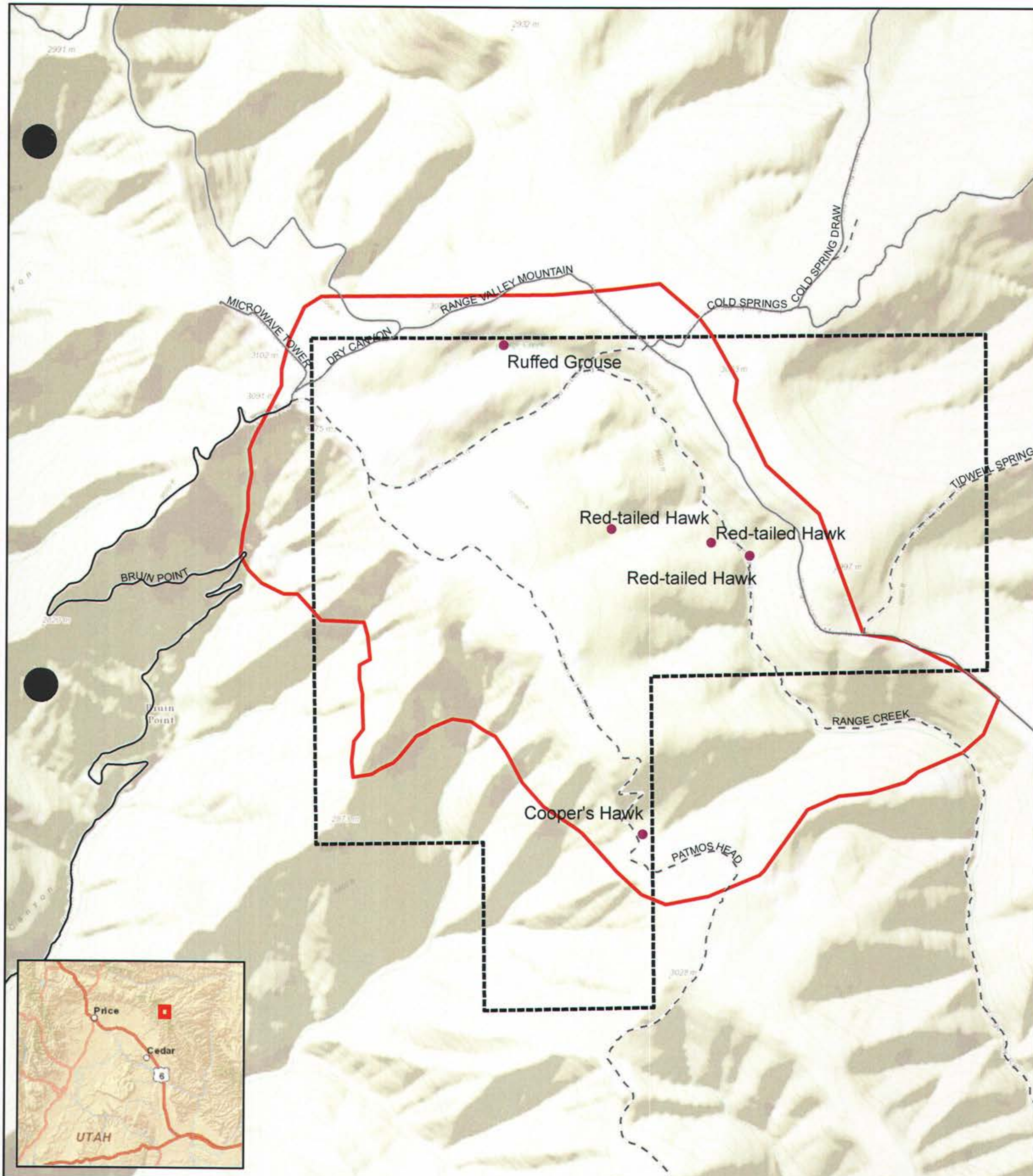


Figure 2. Northern Goshawk Suitable Habitat and Call Stations

American Sands Bruin Point
Raptor Surveys
August 2014



Legend

- Wildlife Observation
- Survey Area
- Permit Boundary

Roads

- Unimproved
- Paved
- Improved
- AccessRoad

Figure 3. Raptor and Wildlife of Interest Observation Points

American Sands Bruin Point
Raptor Surveys
August 2014

0 0.25 0.5 Miles

URS

APPENDIX B

Soil Survey Report

URS

SOIL SURVEY REPORT

BRUIN POINT MINE

For

American Sands Energy Corp

Green River Resources Inc.
201 South Main, #1800
Salt Lake City, UT 84111

August 21, 2014

TABLE OF CONTENTS

TABLES

APPENDICES

ACRONYMS

Acronym/Symbol	Definition
ACZ	ACZ Laboratories, Inc.
bgs	below ground surface
CEC	cation exchange capacity
ºC	degrees Celsius
DOGM	Division of Oil, Gas and Mining
EC	electrical conductivity
ºF	degrees Fahrenheit
GPS	global positioning system
”	inches
µm	micrometer
meq/100g-dry	milliequivalents per 100 grams of dry matter
mg/Kg	milligrams per kilogram
mmhos/cm	millimhos per centimeter
NRCS	Natural Resources Conservation Service
N	nitrogen
NA	not applicable
NOI	Notice of Intention
%	percent
SAR	sodium absorption ratio
USDA	U.S. Department of Agriculture
URS	URS Corporation

1.0 INTRODUCTION

URS Corporation (URS) has prepared this Soil Survey Report for the proposed Bruin Point Mine, for Green River Resources near Sunnyside, Carbon County, Utah (**Appendix A – Figure 1**). This report describes the baseline soil survey.

1.1 Purpose

This report provides soil survey information to the Utah Division of Oil, Gas and Mining (DOGM) and will be part of the Notice of Intention (NOI) to Commence Large Mining Operations for the Bruin Point Mine (DOGM permit number M-007-0040). DOGM requires that an ecological baseline survey be completed as part of the NOI. This report describes the soil conditions at the site and will support the ecological baseline reporting performed as part of the permitting process. The information from the baseline survey will be used to determine the reclamation standard for the site upon the completion of the mining operation.

2.0 SITE DESCRIPTION

2.1 Regional

The project area is located approximately 5 miles northeast of Sunnyside, Utah, in eastern Carbon County on Patmos Ridge just south of Bruin Point. This region is considered a sub-humid to semi-arid landscape and receives approximately 10.12 inches (") of rainfall annually NOAA, 2014.

The project area lies at the boundary between the Wasatch and Uinta Mountains and the Colorado Plateau ecoregions. The ecoregions are characterized as containing mixed conifer forests of Engelman spruce, sub-alpine fir, and grassland-shrubland in the upper reaches of the area, and aspen (Woods et al., 2001).

The project area is located on a plateau in the Book Cliffs and Roan Cliffs area at an elevation of between 8,800 and 10,200 feet above mean sea level. The topography of the project area is gently sloping on the north and east side of the site and drops steeply off the top of the plateau on the south and west sides. The vegetation across the project area is dependent on the slope and elevation.

2.2 Local Area

The site is located in the Book Cliff-Roan Cliff Plateau northeast of Sunnyside, UT. When the mine is fully operational, approximately 160 acres will be disturbed (**Figure 1**). The site can be accessed via Water Canyon from Whitmore Canyon Road on a Class B gravel road maintained by the county. However, during operation, the site will be accessed via Nine Mile Canyon. The site can be found on the United States Geological Survey 7.5 minute Bruin Point (1978) quadrangle maps within Township 14 South, Range 14 East, Sections 2, 3, and 10. The approximate site center point is Latitude 39.633° and Longitude -110.33°. Site elevation ranges between approximately 8,800 and 10,200 feet.

Geology at the site is mapped as Eocene fluvial and lacustrine sandstones at the contact between the Wasatch and Green River Formations (Holmes et al., 1948). These units were deposited in a large fluvial-deltaic system associated with Lake Uinta.

The moisture in this region comes in the form of precipitation. Water features within the project area are confined to Water Canyon on the west side of the site and Range Creek on the east side of the site, however, neither Water Canyon or Range Creek is within the proposed area of disturbance. The mainstem of Water Canyon which is outside of the disturbed area is mapped as intermittent or ephemeral. Seeps and springs in the area are sparse.

2.3 Natural Resources Conservation Service – Soil Survey

The U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Web Soil Survey 2.0, National Cooperative Soil Survey identified six soil series within the proposed project area (**Appendix A - Figure 2**). These soil units included the Doney Family-Podo complex, the Guben-Rock outcrop complex, Senchert-Senchert family complex, Senchert family 3-15% slopes, Uinta-Toze families complex, and the Midfork family-Commodore complex.

2.3.1 Doney family-Podo complex

Doney family-Podo complex soils can be found on the east slope of the project area and consist of a combination of soils from both the Doney family and Podo series. These soils are described as being deep, well-drained colluvium and/or slope alluvium deposits that formed on mountain slopes ranging from 40-70 percent (%). The mean annual precipitation is approximately 16-20" and the mean annual air temperature is approximately 38-45 degrees Fahrenheit (°F) (NRCS, 2014).

2.3.2 Guben-Rock Outcrop complex

Guben-Rock soils can be found on the west side of the ridge within the project area and consist of a combination of soils from the Guben series and Rock Outcrop series. These soils are described as being somewhat shallow with large areas covered with surface fragments and unweathered bedrock. The soil is a well-drained, bouldery, fine sandy loam derived from colluvium deposits formed on mountain slopes ranging from 50-80%. The mean annual precipitation is approximately 16-20" and the mean annual air temperature is approximately 38-45 °F (NRCS, 2014).

2.3.3 Senchert-Senchert family complex

Senchert family complex soils can be found on flat to gently sloping areas in the north and east sides of the project area and consist of soils from the Senchert and Senchert family series. These soils are described as being somewhat shallow, well drained colluvium and or slope alluvium deposits that formed on ridges or plateaus with slopes ranging from 1-15%. The mean annual precipitation is approximately 20-30" and the mean annual air temperature is approximately 36-38 °F (NRCS, 2014).

2.3.4 Senchert family, 3 to 15% slopes

Senchert family complex soils can be found on the gently sloping areas on the northwest and east sides of the project area and consist of soils from the Senchert and Senchert family series. These soils are described as being somewhat shallow, well drained colluvium and or slope alluvium deposits that formed on ridges or plateaus with slopes ranging from 1-15%. The mean annual precipitation is approximately 20-30" and the mean annual air temperature is approximately 36-38 °F (NRCS, 2014).

2.3.5 Uinta-Toze families complex

Uinta-Toze family complex soils can be found in a large area in the middle of the project area and consist of soils from the Uinta Family and Toze family series. These soils are described as being somewhat deep, well drained colluvium deposits that formed on mountain slopes ranging from 35-70%. The mean annual precipitation is approximately 20-30" and the mean annual air temperature is approximately 34-38 °F (NRCS, 2014).

2.3.6 Midfork family-Comodore complex.

Midfork family-Comodore complex soils can be found on the steep slopes on the west side of the project area and consist of soils from the Midfork family and Comodore series. These soils are described as being somewhat deep, well drained colluvium deposits that formed on mountain slopes ranging from 50-70%. The mean annual precipitation is approximately 16-25" and the mean annual air temperature is approximately 34-45 °F (NRCS, 2014). Because access to these soils is extremely difficult and none of the soils in this complex exist within the disturbance boundary, a soil sample from this complex was not collected.

3.0 OBJECTIVES

The objective of this soil survey report is to accurately depict and document the existing soil conditions prior to commencing mining operations. The existing site conditions have been recorded so that, upon the completion of the mine operations, the site can be reclaimed as close to its original condition as possible. As part of this characterization, soil samples were collected within the footprint of the proposed project area from each of the five soil units mapped by the NRCS to be present at the site as described in the previous section.

4.0 METHODS

Fieldwork was performed and soil samples were collected on June 23, 2014. A Garmin GPSMAP 62st global positioning system (GPS) was used to survey the soil sample locations during the field survey. The study area being considered for the mining and processing operation covers approximately 160 acres.

4.1 Soil Sample Collection

Soil sample collection and analysis was completed to satisfy the requirements of the State of Utah Department of Natural Resources, DOGM, the NOI, and in accordance with guidance provided verbally from DOGM. Each soil sample collection location was analyzed in the field for texture and color. Soil sample collection pits were photographed (**Appendix B** – Photograph Log) and locations were mapped (**Appendix A - Figure 2**). Two soil samples were collected at each of the five soil pits. One sample was collected from a depth of 0-6" below ground surface (bgs), and one sample was collected from a depth of 6-12" bgs. The samples were packed and shipped to ACZ Laboratories, Inc. (ACZ) at 2773 Downhill Drive, Steamboat Springs, CO 80487, in accordance with the sample storage requirements required by the analytical methods to be performed on the samples. The samples were shipped under chain of custody via Federal Express and delivered on Friday, June 27, 2014.

Per requirements of the NOI and discussions with DOGM, the laboratory analysis for soil samples included texture, pH, EC, cation exchange capacity (CEC), sodium absorption ratio (SAR), total nitrogen (N), available extractable phosphorus, total potassium, and acid/base potential. The sample was first sieved on a <2,000 micrometer (µm) sieve and dried at 35 degrees Celsius (ºC). Sand particles range from 53µm to 850µm. Silt particles range from 2µm to less than 53µm. Clay particles are less than 2µm. Soil groups are determined based on the percentage of the three different particles in each soil group in accordance with the USDA Soil Classification System.

5.0 RESULTS

5.1 Soil Samples

The results of the field soil sample analyses are summarized in **Table 1** and the soil sample locations are shown on **Appendix A - Figure 2**.

Table 1. Soil Sample Field Results, Bruin Point Mine, June, 2014

NRCS Soil Type/Sample ID	Depth (inches)	Color
Doney family-Podo Complex	0-6	Grey/Brown
Doney family-Podo Complex	6-12	Brown
Guben-Rock Outcrop Complex	0-6	Grey/Brown
Guben-Rock Outcrop Complex	6-12	Black/Brown
Senchert-Senchert family Complex	0-6	Brown
Senchert-Senchert family Complex	6-12	Brown
Senchert family, 3 to 15 % Slopes	0-6	Tan/Brown
Senchert family, 3 to 15 % Slopes	6-12	Brown
Uinta-Toze families Complex	0-6	Grey
Uinta-Toze families Complex	6-12	Grey/Brown

5.2 Soil Sample Lab Results

The results from ACZ are summarized in **Table 2** and the complete report can be viewed in **Appendix C**.

Table 2. ACZ Soil Sample Results, Bruin Point Mine, June, 2014

Analyte (Units)	Detection Limit	Analytical Results									
		Doney Family-Podo Complex		Guben-Rock Outcrop Complex		Senchert-Senchert Family Complex		Senchert Family – 3 to 15% Slopes		Uinta-Toze Families Complex	
		0-6"	6-12"	0-6"	6-12"	0-6"	6-12"	0-6"	6-12"	0-6"	6-12"
Total Potassium (mg/Kg)	20	4820	4790	5180	5150	5870	5620	4620	4730	3020	2390
USDA Soil Classification	NA	Silty Clay Loam	Silty Clay Loam	Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam /Silty Clay	Clay Loam	Silty Loam
CEC (meq/100g-dry)	0.02	23.8	20.2	25.3	29.9	26.5	29.4	32.7	31.5	17.0	14.4
EC @ 25 °C (mmhos/cm)	0.001	0.161	0.086	0.092	0.097	0.261	0.214	0.195	.0186	0.067	0.050
pH @ 25 °C	0.1	6.0	6.0	6.0	6.3	6.7	7.0	6.5	6.9	5.8	5.6
Extractable Phosphorus (mg/Kg)	1	7	5	10	7	15	11	5	2	8	3
SAR	0.03	0.043	0.060	0.04	0.04	0.026	0.030	0.039	0.034	0.053	0.085
Total Nitrogen (as N) (%)	0.02	0.22	0.19	0.37	0.26	0.40	0.31	0.46	0.33	0.20	0.12
Sulfur, Total (%)	0.01	0.03	0.02	0.04	0.03	0.04	0.04	0.06	0.04	0.02	0.02
Acid Generation Potential	0.3	0.937	0.625	1.3	0.937	1.3	1.3	1.9	1.3	0.625	0.625
Acid Neutralization Potential	1	15	15	13	20	26	22	20	22	9	7
Acid Base Potential	1	14	14	14	12	25	21	18	21	8	6

Acronyms/Symbols:

CEC	-	cation exchange capacity	N	-	nitrogen
°C	-	degrees Celsius	NA	-	not applicable
EC	-	electrical conductivity	%	-	percent
"	-	inches	SAR		sodium absorption ratio
meq/100g-dry	-	milliequivalents per 100 grams of dry matter	USDA	-	U.S. Department of Agriculture
mg/Kg	-	milligrams per kilogram	mmhos/cm	-	millimhos per centimeter

5.3 Soil Analysis

The soils sampled on site were classified according to the USDA Classification System. Three soil groups were identified in the soil samples: silty loam, silty clay loam, and clay loam. The texture analysis was conducted by hydrometer to determine soil particle sizes.

The soil laboratory results were compared with the Soil Suitability Table 3.1 found the in the *Practical Guide to Reclamation in Utah* (DOGM, 2000). The table provides plant growth suitability guidelines for the following soil parameters: USDA Soil Classification, EC, pH, SAR, and water-holding capacity. Based on the suitability recommendations, the suitability of the soil samples ranged from fair to good for all parameters.

6.0 SUMMARY

This baseline report describes the soil characteristics of five soil units mapped by NRCS to be present within the project area. The soil characteristics presented herein are based on testing performed on two samples for each of the five mapped units. For each unit, one sample was collected at 0-6" deep, and one sample was collected at 6-12" deep. Sample results of each of the soil series across the project area confirm site specific characteristics are similar to the NRCS data.

The soils at the site include a silty clay loam, clay loam, and silty loam. The soils mapped throughout the project area are unlikely to be problematic (acidic, toxic, saline, or sodic), as defined by *The Practical Guide to Reclamation in Utah* (DOGM, 2000). The analytical results for pH, SAR, and acid generation potential were all within acceptable ranges (NRCS, 2014). The soil series mapped across the project area are not likely to be problem soils based on soil analysis.

7.0 RECLAMATION AND RECOMMENDATIONS

Site reclamation should be conducted in accordance with the *Practical Guide to Reclamation in Utah* (DOGM, 2000). Because of their potential to support vegetation, soils will be stripped and stockpiled for use during reclamation.

Revegetation at the Bruin Point Mine will occur after mining operations have concluded. The site will be graded to the final contour and stabilized by regrading slopes to no steeper than 2H:1V. Stored top soil will be spread using scrapers and then ripped with a grader on the contour to roughen the surface. Surface roughening will retain seed, enable root penetration, and decrease erosion potential. A single seed mixture is proposed for the entire mine area and seeding will be performed with a tractor-pulled broadcast seeder. For best propagation, seed should be applied in the late fall. No mulch or fertilizer will be used in reclamation efforts. Following seeding, an ongoing monitoring program will be established to monitor for noxious weeds and revegetion success, and to provide weed control measures in coordination with the county. Full description of the Reclamation Plan is in the Utah, Division of Oil, Gas and Mining, Notice of Intent To Commence Large Mining Operations, permit number M/007/0040, Section 110.

8.0 REFERENCES

DOGM, 2000. *The Practical Guide to Reclamation in Utah.* Available URL: https://fs.ogm.utah.gov/PUB/MINES/Coal_Related/RecMan/Reclamation_Manual.pdf. Accessed July 30, 2014.

Holmes, C.N., B.M. Page, P. Averitt, 1948. Geology of the bituminous sandstone deposits near Sunnyside, Carbon County, UT. USGS Oil and Gas Investigations Preliminary Map 86.

NOAA, 2014. National Oceanic and Atmospheric Administration. National Operational Hydrologic Remote Sensing Center Interactive Snow Information.
Station SHEF ID: BRPU1. <http://www.nohrsc.noaa.gov/interactive/html/graph.html?station=BRPU1>.

NRCS, 2014. Official Soil Series Descriptions. Available URL: http://soils.usda.gov/technical/classification/osd/index.html. Accessed July 30, 2014.

United States Geological Survey, 1978. 7.5 minute quadrangle map, Bruin Point, Utah.

Woods, A.J., Lammers, D.A., Bryce, S.A., Omernik, J.M., Denton, R.L., Domeier, M., and Comstock, J.A., 2001. *Ecoregions of Utah*. U.S. Environmental Protection Agency. Available URL: ftp://ftp.epa.gov/wed/ecoregions/ut/ut_front.pdf. Accessed July 30, 2014.

APPENDIX C

Seep and Spring Inventory and Hydrology of North Spring and Bruin Point

AMERICAN SANDS ENERGY CORPORATION
PROPOSED BRUIN POINT MINE

SEEP AND SPRING INVENTORY

February 2014

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level	cfs	cubic feet per second
GRR	Green River Resources	JBR	JBR Environmental Consultants
Ma	million years	NOI	Notice of Intent
UDOGM	Utah Division of Oil, Gas, and Mining		

GREEN RIVER RESOURCES
PROPOSED BRUIN POINT MINE

SEEP AND SPRING INVENTORY

Introduction

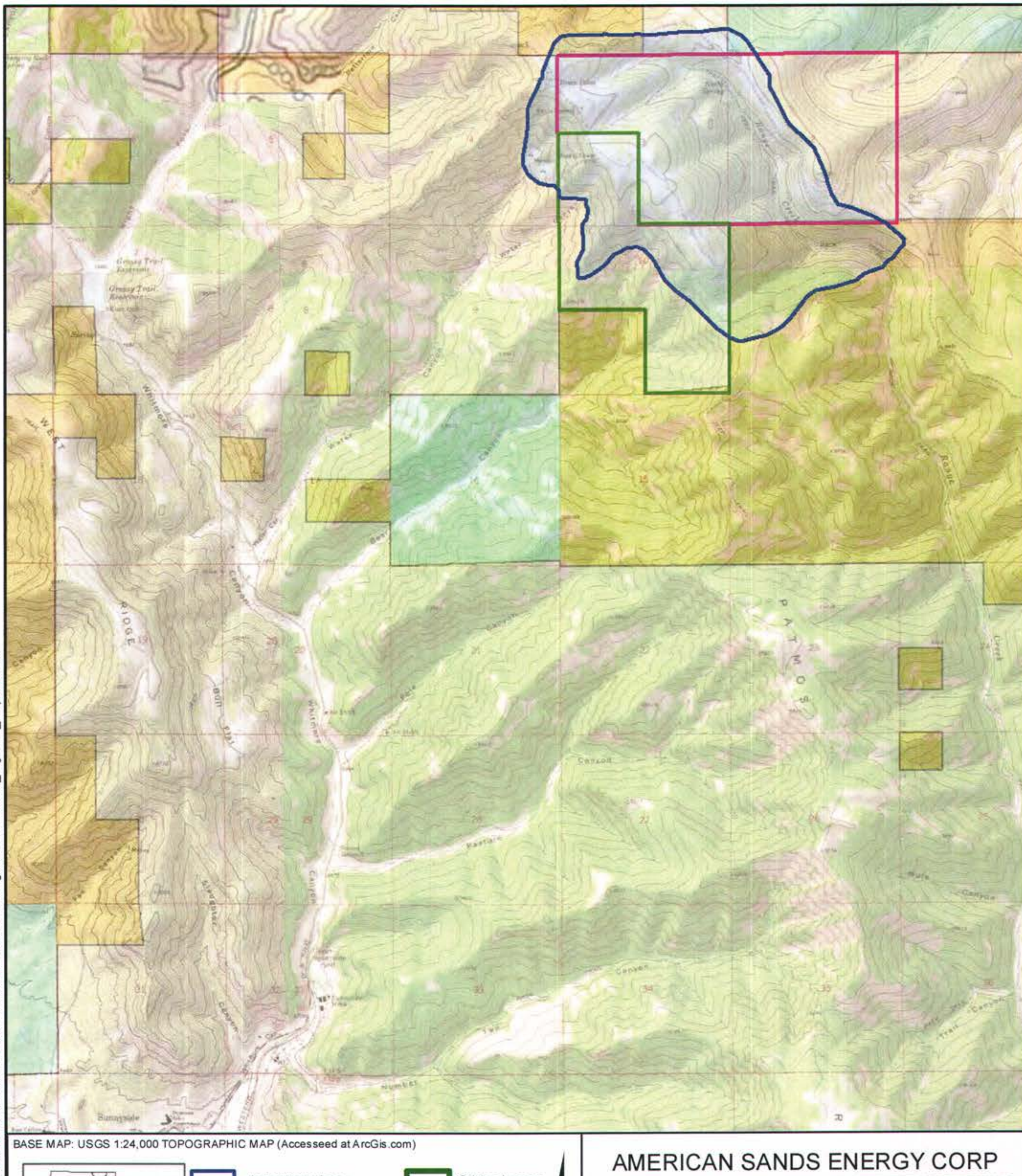
American Sands Energy Corporation (ASEC), a Utah corporation, is preparing a Notice of Intent (NOI) to commence large mining activities, to be submitted for review to the Utah Division of Oil, Gas, and Mining (UDOGM). ASEC proposes to develop an oil sands mine and an associated processing facility within a contiguous 1,760-acre lease area. ASEC plans to restrict their activities and development to private lands within the lease area. The limited amounts of water required for construction, mining, or processing operations would be purchased and trucked in for use at the site.

The ASEC lease area is located approximately six miles northeast of Sunnyside, Utah, in Carbon County, on Patmos Ridge directly east of Bruin Point (located at 39° 38' 38.87"N, 110° 20' 53.06"W). The property is located in the southwest portion of the Uinta Basin and consists of two adjacent parcels identified as the Hunt Lease and the Gibbs Lease. Both parcels are located in Township 14 South, Range 14 East, Salt Lake Base and Meridian. The Hunt Lease comprises all of Section 2 and the northwest, northeast and southeast quarter-sections of Section 3 (totaling approximately 1,120 acres). The Gibbs Lease consists of the southwest quarter-section of Section 3 and the northwest, northeast and southeast quarter-sections of Section 10 (totaling approximately 640 acres; **Figure 1**). The combined area of the two parcels totals approximately 1,760 acres).

This report presents the results of the seep and spring inventory in the ASEC lease area, conducted in October 2012. Relevant data from an initial hydrologic survey and sampling event in May 2012 is also included.

Inventory Boundary

The area included in the seep and spring inventory was determined by observations made during an initial hydrologic survey by JBR hydrologists in May 2012, as well as current knowledge of the proposed project surface disturbances and the extent of proposed underground mining. The latter information was approximated through standard angle of draw measurements applied to ASEC's summer 2012 mine plan. A conservative assumption was made that regardless of cover depth and geologic conditions, all lands above the mined area and extending outside it to a 30º angle of draw (UDOGM's default as stipulated under Utah regulations R645-301-525) were included. This analysis extended the Inventory Area to non-ASEC property to the north, east, and west of the property. Further, a buffer was applied to the west, east, and south to accommodate natural borders, property boundaries, and other physical features (**Figure 1**).



BASE MAP: USGS 1:24,000 TOPOGRAPHIC MAP (Accesseed at ArcGis.com)

- Inventory Area
- Gibbs Lease
- Hunt Lease
- Bureau of Land Management
- Private
- State

N

0.5 0.25 0 0.5 Miles

AMERICAN SANDS ENERGY CORP
SUNNYSIDE TAR SANDS PERMITTING

FIGURE 1
SEEP AND SPRING INVENTORY BOUNDARY

JBR

DRAWN BY STopham	DATE DRAWN 10/09/12
SCALE 1 in = 1 miles	

File Path:C:\Users\stopham\Documents\PROJECTS\American Sand\GIS\MXD\Working\AmericanSand_Figure1_Report.mxd

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Background

The Sunnyside Tar Sands Area is located in central-east Utah, and was known from small commercial asphalt operations dating back to the 1890s and intermittent bitumen exploration programs by major oil and gas companies from the 1950s through 1980s.

ASEC and JBR Environmental Consultants, Inc. (JBR), met with UDOGM representatives in September of 2011 to kick off the project. During the meeting, ASEC presented its general mining strategy, and UDOGM and JBR discussed the requisite baseline data gathering. The UDOGM representatives referred to baseline requirements for underground coal mining permits in the vicinity of Sunnyside. In addition, intense scrutiny is expected for the Division of Water Quality (DWQ) permit, thus an inventory of seeps and springs within the Inventory Area was recommended. ASEC wishes to avoid any streams, wetlands, springs, or other waters of the U.S.

An initial hydrologic survey and water sampling event was conducted by two JBR hydrologists on May 30 and 31st 2012. The purpose of the sampling was to document flow conditions and water quality of the known major surface water occurrences in and near the lease areas. Other areas that were relatively easy to access were also observed for the presence or absence of surface water, in preparation for the seep and spring inventory.

Environmental Setting

General

The Inventory Area is located within the Book Cliffs and Roan Cliffs area in the Colorado Plateau Physiographic Province. The topography in the Inventory Area is mountainous, with nearly 2,000' of relief. Elevations range from approximately 8,200' above mean sea level (amsl) at the southern extreme of the property, to over 10,150' amsl at Bruin Point in the northwest. The area has an annual average temperature range from 15^{o} F to 88^{o} F, with local climate classified as sub-humid to semi-arid. Average annual precipitation includes 12.5" of rainfall, with September having the highest levels, and an additional 20" of snowfall occurring from November through March.

Geology

The Sunnyside Tar Sands are located along the crest of the Roan Cliffs near Bruin Point, which crests at an elevation of 10,131' amsl. The Roan Cliffs contain rocks of Paleocene and Eocene age (ca. 60-40 Ma). In the early stages of this time period a mountain range existed in central Utah while a sea was located in eastern Utah and Colorado. During a period of sea level regression the marine environment was replaced by a coastal plains fluvial environment. During subsequent orogenic events a large lake, Lake Uinta, formed in an intermontane basin. Sediment deposited in Lake Unita during the middle Eocene epoch (ca. 50-40 Ma) formed the sandstone and shale of the Green River Formation. The Green River Formation sandstones would later become the reservoir rocks for the bitumen of the Sunnyside Tar Sands.

The Green River Formation consists of three formal members subdivided on the basis of depositional environment: Parachute Creek Member (lake facies); Garden Gulch Member (shore facies); and Douglas Creek Member (delta facies). The Parachute Creek Member (lake facies) is dominated by gray shale and oil shale and contains limited volumes of bituminous sandstone. The member exists at the top of the Roan Cliffs and is up to 600' thick. The Garden Gulch Member (shore facies) is dominated by green shale and fossiliferous limestone containing ostracods, algal structures, and garpike fish scales and contains minor volumes of bituminous sandstone. The member is commonly 300' to 500' thick. The Douglas Creek Member (delta facies) is dominated by red shale, bituminous sandstone, non-bituminous sandstone, and minor fossiliferous limestone. The member is 1,500' to 2,000' thick.

Soils

Soils within the Inventory Area are comprised predominantly of the Senchert family, which is associated with natural grassland areas, and the Uintah-Toze families complex, which is associated with the naturally wooded areas of the Inventory Area (NRCS 2009). The Senchert family soils are found on plateaus and ridges and are generally 20 to 40 inches deep with parent material derived from colluvium and slope alluvium over residuum weathered from sandstone and shale. Soils are well-drained and organic matter is as high as eight percent. The soils are in the High Mountain Loam (Thurber fescue) ecological site (R048AY515UT) (NRCS 2009). The Uinta-Toze families complex soils are generally 40 to 60 inches or deeper. They are found on mountain slopes of 35 to 70 percent. Parent material of both soil families is derived from colluviums derived from sandstone, shale and siltstone. Soils are well-drained and organic matter is as high as eight percent. Both soil families are in the High Mountain Loam (Engelmann spruce) ecological site (R048AY532UT) (NRCS 2009).

Vegetation

Vegetation in the Inventory Area varies with elevation, aspect, and soil characteristics. The pleateau is dominated by mixed conifer forests including Engelmann spruce (*Picea engelmanii*) and subalpine fir (*Abies lasiocarpa*), open grassland-shrublands, and occasional aspen (*Populus tremuloides*) stands. Some previously logged areas are currently dominated by grasses. Small, localized corridors of riparian-type vegetation are associated with drainages in the Inventory Area; wetland grasses and shrubs can be found in association with springs and other seeps/wallows.

Water

The headwaters of Range Creek, which flows near the eastern boundary of the Inventory Area, and eventually drains to the Green River (Uinta Watershed), are located within the Inventory Area boundary. Range Creek is not within the area proposed for disturbance.

The south and west side of the lease area drops steeply off a plateau into the headwaters of Water Canyon, which drains to Whitmore Canyon (i.e., Grassy Trail Creek; Price Watershed; **Figure 1**) above the town of Sunnyside. Grassy Trail Creek eventually drains to the Price River before joining the Green River.

Water Quality

Tables 1 and **2** show water quality data collected in and around the lease areas during the initial hydrologic survey (May 2012). Site locations correspond with sample locations described in this report (see Inventory Results section). Complete lab results are contained in **Appendix A**.

Table 1. General Water Chemistry and Nutrients

General Water Chemistry (mg/L except where noted)				
	Range Creek Lower Green – Desolation Canyon Watershed		**Lower Grassy Trail Creek and Tributaries** Price Watershed	
	North Spring	Range Creek (Flume)	Cliff Seep (#1)	Water Canyon
Acidity	<15.0	<15.0	<15.0	<15.0
Alkalinity as $CaCO_3$	181	221	254	348
Bicarbonate as $CaCO_3$	181	221	240	348
Carbonate as $CaCO_3$	<20.0	<20.0	<20.0	<40.0
Chloride	0.471	0.676	2.05	3.85
Specific conductance (umhos/cm)	338	389	504	860
Hardness as $CaCO_3$	166	192	218	395
pH @ 25° C (std units)	7.68	8.21	8.28	8.14
Sulfate	8.34	12.1	35.0	160
Total Dissolved Solids	176	192	276	520
Total Suspended Solids	<3.00	<3.00	<3.00	<3.00
Nutrients (mg/L)				
Ammonia as N	<0.0500	<0.0500	<0.0500	<0.0500
Nitrate as N	0.396	0.206	<0.0100	0.0458
Nitrite as N	<0.0100	<0.0100	<0.0100	<0.0100
Total Orthophosphate as P	<0.0500	<0.0500	<0.0500	<0.0500

State-designated beneficial uses for Range Creek and its tributaries (Lower Green – Desolation Canyon Watershed, HUC 14060005) are 1C (domestic purposes), 2B (secondary contact recreation), 3A (cold water game fish and aquatic life), and 4 (agriculture). State-designated beneficial uses for Lower Grassy Trail Creek and its tributaries (including Water Canyon; Price Watershed, HUC 14060007) are 2B (secondary contact recreation), 3C (non-game fish and other aquatic life), and 4 (agriculture). The latest 305(d) report to Congress (UDWQ 2006) indicates that there is insufficient data to determine whether the stream beneficial uses are being met for either Lower Grassy Trail Creek or Range Creek. The 2010 integrated report indicated that Upper Range Creek had not been assessed (UDWQ 2010).

Grassy Trail Creek was listed as impaired for pH in the 2002 and 2008 303(d) List. However, the 2010 integrated report was amended to state that a review of the data showed no pH impairment (UDWQ 2010).

Table 2. Metals and Metalloids (mg/L)

	Range Creek Lower Green – Desolation Canyon Watershed HUC 14060005				**Lower Grassy Trail Creek and Tributaries** Price Watershed HUC 14060007			
	North Spring		**Range Creek (Flume)**		**Cliff Seep (#1)**		**Water Canyon**	
	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Aluminum	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	0.420	<0.100
Arsenic	0.00241	0.00284	0.00297	0.00305	0.000796	0.000855	0.00135	0.00106
Boron	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Cadmium	<0.000180	<0.000180	<0.000180	<0.000180	<0.000180	<0.000180	<0.000180	<0.000180
Calcium	--	40.8	--	44.7	--	46.3	--	62.4
Copper	<0.000800	<0.00160	<0.000800	<0.00160	0.00104	<0.00160	0.00173	0.00242
Iron	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	0.424	<0.100
Lead	<0.000400	<0.000400	<0.000400	<0.000400	<0.000400	<0.000400	0.000420	<0.000400
Magnesium	--	15.6	--	19.5	--	24.8	--	58.0
Manganese	<0.00120	<0.00120	0.00149	0.00127	<0.00120	0.00165	0.0300	0.0154
Molybdenum	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Potassium	--	<1.00	--	<1.00	--	<1.00	--	1.45
Selenium	<0.000800	<0.000800	<0.000800	<0.000800	<0.000800	<0.000800	0.00139	<0.000800
Sodium	--	5.33	--	6.34	--	22.1	--	45.2
Zinc	0.00585	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500

Inventory Methods

Initial data gathering included: water rights research; aerial photograph review; literature research; general site reconnaissance; and discussions with adjacent property owners and others familiar with the area. The literature review included geologic reports, mine records, and USGS and state water resources reports. Three water rights for stock-watering use on point-to-point reaches of Range Creek were located within the Inventory Area boundary.

An initial hydrologic survey and surface water sampling was conducted by two JBR hydrologists on May 30 and 31st, 2012. The purpose of the sampling was to document flow conditions and water quality of the known major surface water occurrences in and near the lease areas. Other areas that were relatively easy to access were also observed for the presence or absence of surface water, in preparation for the seep and spring inventory. During the May survey, four water samples (North Spring, Range Creek (2 locations), and a cliff seep) were collected from the Bruin Point area, and flow velocity measurements were made where possible using a March-McBirney Flo-Mate portable velocity meter with discharge reported as cubic feet per second (cfs).

The seep and spring inventory was conducted by four JBR aquatic biologists or hydrologists on October 1-3rd, 2012. All data collected in 2012 represent the flow and water quality characteristics after a lower-than-normal winter snow pack.

The rugged Inventory Area was covered primarily on foot. Where appropriate, binocular scoping was used to scan cliff faces and other inaccessible terrain. Drainage bottoms and major side channels, including headwater areas, were covered on foot because those areas were thought to be the most likely locations for spring occurrences and because of the expected localized nature of those water sources.

Each member of an inventory team carried a topographic map, gps unit, binoculars, camera, flagging, field notebook, ph meter, conductivity meter, water thermometer, and flow measuring equipment (stop watch, container, piping, and shovel). Where no springs or seeps were identified within a given area of coverage, field notes reflected the lack. Sites were recorded where, based upon vegetation indicators, a seasonal spring may be present, even if currently dry. Where springs were identified, the site was flagged and photographed, and the following was recorded:

- Site name or assigned site number;
- Location (using gps where sky coverage allows, verified by map reading, or map reading alone where a gps reading was not possible);
- Photographs of the site;
- Geologic, topographic, landscape features;
- Vegetation type and extent;
- Type of development if the site had been developed as part of a water right;
- Usage (wildlife or livestock sign);

- Field parameters, including pH, conductivity, water temperature, and flow rate; and
- Where flow rate could not be measured, it was estimated and noted as such.

Water temperature, pH, and conductivity were measured in the field using equipment properly maintained and calibrated. These field parameters were measured as near to the source as possible.

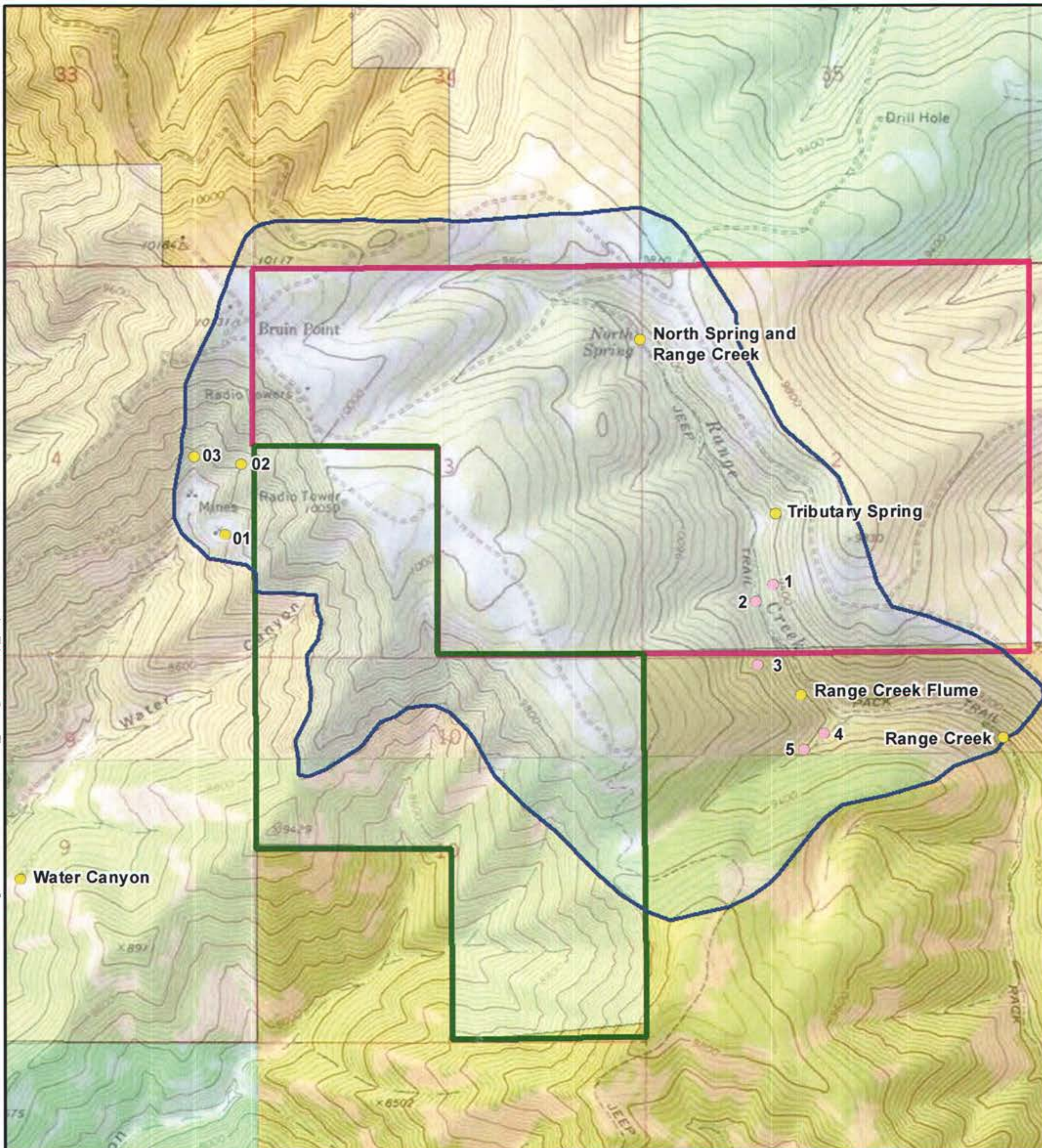
Flow rate was measured at all accessible spring sites using equipment and methods appropriate for the amount of flow, using the standard velocity-area method outlined in Stream Channel Reference Sites: An Illustrated Guide to Field Technique (Harrelson et al. 1994). Springs and streams were measured volumetrically with piping, a known-volume container, and a stopwatch. If flow rate was so reduced that it was not possible to measure (i.e. at a seasonal spring where saturated areas are present but no flow is visible), or if no flow was occurring (i.e. at an ephemeral stream site), notes were made describing the site condition (saturation, ponding, dry but recent flows apparent, etc.)

Inventory Results

Water features in the Inventory Area were confined to Water Canyon and tributaries on the west side of the plateau and Range Creek on the east side. The plateau area in the north and central portion of the Inventory Area, including the Range Creek headwaters, as well as the drainages southeast of Water Canyon (southeast portion of the Inventory Area) were dry.

Flow measurements and water samples were taken in five areas within Range Creek. These areas are two springs that contribute to Range Creek flows, and three points along the Range Creek mainstem. Flow measurements were also taken in two areas within Water Canyon and its tributaries: a cluster of cliff seeps that drain to an unnamed tributary to Water Canyon, and one point along the Water Canyon mainstem (flowing only outside the Inventory Area).

Sample areas are described in the following sections. **Figure 2** shows sample locations.



BASE MAP: USGS 1:24,000 TOPOGRAPHIC MAP (Accesseed at ArcGis.com)

- Potential Seep or Spring
- Sample Point
- Inventory Area
- Bureau of Land Management
- Private
- State
- Gibbs Lease
- Hunt Lease

N

1,200 600 0 1,200 Feet

AMERICAN SANDS ENERGY CORP
SUNNYSIDE TAR SANDS PERMITTING

FIGURE 2
INVENTORY RESULTS AND SAMPLING LOCATIONS

JBR

DRAWN BY STopham | DATE DRAWN 10/09/12
SCALE 1 in = 1,923 feet

File Path:C:\Users\stopham\Documents\PROJECTS\American Sand\GIS\MXD\Working\GreenRivewrResources_NavigationMap_Topo.mxd

Range Creek

The upper headwater area of Range Creek (north end of the Inventory Area) consisted of open areas that were heavily grazed, and forested areas with sloping side hills (no steep drainages; **Photo 1, Appendix B**). Two springs (North Spring and Tributary Spring) that contribute to Range Creek were identified in the Inventory Area further downstream. Several potential seep or spring areas were also identified downstream of these springs.

Sample results for the two springs and three locations on the Range Creek mainstem are described below, in addition to a summary of potential seep and spring areas that were encountered.

<u>Potential seeps and springs (October)</u>

Three potential seeps and two potential springs were found in the Range Creek drainage area during the inventory (October). Locations are numbered on **Figure 2** ("01" to "05" starting upstream), and shown in **Photos 2-6** in **Appendix B** (potential seeps in **Photos 2-4**; potential springs in **Photos 5 and 6**). All five areas contained some wetland grasses that indicated saturated conditions during the growing season. Some contained evidence of cattle or big game use when wet. The three potential seeps were located on side hills near the Range Creek canyon bottom, and did not have associated drainage channels. Both potential springs were marked by depression/slump areas that resembled spring heads, and contained channels (dry in October) downslope to the Range Creek mainstem.

<u>North Spring (May)</u>

North Spring is located in the north-central portion of the Hunt Lease (**Figure 2**). This spring was serving as the headwaters of Range Creek In May, although the Range Creek channel initiates further upstream. North Spring issues adjacent to Range Creek and is fenced, piped, and flows are directed to a small, dammed stock pond (**Photo 7, Appendix B**), before continuing to Range Creek through a culvert. The general condition of North Spring was disturbed and overgrazed with an entrenched channel. Vegetation consisted of (grazed) riparian grasses. In the adjacent Range Creek channel, seepage was also emanating from the channel bottom in May. North Spring was sampled from where it issues inside the fenced area (**Photo 8, Appendix B**).

Flow was calculated at 0.045 cfs. Conductivity was measured at 340 µS, pH at 8.10 std. units, and water temperature at 7º C. There is no water right record on file with the State Engineers Office that appears to be associated with this location.

<u>Tributary Spring (October)</u>

Tributary Spring is located about 0.5-mile downstream from North Spring (**Figure 2**). Tributary Spring is in a steep, mostly forested drainage upslope (east) from the Range

Creek jeep trail (**Photo 9, Appendix B**). In October, water was observed coming out of the rock in several places about halfway up the drainage (**Photo 10, Appendix B**). This spring appeared to be heavily used by deer.

Flow was calculated at 0.010 cfs. Conductivity was measured at 400 µS, pH at 6.71 std. units, and water temperature at 6º C. There is no water right record on file with the State Engineers Office that appears to be associated with this location.

Upper Range Creek – Mainstem (May and October)

Flows in upper Range Creek from North Spring downstream to the Inventory Area boundary fluctuate with influent and effluent tributary reaches from the east. Many reaches of the Range Creek mainstem are dry. In May, flows were strongest for approximately 1,000 feet below the confluence with Tributary Spring (**Photo 11, Appendix B**). Along this flowing reach, many pools, runs, and drops were observed over an entrenched channel. In October, flows were present for approximately 100 feet at the downstream end of this previously flowing reach. Water was flowing in one other location along Range Creek in October, at about 1,000 feet (upstream) from the Inventory Area boundary, for approximately 200 feet.

Range Creek was sampled in three locations between May and October: 1) below the confluence from North Spring (May), 2) near the southern lease boundary where a nonfunctional flume is present (May; **Photos 12 and 13, Appendix B**), and 3) at the southeastern boundary of the Inventory Area (October; **Photo 14, Appendix B**). Sampling results are summarized in **Table 3**.

Table 3. Upper Range Creek sampling results

Range Creek Sample Location	Flow (cfs)	Cond (µS)	pH	Temp (ºC)
North Spring (May)	0.094	350	7.86	9
Flume (May)	0.092	390	8.37	13
Inventory Area boundary (October)	0.017	470	7.25	7

There are three water rights on file with the State Engineers Office associated with Range Creek within the inventory boundary. All are point-to-point rights along the Range Creek mainstem for the purposes of stock watering (UDWR 2011). None correspond to sampling locations.

Water Canyon

The named mainstem of Water Canyon originates on the northern portion of the Gibbs Lease and drains southwest, out of the Inventory Area. Water Canyon is mapped on US Geological Service maps as intermittent or ephemeral. The mainstem originates at approx 9,500' with a small intermittent channel that contained rock outcrops and wet areas in October, within the Inventory Area. The mainstem within the Inventory Area was wet but not flowing in either May or October. Thus, a Water Canyon mainstem sample was taken outside the Inventory Area boundary (described below).

Several cliff seeps were identified that contributed to an unnamed fork of Water Canyon (containing a historic mining area, approximately 0.25-mile down-canyon from the cliffs; **Figure 2**). Sample results for cliff seeps are described below.

Cliff Seeps (May and October)

A large cliff seepage area is located in the far western portion of the Inventory Area, near the boundary of both leases, where water was cascading in several pour-overs from the cliffs. Several sources appeared to be seeping or flowing over the cliffs. In addition, water also appeared to be seeping out of the rock face near the base of several pour-overs. The cliff seeps drain to an unnamed fork of Water Canyon. Vegetation was varied, but contained mostly mosses at rock outcroppings and Douglas-fir with scattered willows where there was soil.

In May, it was not clear whether the water in this area simply reflected the tail end of snowmelt runoff, or a series of seeps or small springs. At that time it was not possible to scale the cliffs and locate the source(s) of the seepage. The largest seepage occurrence (Cliff Seep #1, **Photos 15 and 16, Appendix B**) was sampled in May. Flow data was not collected from Cliff Seep #1 due to the wide outcrop area over which the water flowed. In October, the sources of several cliff seeps were located above the cliffs, originating in intermittent channels (dry in most places) that flowed down and over the cliffs. Sampling at these upper locations was not possible, thus all cliff seep samples were collected as the water cascaded over the cliff or below the cliff. Two different pour-over locations – Cliff Seep #2 and #3 – were sampled in October (shown in **Photo 17, Appendix B**). Results are summarized in **Table 4**.

Table 4. Cliff seep sampling results

	Flow (cfs)	Cond (µS)	pH	Temp (ºC)
Cliff Seep #1 (May)	(not collected)	490	8.49	19
Cliff Seep #2 (October)	0.0002	720	8.47	5
Cliff Seep #3 (October)	0.00002	570	8.85	5

Water Canyon – Mainstem–(May)

The named mainstem of Water Canyon joins the previously mentioned unnamed fork in which the cliff seeps and old mining area are located, and then continues southwest to join Grassy Trail Creek (which drains to the Green River). During the May 2012 sampling visit, flow was present at the confluence of the Water Canyon mainstem and the unnamed fork (**Photo 18, Appendix B**); at that time, flow originated from the unnamed fork and the mainstem fork was dry. The Water Canyon mainstem sample was collected about 1/3-mile downstream from this confluence. A small amount of water was also being contributed from flow crossing the road, from a small tributary drainage. Vegetation consisted mainly of horsetail and wetland grasses at the sampling location.

Flow was calculated at 0.052 cfs. Conductivity was measured at 850 µS, pH at 8.26 std. units, and water temperature at 13º C. There is no water right record on file with the

State Engineers Office that appears to be associated with this location and no evidence of wildlife or stock usage.

Summary

JBR conducted a seep and spring inventory for ASEC in early October 2012, in the vicinity of the planned mining operations. The intent of this inventory was to obtain baseline seep and spring locations to be avoided in support of a mine permit application. Seep and spring resources were sparse in the vicinity of proposed mine operations: only two springs and a cluster of cliff seeps were found in addition to several dry features (at the time of the inventory), which may constitute seeps or springs during runoff.

This report also summarizes the results from an initial hydrologic survey and water sampling event conducted by JBR in late May 2012, during which flow conditions and water quality of the known major surface waters were sampled. The two main surface waters in the vicinity of proposed mine operations are Water Canyon (drains to Grassy Trail Creek) and Range Creek.

Table 5 provides a summary of the field parameter data collected from major surface waters and all flowing springs or seeps in the vicinity of proposed mine operations.

Table 5. Data Summary

Sample Location		Flow (cfs)	Cond (μS)	pH	Temp (°C)
Range Creek	North Spring	0.045	340	8.10	7
	Tributary Spring	0.010	400	6.71	6
	Mainstem (North Spring)	0.094	350	7.86	9
	Mainstem (Flume)	0.092	390	8.37	13
	Mainstem (Inventory Area boundary)	0.017	470	7.25	7
Water Canyon	Cliff Seep #1	--	490	8.49	19
	Cliff Seep #2	0.0002	720	8.47	5
	Cliff Seep #3	0.00002	570	8.85	5
	Mainstem (Outside Inventory Area)	0.052	850	8.26	13

References

Harrelson, C. C., C. L. Rawlins, and J. P. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. General Technical Report RM-245. US Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station.

Natural Resource Conservation Service (NRCS). 2009. Soil Survey Geographic (SSURGO) Database. Available online at http://soildatamart.nrcs.usda.gov.

Utah Division of Water Quality (UDWQ). 2006. Utah's 2006 305(b) Integrated Report Water Quality Assessment Report to Congress. June 15, 2006

Utah Division of Water Quality (UDWQ). 2010. Water Quality Assessment: Utah's 2010 Integrated Report. Available online at http://www.waterquality.utah.gov/WQAssess/currentIR.htm.

Utah Division of Water Rights (UDWR). 2011. Water rights database for Utah, accessed online October 11, 2011 at http://www.waterrights.utah.gov/wrinfo/query.asp

APPENDIX A
WATER QUALITY ANALYTICAL REPORTS

APPENDIX B
PHOTOGRAPHS

Photo 1 Headwaters of Range Creek (dry); October 2012.

Photo 2 Potential Seep 01 (see **Figure 2**); October 2012.

Photo 3 Potential Seep 03 (see **Figure 2**); October 2012.

Photo 4 Potential Seep 05 (see **Figure 2**); October 2012.

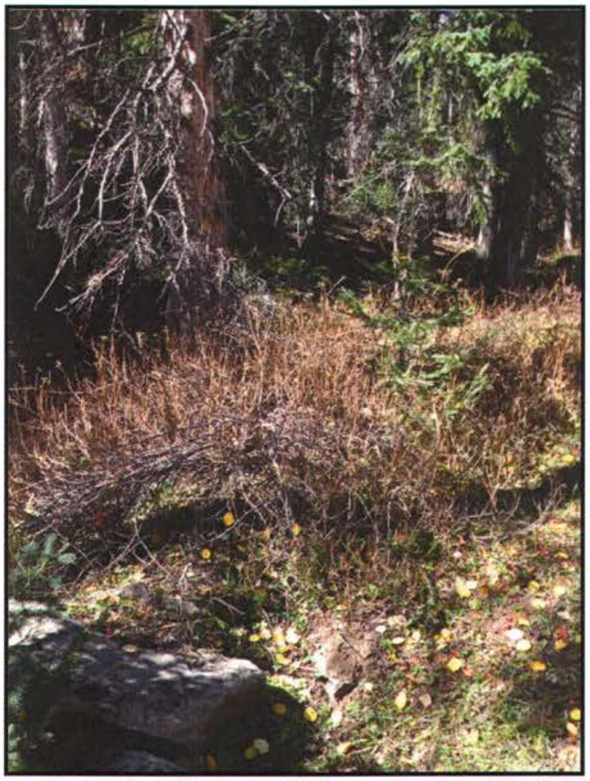


Photo 5 Potential Spring 02 (see **Figure 2**); October 2012.

Photo 6 Potential Spring 04 (see **Figure 2**); October 2012.

Photo 7 Piped outflow from North Spring to stock pond; culvert in background leads to Range Creek; May 2012.

Photo 8 North Spring sampling location; May 2012.

Photo 9 Tributary Spring drainage; October 2012.

Photo 10 Source area of Tributary Spring; October 2012.

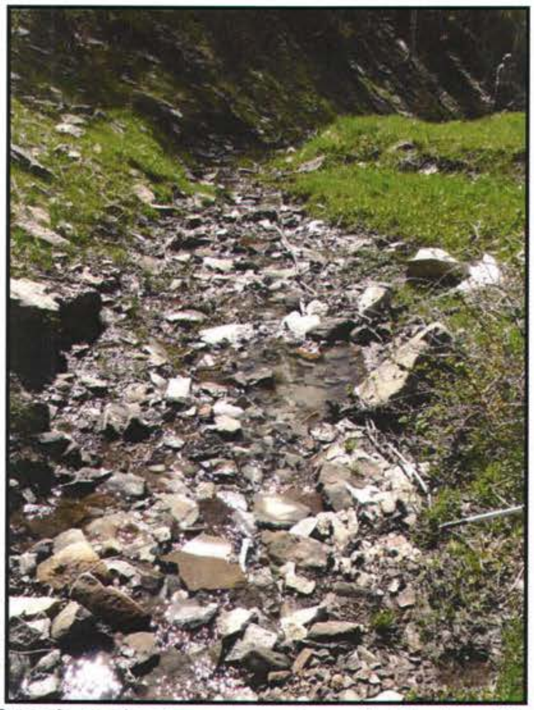


Photo 11 Range Creek mainstem sample point below North Spring; May 2012.

Photo 12 Range Creek mainstem sample point at flume (nonfunctional); May 2012.

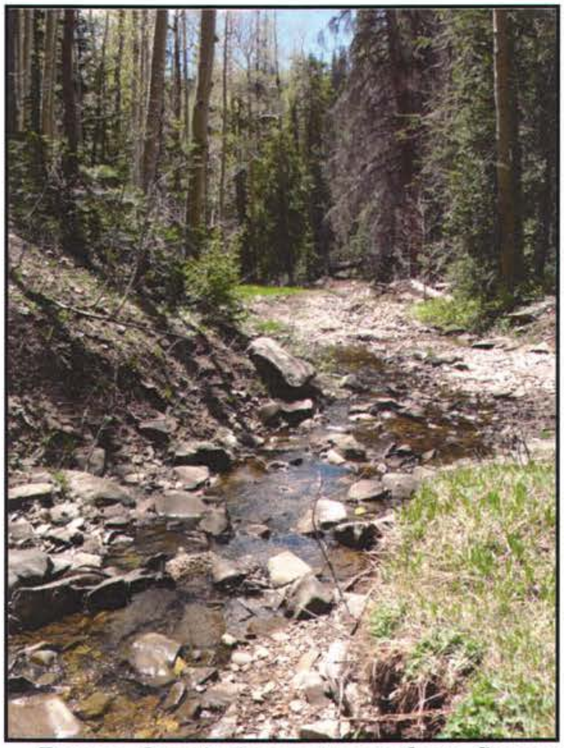


Photo 13 Range Creek downstream from flume; May 2012.

Photo 14 Range Creek mainstem sample point at boundary of Inventory Area; October 2012.

Photo 15 Cliff Seep #1 sample point; May 2012.

Photo 16 Long view of Cliff Seep #1; May 2012.

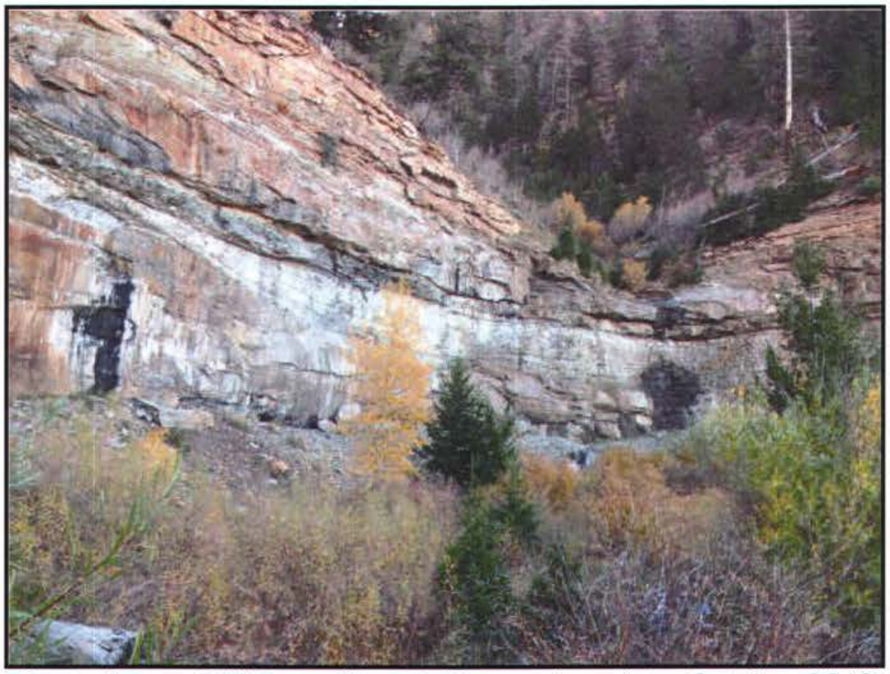


Photo 17 Cliff Seep #2 and #3 sample points; October 2012.

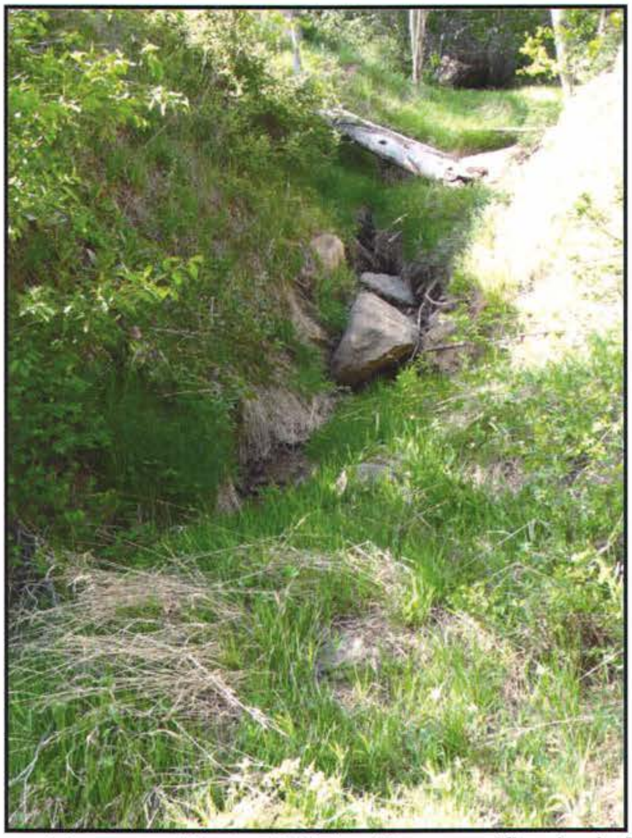


Photo 18 Unnamed fork of Water Canyon (flowing); May 2012.

American West
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Laboratory Director

Jose Rocha
QA Officer

William Gibbs
American Sands Energy Corp.
2610 Hillsden Dr.
Salt Lake City, UT 84117
TEL: (801) 699-3966

RE: Bruin Point Project

Dear William Gibbs: Lab Set ID: 1206001

American West Analytical Laboratories received 4 sample(s) on 6/1/2012 for the analyses presented in the following report.

All analyses were performed in accordance to The NELAC Institute protocols unless noted otherwise. American West Analytical Laboratories is accredited by The NELAC Institute in Utah and Texas; and is state accredited in Colorado, Idaho, and Missouri. Accreditation documents are available upon request. 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. The "Reporting Limit" found on the report is equivalent to the practical quantitation limit (PQL). This is the minimum concentration that can be reported by the method referenced and the sample matrix. The reporting limit must not be confused with any regulatory limit. Analytical results are reported to three significant figures for quality control and calculation purposes.

Thank You,

Kyle F. Gross

Digitally signed by Kyle F. Gross
DN: cn=Kyle F. Gross, o=AWAL, ou=AWAL, email=kyle@awal-labs.com, c=US
Date: 2012.06.18 12:04:52 -06'00'

Approved by:

Laboratory Director or designee

INORGANIC ANALYTICAL REPORT

American West
ANALYTICAL LABORATORIES

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Bruin Point Project
Lab Sample ID: 1206001-001
Client Sample ID: Old Mine Canyon #1
Collection Date: 5/30/2012 1340h
Received Date: 6/1/2012 700h

Analytical Results TOTAL METALS

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Aluminum	mg/L	6/1/2012 1520h	6/14/2012 1408h	E200.7	0.100	< 0.100	
Arsenic	mg/L	6/1/2012 1520h	6/6/2012 836h	E200.8	0.000600	**0.000796**	
Boron	mg/L	6/1/2012 1520h	6/13/2012 2119h	E200.7	0.500	< 0.500	
Cadmium	mg/L	6/1/2012 1520h	6/6/2012 836h	E200.8	0.000180	< 0.000180	
Copper	mg/L	6/1/2012 1520h	6/6/2012 836h	E200.8	0.000800	**0.00104**	
Iron	mg/L	6/1/2012 1520h	6/14/2012 1408h	E200.7	0.100	< 0.100	
Lead	mg/L	6/1/2012 1520h	6/6/2012 836h	E200.8	0.000400	< 0.000400	
Manganese	mg/L	6/1/2012 1520h	6/12/2012 432h	E200.8	0.00120	< 0.00120	
Molybdenum	mg/L	6/1/2012 1520h	6/13/2012 2119h	E200.7	0.0200	< 0.0200	
Selenium	mg/L	6/1/2012 1520h	6/6/2012 836h	E200.8	0.000800	< 0.000800	
Zinc	mg/L	6/1/2012 1520h	6/6/2012 836h	E200.8	0.00500	< 0.00500	

INORGANIC ANALYTICAL REPORT

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Bruin Point Project
Lab Sample ID: 1206001-002
Client Sample ID: Water Canyon #1
Collection Date: 5/30/2012 1750h
Received Date: 6/1/2012 700h

Analytical Results TOTAL METALS

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Aluminum	mg/L	6/1/2012 1520h	6/14/2012 1420h	E200.7	0.100	**0.420**	
Arsenic	mg/L	6/1/2012 1520h	6/6/2012 924h	E200.8	0.000600	**0.00135**	
Boron	mg/L	6/1/2012 1520h	6/13/2012 2152h	E200.7	0.500	< 0.500	
Cadmium	mg/L	6/1/2012 1520h	6/6/2012 924h	E200.8	0.000180	< 0.000180	
Copper	mg/L	6/1/2012 1520h	6/6/2012 924h	E200.8	0.000800	**0.00173**	
Iron	mg/L	6/1/2012 1520h	6/14/2012 1420h	E200.7	0.100	**0.424**	
Lead	mg/L	6/1/2012 1520h	6/6/2012 924h	E200.8	0.000400	**0.000420**	
Manganese	mg/L	6/1/2012 1520h	6/12/2012 453h	E200.8	0.00120	**0.0300**	
Molybdenum	mg/L	6/1/2012 1520h	6/13/2012 2152h	E200.7	0.0200	< 0.0200	
Selenium	mg/L	6/1/2012 1520h	6/6/2012 924h	E200.8	0.000800	**0.00139**	
Zinc	mg/L	6/1/2012 1520h	6/6/2012 924h	E200.8	0.00500	< 0.00500	

INORGANIC ANALYTICAL REPORT

American West
ANALYTICAL LABORATORIES

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Bruin Point Project
Lab Sample ID: 1206001-003
Client Sample ID: North Spring
Collection Date: 5/31/2012 945h
Received Date: 6/1/2012 700h

Analytical Results TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Aluminum	mg/L	6/1/2012 1520h	6/14/2012 1424h	E200.7	0.100	< 0.100	
Arsenic	mg/L	6/1/2012 1520h	6/6/2012 929h	E200.8	0.000600	**0.00241**	
Boron	mg/L	6/1/2012 1520h	6/13/2012 2156h	E200.7	0.500	< 0.500	
Cadmium	mg/L	6/1/2012 1520h	6/6/2012 929h	E200.8	0.000180	< 0.000180	
Copper	mg/L	6/1/2012 1520h	6/6/2012 929h	E200.8	0.000800	< 0.000800	
Iron	mg/L	6/1/2012 1520h	6/14/2012 1424h	E200.7	0.100	< 0.100	
Lead	mg/L	6/1/2012 1520h	6/6/2012 929h	E200.8	0.000400	< 0.000400	
Manganese	mg/L	6/1/2012 1520h	6/12/2012 500h	E200.8	0.00120	< 0.00120	
Molybdenum	mg/L	6/1/2012 1520h	6/13/2012 2156h	E200.7	0.0200	< 0.0200	
Selenium	mg/L	6/1/2012 1520h	6/6/2012 929h	E200.8	0.000800	< 0.000800	
Zinc	mg/L	6/1/2012 1520h	6/6/2012 929h	E200.8	0.00500	**0.00585**	

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INORGANIC ANALYTICAL REPORT

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Jose Rocha
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Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Bruin Point Project
Lab Sample ID: 1206001-004
Client Sample ID: Range Creek Flume
Collection Date: 5/31/2012 1155h
Received Date: 6/1/2012 700h

Analytical Results TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Aluminum	mg/L	6/1/2012 1520h	6/14/2012 1440h	E200.7	0.100	< 0.100	
Arsenic	mg/L	6/1/2012 1520h	6/6/2012 934h	E200.8	0.000600	**0.00297**	
Boron	mg/L	6/1/2012 1520h	6/13/2012 2200h	E200.7	0.500	< 0.500	
Cadmium	mg/L	6/1/2012 1520h	6/6/2012 934h	E200.8	0.000180	< 0.000180	
Copper	mg/L	6/1/2012 1520h	6/6/2012 934h	E200.8	0.000800	< 0.000800	
Iron	mg/L	6/1/2012 1520h	6/14/2012 1440h	E200.7	0.100	< 0.100	
Lead	mg/L	6/1/2012 1520h	6/6/2012 934h	E200.8	0.000400	< 0.000400	
Manganese	mg/L	6/1/2012 1520h	6/12/2012 507h	E200.8	0.00120	**0.00149**	
Molybdenum	mg/L	6/1/2012 1520h	6/13/2012 2200h	E200.7	0.0200	< 0.0200	
Selenium	mg/L	6/1/2012 1520h	6/6/2012 934h	E200.8	0.000800	< 0.000800	
Zinc	mg/L	6/1/2012 1520h	6/6/2012 934h	E200.8	0.00500	< 0.00500	

INORGANIC ANALYTICAL REPORT

American West ANALYTICAL LABORATORIES

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Bruin Point Project
Lab Sample ID: 1206001-001
Client Sample ID: Old Mine Canyon #1
Collection Date: 5/30/2012 1340h
Received Date: 6/1/2012 700h

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Analytical Results DISSOLVED METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Aluminum	mg/L	6/1/2012 1520h	6/16/2012 1556h	E200.7	0.100	< 0.100	
Arsenic	mg/L	6/1/2012 1520h	6/13/2012 2302h	E200.8	0.000600	**0.000855**	
Boron	mg/L	6/1/2012 1520h	6/16/2012 1556h	E200.7	0.500	< 0.500	
Cadmium	mg/L	6/1/2012 1520h	6/13/2012 2302h	E200.8	0.000180	< 0.000180	
Calcium	mg/L	6/1/2012 1520h	6/16/2012 1441h	E200.7	10.0	**46.3**	
Copper	mg/L	6/1/2012 1520h	6/15/2012 1459h	E200.8	0.00160	< 0.00160	
Iron	mg/L	6/1/2012 1520h	6/16/2012 1556h	E200.7	0.100	< 0.100	
Lead	mg/L	6/1/2012 1520h	6/15/2012 1008h	E200.8	0.000400	< 0.000400	
Magnesium	mg/L	6/1/2012 1520h	6/16/2012 1441h	E200.7	10.0	**24.8**	
Manganese	mg/L	6/1/2012 1520h	6/15/2012 1008h	E200.8	0.00120	**0.00165**	
Molybdenum	mg/L	6/1/2012 1520h	6/16/2012 1556h	E200.7	0.0200	< 0.0200	
Potassium	mg/L	6/1/2012 1520h	6/16/2012 1556h	E200.7	1.00	< 1.00	
Selenium	mg/L	6/1/2012 1520h	6/13/2012 2302h	E200.8	0.000800	< 0.000800	
Sodium	mg/L	6/1/2012 1520h	6/16/2012 1441h	E200.7	10.0	**22.1**	
Zinc	mg/L	6/1/2012 1520h	6/13/2012 2302h	E200.8	0.00500	< 0.00500	

INORGANIC ANALYTICAL REPORT

American West ANALYTICAL LABORATORIES

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Bruin Point Project
Lab Sample ID: 1206001-002
Client Sample ID: Water Canyon #1
Collection Date: 5/30/2012 1750h
Received Date: 6/1/2012 700h

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Laboratory Director

Jose Rocha
QA Officer

Analytical Results DISSOLVED METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Aluminum	mg/L	6/1/2012 1520h	6/16/2012 1620h	E200.7	0.100	< 0.100	
Arsenic	mg/L	6/1/2012 1520h	6/13/2012 2355h	E200.8	0.000600	**0.00106**	
Boron	mg/L	6/1/2012 1520h	6/16/2012 1620h	E200.7	0.500	< 0.500	
Cadmium	mg/L	6/1/2012 1520h	6/13/2012 2355h	E200.8	0.000180	< 0.000180	
Calcium	mg/L	6/1/2012 1520h	6/16/2012 1457h	E200.7	10.0	**62.4**	
Copper	mg/L	6/1/2012 1520h	6/15/2012 1507h	E200.8	0.00160	**0.00242**	
Iron	mg/L	6/1/2012 1520h	6/16/2012 1620h	E200.7	0.100	< 0.100	
Lead	mg/L	6/1/2012 1520h	6/15/2012 1048h	E200.8	0.000400	< 0.000400	
Magnesium	mg/L	6/1/2012 1520h	6/16/2012 1457h	E200.7	10.0	**58.0**	
Manganese	mg/L	6/1/2012 1520h	6/15/2012 1048h	E200.8	0.00120	**0.0154**	
Molybdenum	mg/L	6/1/2012 1520h	6/16/2012 1620h	E200.7	0.0200	< 0.0200	
Potassium	mg/L	6/1/2012 1520h	6/16/2012 1620h	E200.7	1.00	**1.45**	
Selenium	mg/L	6/1/2012 1520h	6/13/2012 2355h	E200.8	0.000800	< 0.000800	
Sodium	mg/L	6/1/2012 1520h	6/16/2012 1457h	E200.7	10.0	**45.2**	
Zinc	mg/L	6/1/2012 1520h	6/13/2012 2355h	E200.8	0.00500	< 0.00500	

INORGANIC ANALYTICAL REPORT

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Jose Rocha
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Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Bruin Point Project
Lab Sample ID: 1206001-003
Client Sample ID: North Spring
Collection Date: 5/31/2012 945h
Received Date: 6/1/2012 700h

Analytical Results DISSOLVED METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Aluminum	mg/L	6/1/2012 1520h	6/16/2012 1624h	E200.7	0.100	< 0.100	
Arsenic	mg/L	6/1/2012 1520h	6/14/2012 000h	E200.8	0.000600	**0.00284**	
Boron	mg/L	6/1/2012 1520h	6/16/2012 1624h	E200.7	0.500	< 0.500	
Cadmium	mg/L	6/1/2012 1520h	6/14/2012 000h	E200.8	0.000180	< 0.000180	
Calcium	mg/L	6/1/2012 1520h	6/16/2012 1501h	E200.7	10.0	**40.8**	
Copper	mg/L	6/1/2012 1520h	6/15/2012 1510h	E200.8	0.00160	< 0.00160	
Iron	mg/L	6/1/2012 1520h	6/16/2012 1624h	E200.7	0.100	< 0.100	
Lead	mg/L	6/1/2012 1520h	6/15/2012 1052h	E200.8	0.000400	< 0.000400	
Magnesium	mg/L	6/1/2012 1520h	6/16/2012 1501h	E200.7	10.0	**15.6**	
Manganese	mg/L	6/1/2012 1520h	6/15/2012 1052h	E200.8	0.00120	< 0.00120	
Molybdenum	mg/L	6/1/2012 1520h	6/16/2012 1624h	E200.7	0.0200	< 0.0200	
Potassium	mg/L	6/1/2012 1520h	6/16/2012 1624h	E200.7	1.00	< 1.00	
Selenium	mg/L	6/1/2012 1520h	6/14/2012 000h	E200.8	0.000800	< 0.000800	
Sodium	mg/L	6/1/2012 1520h	6/16/2012 1624h	E200.7	1.00	**5.33**	
Zinc	mg/L	6/1/2012 1520h	6/14/2012 000h	E200.8	0.00500	< 0.00500	

INORGANIC ANALYTICAL REPORT

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Bruin Point Project
Lab Sample ID: 1206001-004
Client Sample ID: Range Creek Flume
Collection Date: 5/31/2012 1155h
Received Date: 6/1/2012 700h

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Analytical Results DISSOLVED METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Aluminum	mg/L	6/1/2012 1520h	6/16/2012 1628h	E200.7	0.100	< 0.100	
Arsenic	mg/L	6/1/2012 1520h	6/14/2012 005h	E200.8	0.000600	**0.00305**	
Boron	mg/L	6/1/2012 1520h	6/16/2012 1628h	E200.7	0.500	< 0.500	
Cadmium	mg/L	6/1/2012 1520h	6/14/2012 005h	E200.8	0.000180	< 0.000180	
Calcium	mg/L	6/1/2012 1520h	6/16/2012 1505h	E200.7	10.0	**44.7**	
Copper	mg/L	6/1/2012 1520h	6/15/2012 1513h	E200.8	0.00160	< 0.00160	
Iron	mg/L	6/1/2012 1520h	6/16/2012 1628h	E200.7	0.100	< 0.100	
Lead	mg/L	6/1/2012 1520h	6/15/2012 1056h	E200.8	0.000400	< 0.000400	
Magnesium	mg/L	6/1/2012 1520h	6/16/2012 1505h	E200.7	10.0	**19.5**	
Manganese	mg/L	6/1/2012 1520h	6/15/2012 1056h	E200.8	0.00120	**0.00127**	
Molybdenum	mg/L	6/1/2012 1520h	6/16/2012 1628h	E200.7	0.0200	< 0.0200	
Potassium	mg/L	6/1/2012 1520h	6/16/2012 1628h	E200.7	1.00	< 1.00	
Selenium	mg/L	6/1/2012 1520h	6/14/2012 005h	E200.8	0.000800	< 0.000800	
Sodium	mg/L	6/1/2012 1520h	6/16/2012 1628h	E200.7	1.00	**6.34**	
Zinc	mg/L	6/1/2012 1520h	6/14/2012 005h	E200.8	0.00500	< 0.00500	

INORGANIC ANALYTICAL REPORT

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Jose Rocha
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Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Bruin Point Project
Lab Sample ID: 1206001-001
Client Sample ID: Old Mine Canyon #1
Collection Date: 5/30/2012 1340h
Received Date: 6/1/2012 700h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Acidity	mg/L		6/4/2012 606h	SM2310B	15.0	< 15.0	
Alkalinity (as CaCO3)	mg/L		6/1/2012 1035h	SM2320B	20.0	**254**	
Ammonia (as N)	mg/L	6/8/2012 1142h	6/8/2012 1808h	E350.1	0.0500	< 0.0500	
Bicarbonate (as CaCO3)	mg/L		6/1/2012 1035h	SM2320B	20.0	**240**	
Carbonate (as CaCO3)	mg/L		6/1/2012 1035h	SM2320B	20.0	< 20.0	
Chloride	mg/L		6/11/2012 2026h	E300.0	0.100	**2.05**	
Conductivity	µmhos/cm		6/1/2012 1152h	SM2510B	2.00	**504**	
Hardness (as CaCO3)	mg/L		6/18/2012	SM2340B	10.0	**218**	
Ion Balance	%		6/18/2012	Calc.	-15.0	**-4.73**	
Nitrate (as N)	mg/L		6/1/2012 1515h	E353.2	0.0100	< 0.0100	
Nitrite (as N)	mg/L		6/1/2012 1256h	E353.2	0.0100	< 0.0100	
pH @ 25° C	pH Units		6/1/2012 1600h	SM4500-H+B	1.00	**8.28**	H
Phosphate, Total Ortho (as P)	mg/L		6/1/2012 1108h	E365.1	0.0500	< 0.0500	
Sulfate	mg/L		6/8/2012 1200h	E300.0	7.50	**35.0**	
Total Dissolved Solids	mg/L		6/4/2012 1500h	SM2540C	20.0	**276**	
Total Suspended Solids	mg/L		6/1/2012 1615h	SM2540D	3.00	< 3.00	

H - Sample was received outside of the holding time.

INORGANIC ANALYTICAL REPORT

American West
ANALYTICAL LABORATORIES

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Bruin Point Project
Lab Sample ID: 1206001-002
Client Sample ID: Water Canyon #1
Collection Date: 5/30/2012 1750h
Received Date: 6/1/2012 700h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Acidity	mg/L		6/4/2012 606h	SM2310B	15.0	< 15.0	
Alkalinity (as CaCO3)	mg/L		6/1/2012 1035h	SM2320B	40.0	**348**	
Ammonia (as N)	mg/L	6/8/2012 1142h	6/8/2012 1812h	E350.1	0.0500	< 0.0500	
Bicarbonate (as CaCO3)	mg/L		6/1/2012 1035h	SM2320B	40.0	**348**	
Carbonate (as CaCO3)	mg/L		6/1/2012 1035h	SM2320B	40.0	< 40.0	
Chloride	mg/L		6/8/2012 1222h	E300.0	1.00	**3.85**	
Conductivity	µmhos/cm		6/1/2012 1152h	SM2510B	2.00	**860**	
Hardness (as CaCO3)	mg/L		6/18/2012	SM2340B	10.0	**395**	
Ion Balance	%		6/18/2012	Calc.	-15.0	**-2.56**	
Nitrate (as N)	mg/L		6/1/2012 1519h	E353.2	0.0100	**0.0458**	
Nitrite (as N)	mg/L		6/1/2012 1300h	E353.2	0.0100	< 0.0100	
pH @ 25° C	pH Units		6/1/2012 1600h	SM4500-H+B	1.00	**8.14**	H
Phosphate, Total Ortho (as P)	mg/L		6/1/2012 1111h	E365.1	0.0500	< 0.0500	
Sulfate	mg/L		6/8/2012 1222h	E300.0	7.50	**160**	
Total Dissolved Solids	mg/L		6/4/2012 1500h	SM2540C	20.0	**520**	
Total Suspended Solids	mg/L		6/1/2012 1615h	SM2540D	3.00	< 3.00	

H - Sample was received outside of the holding time.

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INORGANIC ANALYTICAL REPORT

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Bruin Point Project
Lab Sample ID: 1206001-003
Client Sample ID: North Spring
Collection Date: 5/31/2012 945h
Received Date: 6/1/2012 700h

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Laboratory Director

Jose Rocha
QA Officer

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Acidity	mg/L		6/4/2012 606h	SM2310B	15.0	< 15.0	
Alkalinity (as CaCO3)	mg/L		6/1/2012 1035h	SM2320B	20.0	**181**	
Ammonia (as N)	mg/L	6/8/2012 1142h	6/8/2012 1813h	E350.1	0.0500	< 0.0500	
Bicarbonate (as CaCO3)	mg/L		6/1/2012 1035h	SM2320B	20.0	**181**	
Carbonate (as CaCO3)	mg/L		6/1/2012 1035h	SM2320B	20.0	< 20.0	
Chloride	mg/L		6/11/2012 2046h	E300.0	0.100	**0.471**	
Conductivity	µmhos/cm		6/1/2012 1152h	SM2510B	2.00	**338**	
Hardness (as CaCO3)	mg/L		6/18/2012	SM2340B	10.0	**166**	
Ion Balance	%		6/18/2012	Calc.	-15.0	**-4.02**	
Nitrate (as N)	mg/L		6/1/2012 1520h	E353.2	0.0100	**0.396**	
Nitrite (as N)	mg/L		6/1/2012 1301h	E353.2	0.0100	< 0.0100	
pH @ 25° C	pH Units		6/1/2012 1600h	SM4500-H+B	1.00	**7.68**	H
Phosphate, Total Ortho (as P)	mg/L		6/1/2012 1112h	E365.1	0.0500	< 0.0500	
Sulfate	mg/L		6/11/2012 2046h	E300.0	0.750	**8.34**	
Total Dissolved Solids	mg/L		6/4/2012 1500h	SM2540C	20.0	**176**	
Total Suspended Solids	mg/L		6/1/2012 1615h	SM2540D	3.00	< 3.00	

H - Sample was received outside of the holding time.

INORGANIC ANALYTICAL REPORT

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Bruin Point Project
Lab Sample ID: 1206001-004
Client Sample ID: Range Creek Flume
Collection Date: 5/31/2012 1155h
Received Date: 6/1/2012 700h

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Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Acidity	mg/L		6/4/2012 606h	SM2310B	15.0	< 15.0	
Alkalinity (as CaCO3)	mg/L		6/1/2012 1035h	SM2320B	20.0	**221**	
Ammonia (as N)	mg/L	6/8/2012 1142h	6/8/2012 1814h	E350.1	0.0500	< 0.0500	
Bicarbonate (as CaCO3)	mg/L		6/1/2012 1035h	SM2320B	20.0	**221**	
Carbonate (as CaCO3)	mg/L		6/1/2012 1035h	SM2320B	20.0	< 20.0	
Chloride	mg/L		6/11/2012 2106h	E300.0	0.100	**0.676**	
Conductivity	µmhos/cm		6/1/2012 1152h	SM2510B	2.00	**389**	
Hardness (as CaCO3)	mg/L		6/18/2012	SM2340B	10.0	**192**	
Ion Balance	%		6/18/2012	Calc.	-15.0	**-6.84**	
Nitrate (as N)	mg/L		6/1/2012 1522h	E353.2	0.0100	**0.206**	
Nitrite (as N)	mg/L		6/1/2012 1303h	E353.2	0.0100	< 0.0100	
pH @ 25° C	pH Units		6/1/2012 1600h	SM4500-H+B	1.00	**8.21**	H
Phosphate, Total Ortho (as P)	mg/L		6/1/2012 1112h	E365.1	0.0500	< 0.0500	
Sulfate	mg/L		6/11/2012 2106h	E300.0	0.750	**12.1**	
Total Dissolved Solids	mg/L		6/4/2012 1500h	SM2540C	20.0	**192**	
Total Suspended Solids	mg/L		6/1/2012 1615h	SM2540D	3.00	< 3.00	

H - Sample was received outside of the holding time.

American West Analytical Laboratories

D

WORK ORDER Summary

Work Order: **1206001**
 6/1/2012

Client: American Sands Energy Corp.
Client ID: WALKIN **Contact:** William Gibbs
Project: Bruin Point Project **QC Level:** LEVEL I **WO Type:** Standard
Comments: Do not release w/o Financial Arrangements! / send results to both William and Karla Knoop @ JBR. Dissolved metals samples have been field filtered. Footnote report, pH received outside of hold.;

HOK-AC el

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1206001-001A	Old Mine Canyon #1	5/30/2012 1340h	6/1/2012 0700h	6/15/2012	Aqueous	300.0-W	☑	df / wc	1
	SEL Analytes: CL SO4								
						ACIDITY-W-2310B	☐	df / wc	
						ALK-W-2320B	☑	df / wc	
	SEL Analytes: ALK ALKB ALKC								
						COND-W-2510B	☐	df / wc	
						NO2-W-353.2	☐	df / wc	
						NO3-W-353.2	☐	df / wc	
						PH-4500H+B	☐	df / wc	
						PO4-O-365.1	☐	df / wc	
1206001-001B						NH3-W-350.1	☐	df / nh3	
						NH3-W-PR	☐	df / nh3	
1206001-001C						TSS-W-2540D	☐	ww - tss	
1206001-001D						TDS-W-2540C	☐	ww - tds	
1206001-001E						200.7-DIS	☑	df / dis metals	
	SEL Analytes: AL B CA FE MG MO K NA								
						200.7-DIS-PR	☐	df / dis metals	
						200.8-DIS	☑	df / dis metals	
	SEL Analytes: AS CD CU PB MN SE ZN								
						200.8-DIS-PR	☐	df / dis metals	
						HARD-2340B	☐	df / dis metals	
1206001-001F						200.7-W	☑	df / total metals	
	SEL Analytes: AL B FE MO								
						200.7-W-PR	☐	df / total metals	

WORK ORDER Summary

Client: American Sands Energy Corp.

Work Order: **1206001**

 6/1/2012

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1206001-001F	Old Mine Canyon #1 **SEL Analytes: AS CD CU PB MN SE ZN**	5/30/2012 1340h	6/1/2012 0700h	6/15/2012	Aqueous	200.8-W	☑	df / total metals	1
						200.8-W-PR	☐	df / total metals	
						IONBALANCE	☐	df / total metals	
1206001-002A	Water Canyon #1 **SEL Analytes: CL SO4**	5/30/2012 1750h				300.0-W	☑	df / wc	
						ACIDITY-W-2310B	☐	df / wc	
	SEL Analytes: ALK ALKB ALKC					ALK-W-2320B	☑	df / wc	
						COND-W-2510B	☐	df / wc	
						NO2-W-353.2	☐	df / wc	
						NO3-W-353.2	☐	df / wc	
						PH-4500H+B	☐	df / wc	
						PO4-O-365.1	☐	df / wc	
1206001-002B						NH3-W-350.1	☐	df / nh3	
						NH3-W-PR	☐	df / nh3	
1206001-002C						TSS-W-2540D	☐	ww - tss	
1206001-002D						TDS-W-2540C	☐	ww - tds	
1206001-002E	**SEL Analytes: AL B CA FE MG MO K NA**					200.7-DIS	☑	df / dis metals	
						200.7-DIS-PR	☐	df / dis metals	
	SEL Analytes: AS CD CU PB MN SE ZN					200.8-DIS	☑	df / dis metals	
						200.8-DIS-PR	☐	df / dis metals	
						HARD-2340B	☐	df / dis metals	
1206001-002F	**SEL Analytes: AL B FE MO**					200.7-W	☑	df / total metals	
						200.7-W-PR	☐	df / total metals	

WORK ORDER Summary

Client: American Sands Energy Corp.

Work Order: **1206001**

6/5/2012

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1206001-002F	Water Canyon #1 **SEL Analytes: AS CD CU PB MN SE ZN**	5/30/2012 1750h	6/1/2012 0700h	6/15/2012	Aqueous	200.8-W	☑	df / total metals	1
						200.8-W-PR	☐	df / total metals	
						IONBALANCE	☐	df / total metals	
1206001-003A	North Spring **SEL Analytes: CL SO4**	5/31/2012 0945h				300.0-W	☑	df / wc	
						ACIDITY-W-2310B	☐	df / wc	
	SEL Analytes: ALK ALKB ALKC					ALK-W-2320B	☑	df / wc	
						COND-W-2510B	☐	df / wc	
						NO2-W-353.2	☐	df / wc	
						NO3-W-353.2	☐	df / wc	
						PH-4500H+B	☐	df / wc	
						PO4-O-365.1	☐	df / wc	
1206001-003B						NH3-W-350.1	☐	df / nh3	
						NH3-W-PR	☐	df / nh3	
1206001-003C						TSS-W-2540D	☐	ww - tss	
1206001-003D						TDS-W-2540C	☐	ww - tds	
1206001-003E	**SEL Analytes: AL B CA FE MG MO K NA**					200.7-DIS	☑	df / dis metals	
						200.7-DIS-PR	☐	df / dis metals	
	SEL Analytes: AS CD CU PB MN SE ZN					200.8-DIS	☑	df / dis metals	
						200.8-DIS-PR	☐	df / dis metals	
						HARD-2340B	☐	df / dis metals	
1206001-003F	**SEL Analytes: AL B FE MO**					200.7-W	☑	df / total metals	
						200.7-W-PR	☐	df / total metals	

WORK ORDER Summary

Client: American Sands Energy Corp.

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1206001-003F	North Spring	5/31/2012 0945h	6/1/2012 0700h	6/15/2012	Aqueous	200.8-W	☑	df / total metals	1
	SEL Analytes: AS CD CU PB MN SE ZN								
						200.8-W-PR	☐	df / total metals	
						IONBALANCE	☐	df / total metals	
1206001-004A	Range Creek Flume	5/31/2012 1155h				300.0-W	☑	df / wc	
	SEL Analytes: CL SO4								
						ACIDITY-W-2310B	☐	df / wc	
						ALK-W-2320B	☑	df / wc	
	SEL Analytes: ALK ALKB ALKC								
						COND-W-2510B	☐	df / wc	
						NO2-W-353.2	☐	df / wc	
						NO3-W-353.2	☐	df / wc	
						PH-4500H+B	☐	df / wc	
						PO4-O-365.1	☐	df / wc	
1206001-004B						NH3-W-350.1	☐	df / nh3	
						NH3-W-PR	☐	df / nh3	
1206001-004C						TSS-W-2540D	☐	ww - tss	
1206001-004D						TDS-W-2540C	☐	ww - tds	
1206001-004E						200.7-DIS	☑	df / dis metals	
	SEL Analytes: AL B CA FE MG MO K NA								
						200.7-DIS-PR	☐	df / dis metals	
						200.8-DIS	☑	df / dis metals	
	SEL Analytes: AS CD CU PB MN SE ZN								
						200.8-DIS-PR	☐	df / dis metals	
						HARD-2340B	☐	df / dis metals	
1206001-004F						200.7-W	☑	df / total metals	
	SEL Analytes: AL B FE MO								
						200.7-W-PR	☐	df / total metals	

WORK ORDER Summary

Work Order: **1206001**

Client: American Sands Energy Corp.

 6/1/2012

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1206001-004F	Range Creek Flume	5/31/2012 1155h	6/1/2012 0700h	6/15/2012	Aqueous	200.8-W	☑	df / total metals	1
	SEL Analytes: AS CD CU PB MN SE ZN								
						200.8-W-PR	☐	df / total metals	
						IONBALANCE	☐	df / total metals	

Client American Sands Energy Corp
Address 2610 Hillsden Dr
Salt Lake City UT 84117
City State Zip
Phone 801 699 3966 Fax 801 277 7888
Contact William Gibbs
E-mail wgibbs@americansandsenergy.com
Project Name Bruin Point Project
Project Number/P.O.#
Sampler Name K. Knoop

AMERICAN WEST ANALYTICAL LABORATORIES
463 West 3600 South
Salt Lake City, Utah 84115

CHAIN OF CUSTODY

(801) 263-8686
(888) 263-8686
Fax (801) 263-8687
Email:awal@awal-labs.com

Lab Sample Set # 1206001
Page ____ of ____

Turn Around Time (Circle One)
1 day 2 day 3 day 4 day 5 day Standard

Sample ID	Date/Time Collected	Matrix	Number of Containers (Total)	General (see	Nutrients attached	Metals list)								COMMENTS
Old Mine Canyon #1	5/30/12 1340	W	6	X	X	X								Problems with
Water Canyon #1	5/30/12 1750	W	6	X	X	X								acidified bottles
North Spring	5/31/12 0945	W	6	X	X	X								leaking - sample
Range Creek flume	5/31/12 1155	W	6	X	X	X								IDs put on lids

QC LEVEL: 1 2 2+ 3 3+ 4

Relinquished By: Signature	Date	Received By: Signature	Date
[signature]	6/1/12	[signature]	6-1-12
PRINT NAME: Karla Knoop	Time 7:00	PRINT NAME: Lynn Turner	Time 7:00
Relinquished By: Signature	Date	Received By: Signature	Date
PRINT NAME	Time	PRINT NAME	Time
Relinquished By: Signature	Date	Received By: Signature	Date
PRINT NAME	Time	PRINT NAME	Time
Relinquished By: Signature	Date	Received By: Signature	Date
PRINT NAME	Time	PRINT NAME	Time

Special Instructions:
BILL AMERICAN SANDS, NOT JBR
Send results report to client + to JBR (kknoop@jbrenv.com)
Questions - Karla Knoop, JBR, 801 438 2245

LABORATORY USE ONLY

SAMPLES WERE:
1 Shipped or hand delivered
Notes:
2 Ambient or Chilled
Notes:
3 Temperature 3.2
4 Received Broken/Leaking (Improperly Sealed) Y N
Notes:
5 Properly Preserved Y N
Checked at Bench Y N
Notes:
6 Received Within Holding Times Y N
Notes: pH rec. outside of hold.

COC Tape Was:
1 Present on Outer Package Y N NA
2 Unbroken on Outer Package Y N NA
3 Present on Sample Y N NA
4 Unbroken on Sample Y N NA

Discrepancies Between Sample Labels and COC Record? Y N
Notes:

Acidity $25.00	Arsenic (dissolved and total) 10.00/each
Alkalinity 19.00	Aluminum (dissolved and total) 10.00/each
Bicarbonate (included in alkalinity)	Boron (dissolved and total) 10.00/each
Carbonate (included in alkalinity)	Cadmium (dissolved and total) 10.00/each
Calcium (dissolved) 10.00	Copper (dissolved and total) 10.00/each
Chloride 13.00	Iron (total and dissolved) 10.00/each
Magnesium (dissolved)10.00	Lead (dissolved and total) 10.00/each
Potassium (dissolved)10.00	Manganese (total and dissolved) 10.00/each
Sodium (dissolved) 10.00	Molybednum (dissolved and total) 10.00/each
Sulfate 13.00	Selenium (dissolved and total) 10.00/each
Total Dissolved Solids 15.00	Zinc (dissolved and total) 10.00/each
Hardness 22.00	Total Suspended Solids 15.00
Ammonia 38.00	pH 13.00
Nitrate 13.00	Conductivity 12.00
Nitrite 13.00	Cation/anion balance 13.00
Orthophosphate 13.00	Metals Prep 20.00
	Metals – dissolved (15+prep)= $170.00
	Metals – Totals (11+prep)= $130.00
Totals out to $537.00 per sample	

Sample Set: 120600/

Preservation Check Sheet

Sample Set Extension and pH

Bottle Type	Preservative	All OK	~~Except~~ 1	~~Except~~ 2	~~Except~~ 3	~~Except~~ 4	~~Except~~	~~Except~~	~~Except~~	~~Except~~	~~Except~~	~~Except~~	~~Except~~	~~Except~~	~~Except~~	~~Except~~	~~Except~~
Ammonia	pH <2 H_2SO_4		yes	yes	yes	yes											
COD	pH <2 H_2SO_4																
Cyanide	PH >12 NaOH																
Metals	pH <2 HNO_3		yes	yes	yes	yes											
NO_2 & NO_3	pH <2 H_2SO_4																
Nutrients	pH <2 H_2SO_4																
O & G	pH <2 HCL																
Phenols	pH <2 H_2SO_4																
Sulfide	pH > 9NaOH, Zn Acetate																
TKN	pH <2 H_2SO_4																
TOC	pH <2 H_3PO_4																
TOX	pH <2 H_2SO_4																
T PO_4	pH <2 H_2SO_4																
TPH	pH <2 HCL																

8/1/12

Procedure:

1) Pour a small amount of sample in the sample lid
2) Pour sample from Lid gently over wide range pH paper
3) **Do Not** dip the pH paper in the sample bottle or lid
4) If sample is not preserved properly list its extension and receiving pH in the appropriate column above
5) Flag COC, notify client if requested
6) Place client conversation on COC
7) Samples may be adjusted

Frequency: All samples requiring preservation

URS

HYDROLOGY OF NORTH SPRING AND BRUIN POINT
BRUIN POINT MINE

For

American Sands Energy Corp

Green River Resources Inc.
201 South Main 1800
Salt Lake City, UT 84111

September 18, 2014

Hydrology of North Spring And Bruin Point Utah

Prepared for:

American Sands Energy Corp

Green River Resources Inc.
201 South Main 1800
Salt Lake City, UT 84111

Prepared by:

URS Corporation
756 East Winchester, Suite 400
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LICENSED PROFESSIONAL GEOLOGIST
9/18/14
HYRUM L. CANNON
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STATE OF UTAH

H. Lawrence Cannon, P.G.
Project Geologist

Stephen H Snelgrove

Stephen H. Snelgrove
Senior Hydrogeologist
Vice President

TABLE OF CONTENTS

ACRONYMS

ASEC	American Sands Energy Corporation
BGS	Below Ground Surface
GPM	Gallons Per Minute
GRF	Green River Formation
GRR	Green River Resources Inc.
JBR	JBR Environmental Consultants, Inc.
NOAA	National Oceanic and Atmospheric Administration
USDA	U.S. Department of Agriculture
URS	URS Corporation
USGS	United States Geological Survey

1.0 INTRODUCTION

Green River Resources Inc. (GRR) proposes to mine and process oil sand resources located on private property approximately 6 miles northeast of Sunnyside, Utah, and approximately 100 miles southeast of Salt Lake City, Utah as illustrated in Figure 1. The proposed facilities include a subsurface mine to extract oil sand materials from deposits approximately 800-900 feet below the ground surface (bgs); a processing plant on the surface to extract bitumen from the oil sands; a surface impoundment to store dry materials derived from the processing plant; and associated haul roads used to move materials between the mine, processing plant, and the dry material surface impoundment.

2.0 HYDROGEOLOGY

The project area is in the Roan Cliffs and comprises 1,760 acres of private parcels located in Township 14 South, Range 14 East, Sections 2, 3, and 10, Salt Lake Meridian (Figure 1). The area is in mountainous terrain; elevations range from approximately 8,000 feet to over 10,150 feet at Bruin Point, near the northwest corner of the project area.

Much of the project area is within the Range Creek drainage (Figure 1). Although numerous studies conducted by Amoco, JBR and others indicate that Range Creek is generally dry in the vicinity of the project, North Spring, located near the northern boundary of project area and approximately 500 feet southeast of the proposed dry materials surface impoundment, discharges into the Range Creek drainage, indicating the presence of groundwater (JBR, 2014; Calkin, 1990A). Several factors affect the occurrence and movement of groundwater near the project, primarily the climate and topography of the project location, which controls the fraction of annual precipitation that infiltrates into the subsurface and when the infiltration occurs; the subsurface stratigraphy, which inhibits the percolation of shallow groundwater into deeper units; and the structural geology, which provides mechanisms for shallow groundwater storage, movement, and the direction of flow. Each of these factors is discussed below, followed n a conceptual model of the groundwater in the project area that describes how these factors interact.

2.1 Climate and Topography

Few climate data are readily available that are directly applicable to the project area. The nearest relevant information is from the National Oceanic and Atmospheric Administration (NOAA) Bruin Point Station (SHEF ID: BRPU1), approximately 1.5 miles southeast of the project area, at an elevation of 9,341 feet (NOAA, 2014). (Climate data available for Sunnyside, UT, at an elevation of 6,414 feet, are not applicable to the project site because the difference in elevation results in a difference in precipitation and snowpack.) Data for the NOAA BRPU1 station were downloaded for the dates of October 2007 – August 2014. Table 1 lists the monthly and cumulative precipitation, beginning in October 2007; Figure 2 shows time series plots of the data, including temperature data. Assuming that the past seven years of data are representative of the typical behavior and variability of climate in the project area, the average annual precipitation is 10.12 inches.

Snowmelt is an important mechanism for in-place groundwater recharge in mountainous terrain because the evapotranspiration potential is considerably smaller than the amount of water available for infiltration into the subsurface during the period when the snowpack melts, and during which subsurface moisture conditions are conducive to recharge (Wilson and Guan, 2004; Flint et al., 2008). The snowpack is in direct contact with the ground surface and provides a near-continuous source of water during the snowmelt season. Conditions for infiltration in the project area are further enhanced because the eastern portion of the project area is on a slope with a northeastern aspect, between the ridge crest to the west and Range Creek to the east, and thus protected from direct insolation during much of the snowmelt period, thereby prolonging the snowmelt period in comparison with slopes with a southern aspect (see Figure 1). The northeastern aspect of the project area would allow snowpack to melt slowly over a prolonged period, allowing a significant amount of snowmelt water to infiltrate into the subsurface and recharge the shallow groundwater system.

The majority of the precipitation occurring during the late spring, summer, and early fall is consumed by evapotranspiration and provides only an insignificant contribution to recharge.

2.2 Subsurface Stratigraphy

Soil cover in the project area is thin, ranging from zero to a few feet (<4 feet) thick (see Attachment A, Photographs 1, 2, and 4). Infiltration of surface water is therefore controlled to a large extent by the fractured bedrock stratigraphy. Surface outcrops are primarily of the Parachute Creek Member of the Eocene-age (56 to 34 million years before present) Green River Formation (GRF).

Lithologic logs from a series of exploratory wells in the project area drilled by Amoco in the 1980s (see Attachment B) indicate that the upper (approximately) 100 feet of the subsurface consists primarily of shale, with occasional thin (<1 feet) oil shale, tar sand, siltstone, and sandstone layers (see, for example, Amoco No. 14, located in the area of the planned dry materials storage area and approximately 2,000 feet west of North Spring). Below 100 feet bgs, in the Garden Gulch and Douglas Creek Members of the GRF, the lithology continues to be dominated by shale layers, often massive, with occasional thin limestone, siltstone, and sandstone layers. In addition, numerous thick (>10 feet and up to 100 feet) tar sand layers with high bitumen content occur beginning at approximately 400 feet bgs and ending approximately 900 feet bgs.

The major lithologies (shale, tar sand) present in the subsurface tend to have low permeability, which would impede vertical infiltration. Except in the upper (approximately) 100 feet of the subsurface, where relief fractures provide voids for both groundwater storage and flow (discussed below), there is little opportunity for groundwater recharge via vertical infiltration.

The higher bitumen content of the tar sands and oil shales beneath the Parachute Creek Member within the western segment of the Mount Bartles-Bruin Point flexure (discussed below) form significant aquicludes beneath the proposed dry material impoundment and processing plant. The steeper dips of the western segment of the flexure would also promote shallow groundwater movement down dip toward North Spring and Range Creek, and would preclude downward movement of shallow groundwater associated with the Parachute Creek Member from moving downward into the hydrogeologic units of the Garden Gulch and Douglas Creek Members.

2.3 Structural Factors

Two aspects of the structural geology in the project area influence groundwater storage and flow: near-surface relief fractures and a subsurface structural flexure.

Relief fractures occur when compressional stress on underlying rocks is removed by the erosion of overlying rock layers (Wyrick and Borchers, 1981). The relief of stress on exposed material on valley/canyon walls and floors results in predictable pattern of shallow, interconnected vertical and horizontal fractures. Secondary permeability provided by the fractures is often more significant than primary permeability through intergranular pore spaces (Wyrick and Borchers, 1981); this is the case in the project area given that the subsurface lithology is dominated by shale and tar sand. Fractures also provide groundwater storage capacity (Wilson and Guan, 2004). Thus the relief fractures provide the means for vertical infiltration of snowmelt into the subsurface, storage capacity for the infiltrated water, and conduits for groundwater flow.

The Mount Bartles-Bruin Point flexure, a large north-west segmented monoclinal dip slope (Calkin, 1990A), has been mapped in the project area and is shown on Figure 3 and is also depicted on Figure 4. The southern part of the flexure zone follows the pronounced topographic lineament of the upper portion of Range Creek. The flexure has divided the project area into three segments as shown on Figure 3. Each segment is characterized by different dips and bitumen content. The eastern segment is characterized by shallow 3-5° northeast dips and sandstones that contain low weight percent of bitumen (0-4%). The central segment is characterized by 4-7° northeast dips and sandstones that contain slightly higher weight percentages of bitumen (4-7%). The western segment exists along the Roan Cliffs and is characterized by steeper 4-12° northeast dips with sandstones that contain high weight percentages of bitumen (4-12%). Thus, this northwest trending flexure has gentle dips of 3-4° NE on the downthrown side and steeper dips of 4-12° NE on the upthrown side (Calkin, 1990A). As discussed below, the transition from comparatively steeper dips west of Range Creek to gentler dips at the flexure enhances discharge from the shallow groundwater system to North Spring. The elevated bitumen content to the west inhibits vertical movement of groundwater.

2.4 Groundwater

The three factors discussed above – climate/topography, stratigraphy, and structure – are the key elements of a conceptual model of the groundwater system that supplies water to North Spring. Recharge to the system occurs at the higher elevations of the upper Range Creek drainage northwest of the spring (Figure 1, Figure 4, and Appendix A, Photograph 6). Recharge is derived primarily from snowmelt that infiltrates and is stored in near-surface (<100 feet below ground surface) fractures in geologic units above oil shale and tar sand beds. Water percolates downward through the preferential pathways provided by the fractures until encountering a competent and low permeability oil shale or tar sand bed (e.g., the R-2 oil shale). As the volume of water in storage increases, hydraulic head is also increasing, driving flow down-dip toward Range Creek, where groundwater discharges from North Spring and other smaller seeps within the Range Creek channel near North Spring (JBR, 2014). The volume of water in storage, hydraulic head, and discharge from springs are interrelated and seasonal. In the springtime, when storage and head are high, flow from the spring is at a maximum; storage and flow steadily decline during summer and fall, and reach a minimum in winter; the cycle starts again with the accumulation and eventual melting of new snowpack.

Groundwater moving from the western segment into the central segment of the flexure would be impeded when it encounters the shallower dip of the central segment of the flexure (as noted above, the hinge line of the flexure, where the change in dip occurs, is coincident with Range Creek). This enhances discharge from springs and seeps because groundwater would follow the preferential flow path of the shallow, near-surface fractures and discharge to the surface as springs and seeps (North Spring) near the boundary of the western and central segments of the flexure (Range Creek).

Groundwater flow in upper Range Creek basin is confined to the Parachute Creek Member of the Green River Formation just above the R-2 and R-5 oil-shale intervals (Calkin, 1990A). The R-2 and R-5 oil-shale units serve as aquicludes impeding vertical movement of groundwater. Sedimentary rocks (calcareous shale/sandstone) of the Parachute Creek Member above the R-2 and R-5 oil-shale units are generally more permeable (largely due to secondary porosity of factures), and the groundwater preferentially passes through and is stored in these more permeable near-surface beds. In general, bitumen contained within the underlying oil shale and tar sand beds of the Garden Gulch and Douglas Creek Members inhibits downward movement of groundwater to lower units by semi-sealing fractures/joints. Amoco did not report encountering groundwater below the Parachute Creek Member in any of the exploratory borings drilled in the 1980s (UGS, 2010). In the Sunnyside Tar Sands area, North Spring and South Spring/Tributary Spring are located just above the R-2 oil shale interval and the Stone Cabin Spring is located just above the R-5 oil shale unit (Calkin, 1990A).

Observed flow from North Spring ranges from approximately 40 gallons per minute (gpm) in the springtime to 3 gpm or less in the fall (Calkin, 1990A and JBR, 2014). During the August 2014 geotechnical investigation of the dry material impoundment area, flow from North Spring was measured at 1.8 gpm. A water quality sample collected in May 2012 from the discharge from North Spring indicated the water quality is high (JBR, 2014) with low concentration of total dissolved solids (176 mg/L).

Note that the shallow groundwater system and North Spring are considerably higher (>500 feet) in elevation and east of the region where the T-38 member will be mined to obtain tar sand for bitumen extraction (Figure 4).

Amoco reported artesian groundwater within the parachute Creek Member at boring locations A-14 and A-17. During drilling activities at boring A-14, artesian groundwater was encountered at 65 feet bgs within the Parachute Creek Member. In A-17 artesian groundwater was encountered at 70 feet bgs, also within the Parachute Creek Member. Flow at A-14 was reported at approximately 300 gallons per minute (gpm) and at boring A-17 at 50 gpm. These boring are located topographically up dip from North Spring and within the recharge area of the shallow groundwater system. Boring logs can be found in Appendix B for borings A-14 and A-17.

ASEC encountered groundwater in a recent boring at 400 to 420 feet bgs within the Garden Gulch Member. This is anomalous with respect to the 50+ exploratory borings drilled by Amoco, including at least three in the immediate vicinity of the ASEC boring. None of logs for the Amoco borings reported groundwater at depths below the shallow aquifer in the Parachute Creek Member. Flow at the ASEC boring was reported at 2 gpm. Based on available documents, it is unclear whether this water is derived from higher in the boring within the Parachute Creek Member and trickles down the bore hole, or whether it is formation water within the Garden Gulch Member. If the water encountered were formation water, it would have to traverse numerous tar sand aquicludes before reaching the proposed mine workings.

surface location of the boring, the water may find preferential pathways northwest toward through stress relief fractures and discharge on the face of the Roan Cliffs. Three cliff face seeps were observed in the upper reaches of Water Canyon near Bruin Point (JBR, 2014). These seeps discharge through stress relief factures with groundwater sourced near the topographic high point of Bruin Point (approximately 1 mile northwest of the boring). No spring or seeps were observed during the July 29, 2014 site inspections of the mine portal area within the head waters of Bear Canyon. The head water of Bear Canyon is located within the Roan Cliff directly west of the ASEC boring.

North Spring originates from groundwater discharging from fractures sets located approximately 10 feet above Range Creek channel from the southwest side of the canyon (Appendix A, Photograph 3). Fractured bedrock was observed approximately 10-50 feet northwest of North Spring with a fracture orientation of 95° southeast and near vertical dip of 85-90° to the northeast (Appendix A, Photograph 4). Bedrock exposed at the surface in Range Creek, located approximately 200-300 feet north of North Spring, exhibits conjugate joint sets (Appendix A, Photograph 5). The orientation of these conjugate joints are 95° and 138° to the south east and near vertical dip of 85-90° to the northeast. The orientation of the calcareous shale/sandstone beds near North Spring strike approximately 290° and dip approximately 9° to the northeast.

3.0 CONCLUSIONS

The source area of North Spring is the upper Range Creek drainage basin northwest of the spring (see Appendix A, Photograph 6). Recharge to the shallow aquifer feeding North Spring occurs when water derived from snowmelt, soaks through the thin site soils and fractured bedrock covering the topographically-elevated drainage. Water percolates down-dip through preferential pathways in the fractured calcareous sandstone and shale beds of the Parachute Creek Member until an oil shale confining bed is reached (R-2 oil shale). Infiltrated water is stored in fractures. As storage from infiltration increases hydraulic head also increases, driving flow down-dip toward Range Creek, where subtle changes in dip angle associated with a structural flexure causes groundwater to discharge from North Spring near Range Creek. Fractured calcareous sandstone and shales bed allow groundwater to move down slope in a stair step pattern.

High bitumen-content layers within the western segment of the flexure (underlying oil shale and tar sand beds of the Garden Gulch and Douglas Creek Members) inhibit downward movement of groundwater from the shallow groundwater system to lower units by semi-sealing fractures/joints. Amoco did not report encountering groundwater below the Parachute Creek Member in any of the exploratory borings drilled in the 1980s.

4.0 REFERENCES

Calkin, WM. S. 1990A. Geologic Summary Report of the 1989 Exploration Program Sunnyside Tar Sands Project Carbon County Utah. *For* Amoco Corporation, Solid Resources.

Calkin, WM. S. 1990B. Regional Map Sunnyside Tar Sands, Carbon County, Utah. *For* Amoco Corporation, Solid Resources.

Flint, A.L., L.E. Flint, and M.D. Dettinger. 2008. Modeling soil moisture processes and recharge under a melting snowpack. Vadose Zone Journal, 7:350-357.

JBR. 2014. American Sands Energy Corporation Proposed Bruin Point Mine, Seep and Spring Inventory.

NOAA, 2014. National Oceanic and Atmospheric Administration. National Operational Hydrologic Remote Sensing Center Interactive Snow Information. Station SHEF ID: BRPU1. <http://www.nohrsc.noaa.gov/interactive/html/graph.html?station=BRPU1>.

UGS. 2010. Utah Geological Survey Open-File Report 566. 2010

Weiss, M.P., Witkind, C.J., and Cashion, W.K. 1981. Geologic Map of Price Quadrangle, Carbon, Duchesne, Uinta, Utah, and Wasatch Counties, Utah, USGS 1-1981.

Wilson, J.L., and H. Guan. 2004. Mountain-block hydrology and mountain-front recharge. p. 113–137. In J.F. Hogan, F.M. Phillips, and B.R. Scanlon (ed.) Groundwater recharge in a desert environment: The southwestern United States. Water Science and Applications Ser. Vol. 9. American Geophysical Union, Washington, DC.

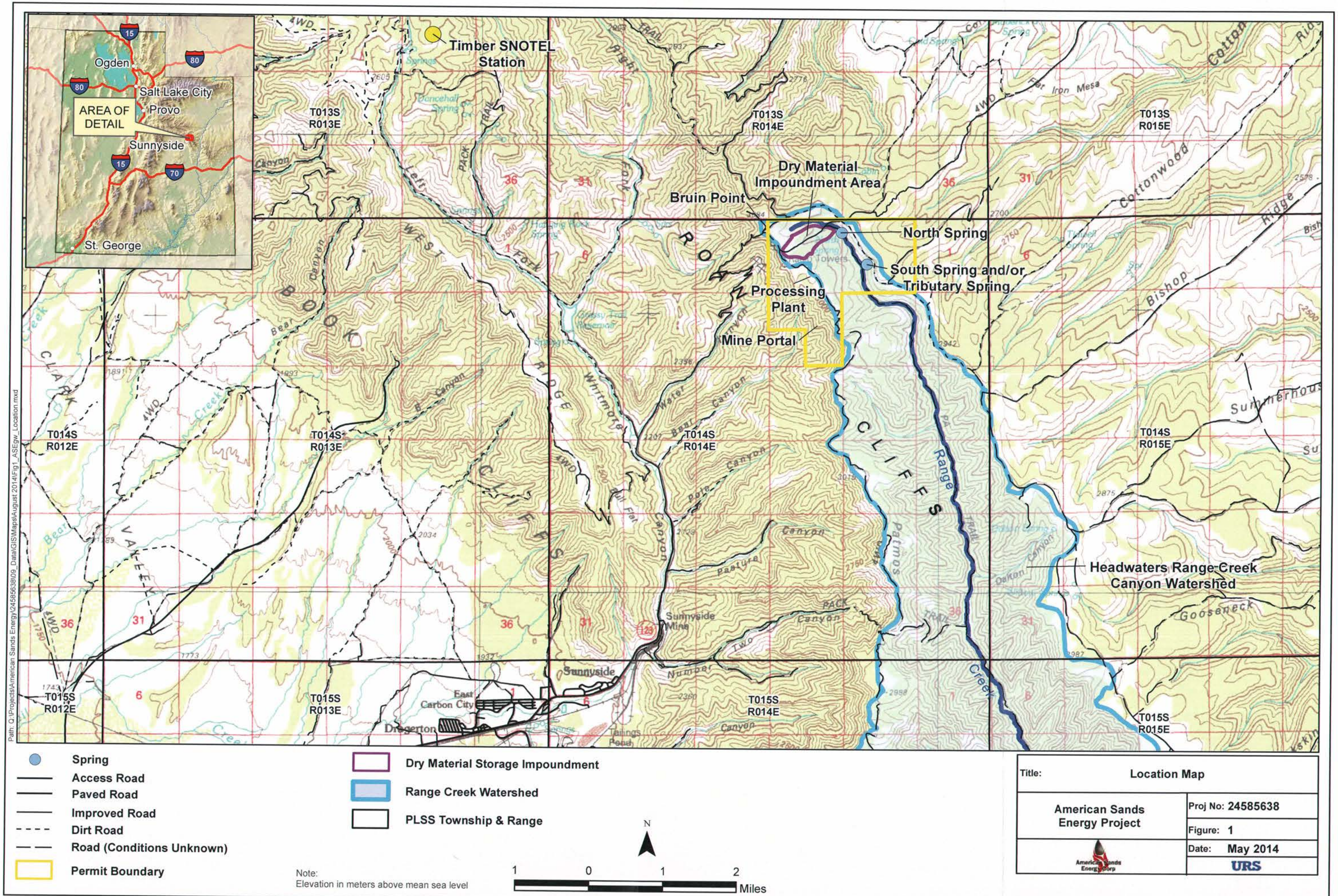
Wyrick, G.G., and J.W. Borchers. 1981. Hydrologic effects of stress-relief fracturing in an Appalachian Valley. US Geological Survey Water-Supply Paper 2177, US Government Printing Office.

Table 1
NOAA Station BRPU1 Bruin Point Precipitation Data

	Monthly Precipitation (in)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2008	0.2	0.01	0.05	0.01	0.2	0.11	0.16	0.76	0.18	0	0.22	1.19
2009	1.48	0.17	0.07	0.1	0.29	0.11	0.21	2.26	2.1	0.86	0.47	0.75
2010	1.06	0.21	0.08	0.21	0.18	0.99	0.63	0.38	0.79	1.23	2.23	0.29
2011	3.96	0.08	0.15	0.65	0.16	0.7	1.53	1.51	1.29	3.32	1.16	1.72
2012	0.79	0.31	0.26	0.14	0.53	0.53	1.32	0.04	0	1.98	0.34	1.76
2013	0.57	0.38	0.27	0.8	0.88	0.75	2.09	1.34	0.15	1.48	0	0.53
2014	1.44	1.13	0.46	0.08	0.53	0.97	1.31	1.3	0.25	1.59	3.76	

	Cumulative Precipitation (in)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2008	0.20	0.21	0.26	0.27	0.47	0.58	0.74	1.50	1.68	1.68	1.90	3.09
2009	1.48	1.65	1.72	1.82	2.11	2.22	2.43	4.69	6.79	7.65	8.12	8.87
2010	1.06	1.27	1.35	1.56	1.74	2.73	3.36	3.74	4.53	5.76	7.99	8.28
2011	3.96	4.04	4.19	4.84	5.00	5.70	7.23	8.74	10.03	13.35	14.51	16.23
2012	0.79	1.10	1.36	1.50	2.03	2.56	3.88	3.92	3.92	5.90	6.24	8.00
2013	0.57	0.95	1.22	2.02	2.90	3.65	5.74	7.08	7.23	8.71	8.71	9.24
2014	1.44	2.57	3.03	3.11	3.64	4.61	5.92	7.22	7.47	9.06	12.82	

	Average Temperature (°F)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2008	37.5	31.5	14.8	13.2	20.5	25.0	31.6	39.9	53.9	63.2	59.8	50.5
2009	39.8	31.5	18.0	23.7	22.5	27.7	32.8	45.6	49.2	62.3	59.0	52.0
2010	33.1	30.5	14.4	21.6	18.9	26.7	33.5	38.3	54.8	61.1	56.9	54.2
2011	38.7	23.8	23.5	20.2	17.5	27.2	31.3	37.8	52.4	59.0	61.5	51.6
2012	38.4	26.0	21.1	24.1	19.6	33.2	38.2	47.5	60.7	61.4	61.8	53.1
2013	40.0	32.2	18.4	19.8	19.1	30.4	33.2	44.5	60.0	62.1	57.9	48.9
2014	35.1	27.7	19.1	24.6	22.8	28.6	33.6	44.0	54.7	61.9	54.3	



Title:	Location Map
American Sands Energy Project	Proj No: 24585638
	Figure: 1
	Date: May 2014
	URS

Figure 2
NOAA Station BRPU1 Bruin Point Precipitation Charts

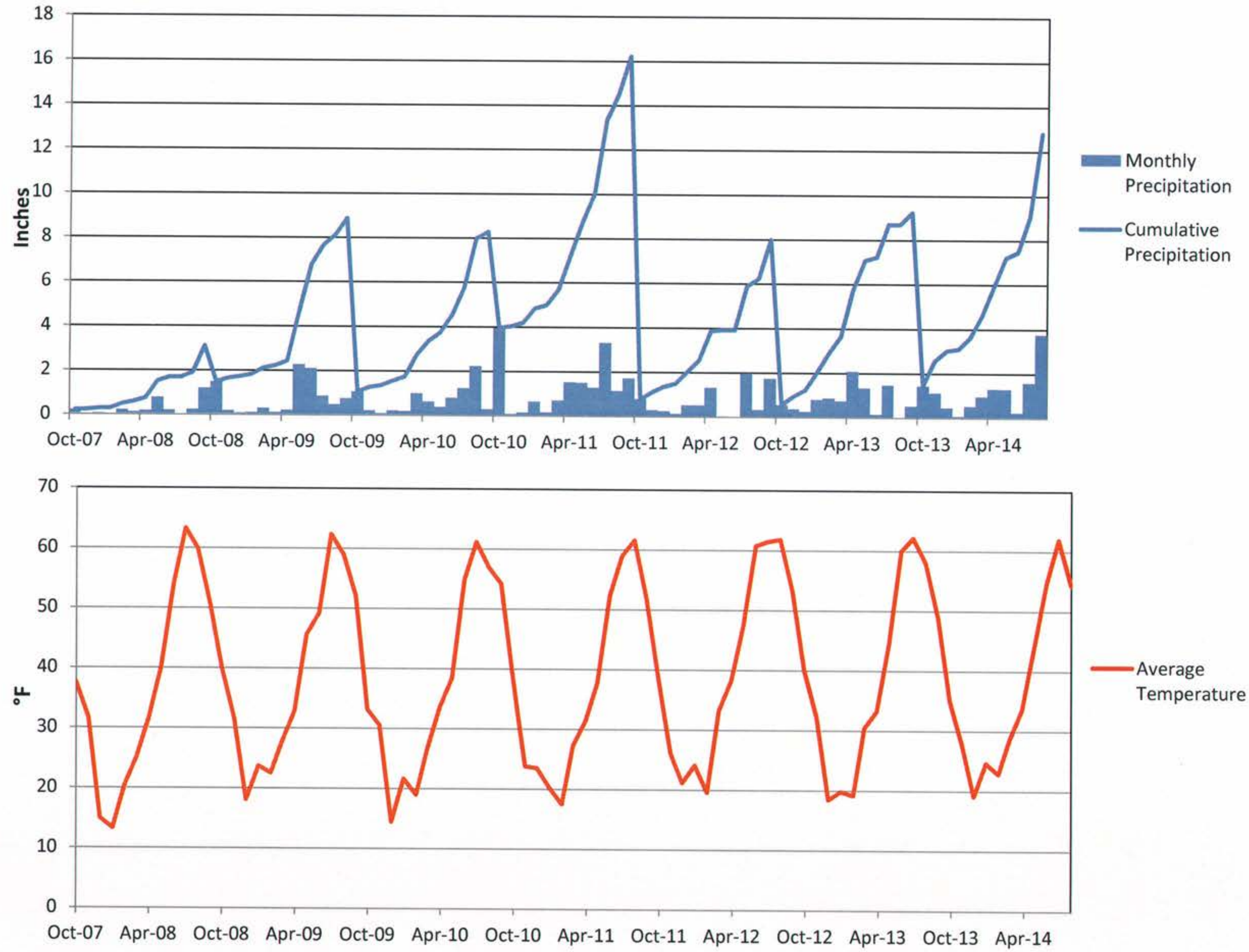
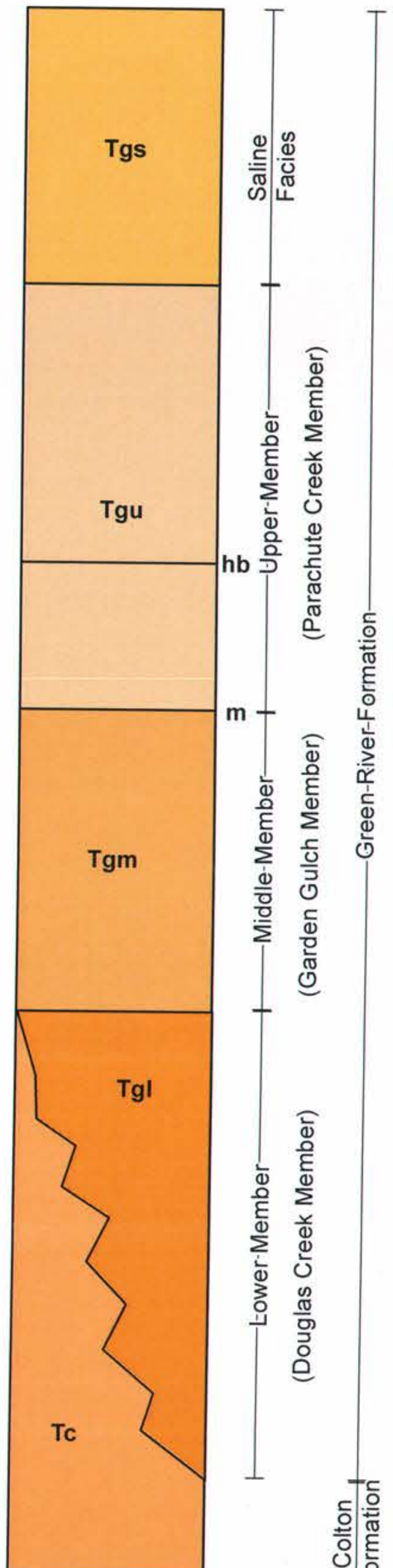


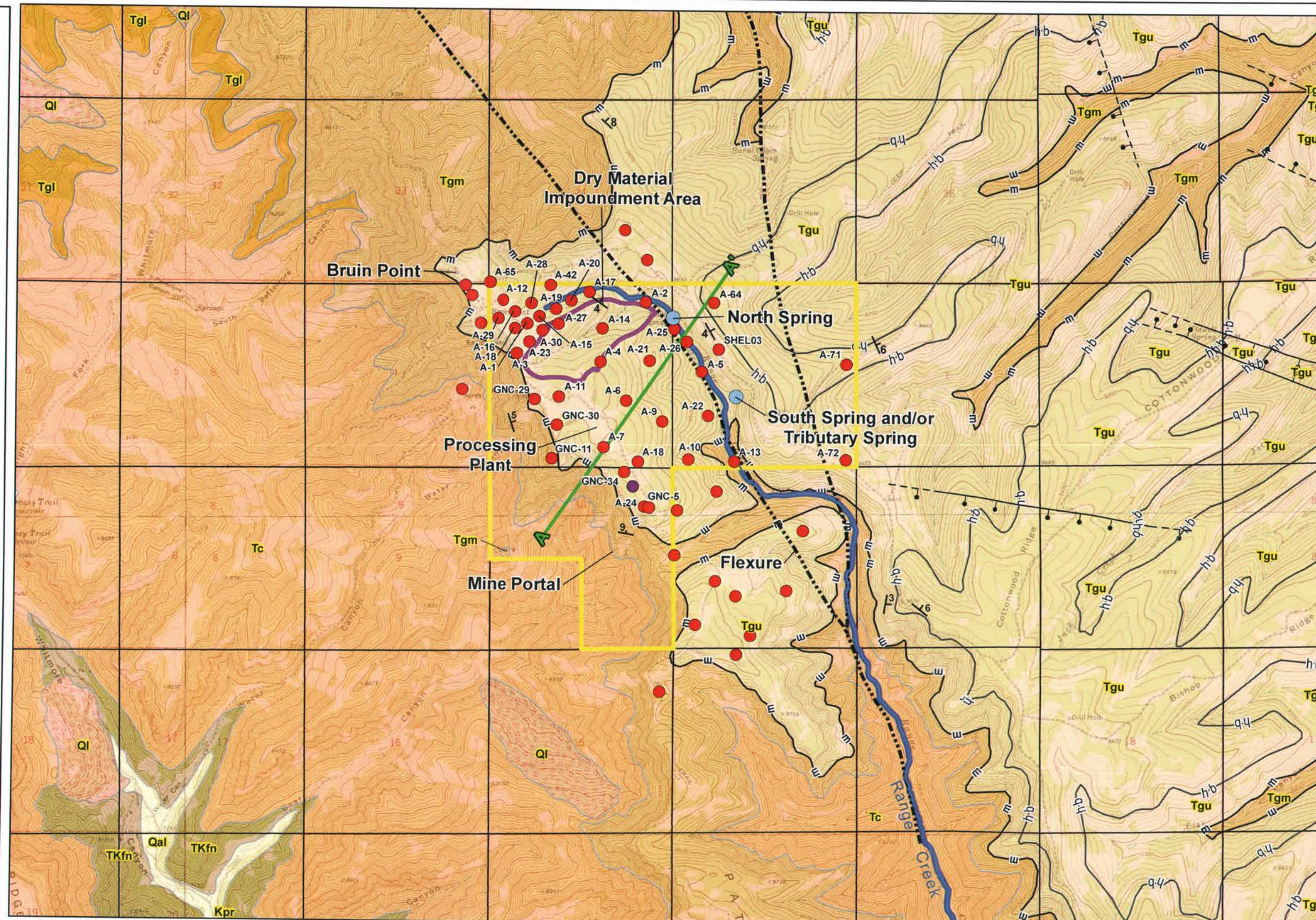
Figure 2: Precipitation, Snow depth, and Temperature data from October 2007 – August 2014, NOAA Bruin Point Station BRPU1

Typical Site Stratigraphic Column



hb Horsebench Sandstone Bed
m Top of Mahogany Bed

Reference: Geologic map and stratigraphic column complied from Regional Map Sunnyside, Tar Sands, Carbon County, Utah, 1990. Calkin, WM. S. and Geologic map of Price 30'x60' quadrangle Carbon, Duchesne, Uinta, Utah, and Wasatch counties, Utah, 1990. Weiss, M. P., Witkind, C. J., and Cashion, W. K., USGS 1-1981



Geologic Units

Qal	Alluvium
Ql	Landslide deposits
Tgu	Upper member of the Green River Formation
Tgm	Middle member of the Green River Formation
Tgl	Lower member of the Green River Formation
Tc	Colton Formation
TKfn	Flagstaff Limestone and North Horn Formation

Spring

Amaco Boring Location

Fault
Dashed where approximately located, ball rests on downthrown block

Contact - Approximately Located or Inferred
m — Top of Mahogany Bed
h·b — Horsebench Sandstone Bed

American Sands Boring Location

6 Strike and Dip

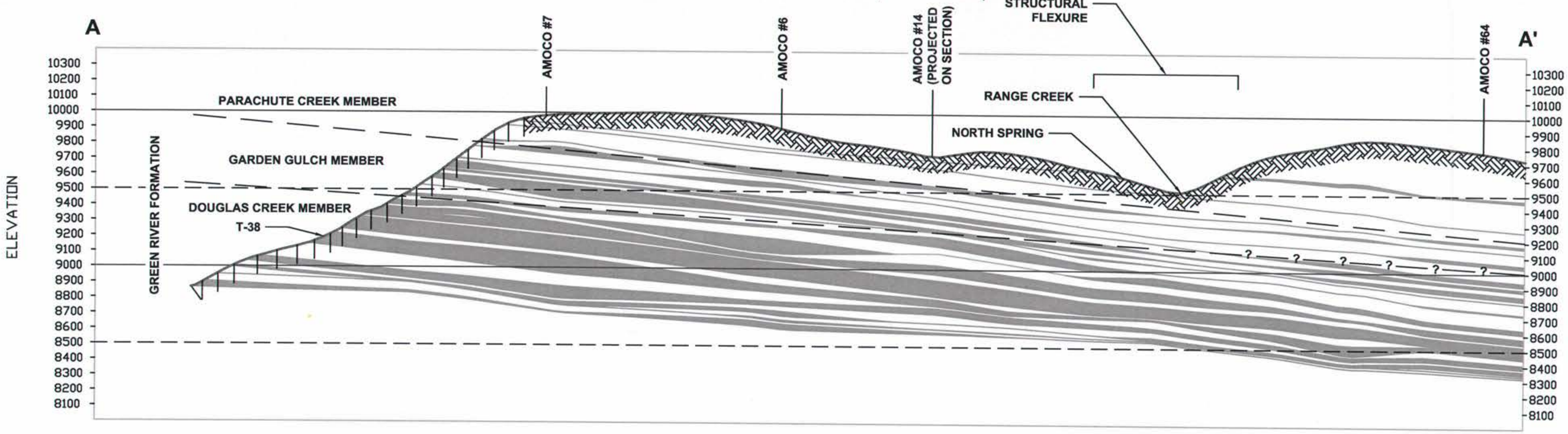
Permit Boundary

N

1,500 0 1,500 3,000 Feet

Title:	Geologic Map
Bruin Point Mine DOGM Permit Application	Proj No: 24585638
	Figure: 3
American Sands Energy Corp	Date: May 2014
	URS

STRUCTURAL FACTORS AFFECTING GROUND WATER



GENERALIZED CROSS SECTION A-A'

SCALE=1"=800'
2 X VERTICAL EXAGGERATION

400 0 800 1600 FEET

LEGEND

TAR SANDS BITUMINOUS ZONE, > 10 GAL/TON

STRESS RELIEF FRACTURES

COORDINATE SYSTEM:

UT83-CF
UTAH STATE PLANES: NAD 83 DATUM, CENTRAL ZONE, US FOOT.

No.	REVISION	DATE	BY	CHKD

American Sands Energy Corp
American Sands Energy Corp.
201 South Main 1800
Salt Lake City, UT 84111

Title: GENERALIZED CROSS SECTION A–A'

Scale: 1"=800'	Date:	Design By:	Drawn By:	Approved By:

URS 756 East Winchester Street Ste 400, Salt Lake City, Utah 84107, Phone: (801) 904-4000

FIGURE 4

APPENDIX A
PHOTOGRAPH LOG

URS

PHOTOGRAPHIC LOG

	Bruin Point and North Spring Hydrology **Bruin Point, Utah**	**URS Project No.** 24585638

Photo No. 1 | **Date:** 07/29/14

Direction Photograph Taken:

Looking down and northwest.

Description:

Bedrock outcropping on access road northeast of proposed processing plant area.

Note the thin surface soil layer on the right and left side of road.

Bedrock contains numerous fractures, likely stress relief fractures.

Photo No. 2 | **Date:** 07/29/14

Direction Photograph Taken:

Looking down and west.

Description:

Bedrock outcropping on access road northeast of proposed processing plant area.

Note the thin surface soil layer on the right and left side of road.

Bedrock contains numerous fractures, likely stress relief fractures.

URS

PHOTOGRAPHIC LOG

	Bruin Point and North Spring Hydrology Bruin Point, Utah	URS Project No. 24585638

Photo No. 3	Date: 07/29/14

Direction Photograph Taken:

Looking down and west.

Description:

North Spring discharging from fractured bedrock.

Photo No. 4	Date: 07/29/14

Direction Photograph Taken:

Looking down and west.

Description:

Jointed and fractured bedrock approximately 10-50 feet northwest of North Spring.

URS

PHOTOGRAPHIC LOG

	Bruin Point and North Spring Hydrology Bruin Point, Utah	URS Project No. 24585638

Photo No. 5	Date: 07/29/14

Direction Photograph Taken:

Looking down and northwest.

Description:

Jointed and fractured bedrock within Range Creek approximately 200-300 feet north of North Spring.

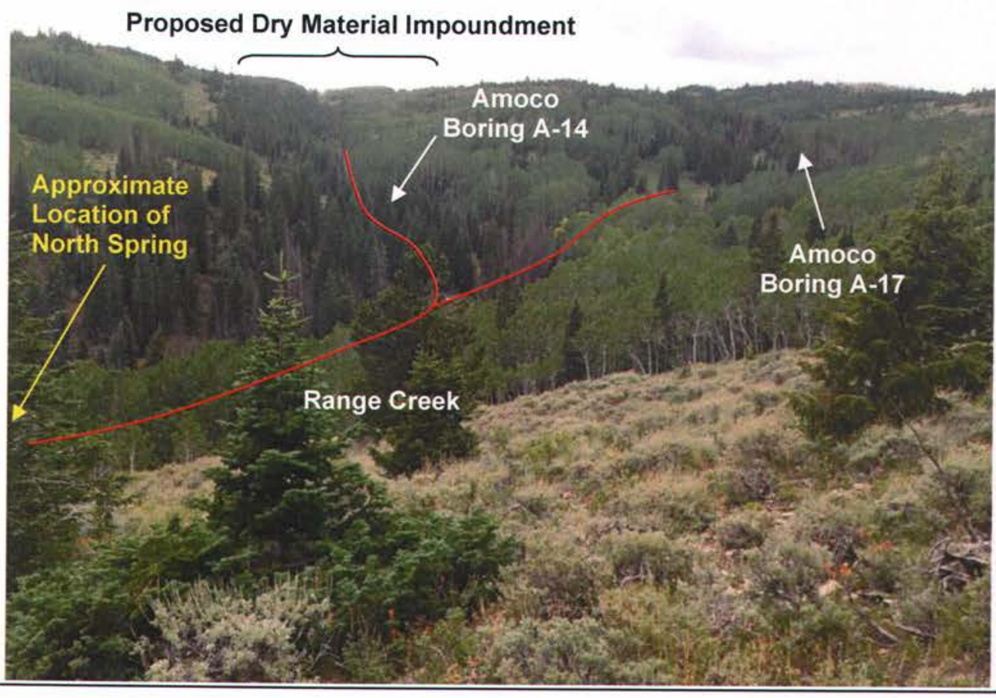
Photo No. 6	Date: 07/29/14

Direction Photograph Taken:

Looking northwest.

Description:

Upper Range Creek drainage basin.



APENDIX B
AMOCO BORING LOGS

Amoco Minerals Company
Denver Division

PROJECT SUNNYSIDE TAR SANDS
T. 14S R. 14E SEC. 3 COUNTY CARBON STATE UTAH
HOLE NO. AMOCO NO. 14 COLLAR COORDINATES N. 477,958.9 E. 2,328,740.1
STARTED 6-30-81 COMPLETED 7-25-81 ELEVATION 9760.1 FT (GROUND)
INCLINATION VERTICAL BEARING TOTAL DEPTH 1077 FT
CONTRACTOR LONGYEAR CORE SIZE NQ LOGGED BY W. CALKIN & R. ROY
SCALE 1" = 50 FT AVE. CORE REC'Y / HOLE 97.2% SHEET 1 OF 1
COMMENTS DATA CONDENSED FROM ORIGINAL LOG AT SCALE 1" = 10 FT.

GAS ZONE
TAR ZONE
OIL SHALE
SS = SANDSTONE
SL = SILTSTONE
SH = SHALE
LS = LIMESTONE
CG = CONGLOMERATE
IFC = INTRAFORMATIONAL CONGLOMERATE
SAT = SATURATED

NONSAT = NONSATURATED
BIT = BITUMINOUS
NONBIT = NONBITUMINOUS
XB = CROSS BEDDED
XB 20 = CROSS BEDDING @ 20°
BP = BEDDING PLANE
CCO = COMPOSITE CHANNEL ORIENTATION
MUSC = MUSCOVITE
LAM = LAMINATED
MASS = MASSIVE

ALGAL ZONE
OSTRACODS
BONE FRAGMENT
FISH SCALES
FISH FOSSILS
OOLITE
BIOTURBATED
ROOTLET
PLANT DEBRIS
COAL

ELEVATION | FOOTAGE | FORMATION | MEMBER | TAR ZONE > 10' | LITHOLOGY | DETAILED DESCRIPTION | GROSS LITHOLOGY | ENVIRONMENT OF DEPOSITION (MINOR / MAJOR)

Elevation: 9700, 9600, 9500, 9400, 9300, 9200, 9100, 9000, 8900, 8800, 8700
Footage: 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400

FORMATION: GREEN RIVER FORMATION
MEMBER: PARACHUTE CREEK MBR; GARDEN GULCH MEMBER; DOUGLAS CREEK MEMBER

DETAILED DESCRIPTION	GROSS LITHOLOGY	ENVIRONMENT OF DEPOSITION – MINOR
OVERBURDEN-NO RECOVERY THIN LAMINATED TAN SHALES 2" OIL SHALE ZONE 9" OIL SHALE ZONE LAMINATED TAN TO LT GREEN SH	SH_{100}	PRODELTA
SAT SL-BIT VFG QTZ SS AT 65' STRONG ARTESIAN FLOW-300 gpm 6" & 9" OIL SH ZONES LAMINATED LT GREEN-GRAY SH	SS_3 SL_{10} SH_{87}	DELTA FRONT
OSTRACOD & ALGAL BIT MICRITE		
LT GREEN LAMINATED SH BONE FRAG-COALIFIED PLANT DEBRIS LAMINATED TO MASSIVE LT GREEN SH VFG BIT QTZ SS & BIT MICRITE MASSIVE TO LAMINATED		
LT GREEN SH & BIT MICRITE INTERLAMINATED BIT SL & SH BIT SL-BONE FRAG MASSIVE MOTTLED GREEN SH WK BIOTURB		
WK VARIEGATED-OLIVE GREEN-PURPLE BIT MICRITE-BONE FRAGS-FISH SCALES LAMINATED LT GREEN SH WH NONBIT MICRITE STREAKY SAT SL	SS_1 SL_7 SH_{71} LS_{21}	SHOREFACE
BIT MICRITE TO SPARITE OSTRACODAL MICRITE-FISH SCALE BIT MICRITE & BIT SL DK GREEN-OLIVE DRAB-GRAY SH BIT OSTRACODAL MICRITE		
BIT OSTRACODAL MICRITES LT GRAY-GREEN LAMINATED SH STREAKY SAT SL-LAMINATED SH BIT OSTRACODAL MICRITE LT GREEN SH-SAT SL		
BIT MICRITE-5" BASAL ALGAL ZONE MOTTLED MAROON SH	SH_{100}	BAY
BIT SL VFG BIT QTZ SS CLIMBING RIPPLES-PLANAR BEDDING	SS_{70} SL_{23} CG_7	CHANNEL MOUTH BAR
18" IFC-SL CLASTS-FISH SCALES BIT ALGAL MICRITE$_{95}$ SPARITE$_5$	SH_{72} LS_{28}	SHOREFACE
PALE GREEN LAMINATED SH MAROON-PURPLE-OLIVE DRAB SH PALE GREEN MASSIVE & LAMIN SH	SL_{13} SH_{87}	BAY
MODERATELY BIOTURB SL GREEN-OLIVE DRAB SH NONBIT BIOMICRITE-BIOTURB SL SLUMPED LAMINAE-GREEN SH GRAY-PALE PURPLE SH-OSTRA-PLANTS	SL_{31} SH_{52} LS_{17}	SHOREFACE
BIT OSTRACODAL LS-PARTLY COQUINA LAMINATED PALE GREEN SH BIT OSTRACODAL MICRITE PALE GREEN MASSIVE SH WK BIT-WK BIOTURB SL BIT VFG QTZ SS & ALGAL LS	SS_{90} SH_{10}	BEACH BAR
BIT VFG QTZ SS-1% FG MUSC PLANAR BEDDING	SL_{18} SH_{55} LS_{27}	SHOREFACE
	SS_{92} SH_2 CG_6	CHANNEL MOUTH BAR
2 FT IFC-BIOTA TRASH BIOTURB SL	$SS_{12}$$SL_{32}$$SH_{47}$$LS_9$	SHOREFACE
INTERBEDDED SH-SL-SS BIT MICRITE RED MOTTLED SH	SL_2 SH_{98}	MARSH
BIT SL & GRAY LAMINATED SH BIT SL-CLIMBING RIPPLES	SS_2 SL_{81} SH_{17}	LEVEE
BIT VFG QTZ SS-PLANAR BEDDING BIT VFG QTZ SS-CURRENT RIPPLES GRAY NONBIT SL-9" IFC	$SS_{59}$$SL_{25}$$SH_{13}$$CG_3$	MINOR CHANNEL
MED GRAY TO PYRITIC SH 3 FT IFC-SL CLASTS INTERBEDDED SL-SS-CG	SH_{100}	MARSH
FG BIT QTZ SS INTERBEDDED SH-SS-SL DISTORTED BEDDING BIT FG QTZ SS-PLANAR BEDDING 1 FT IFC-COAL CHUNK 1"Wx2"Lx0.5"H		
BIT FG QTZ SS-1% FG MUSC BEDDING FEATURES OBLITERATED PLANAR BEDDING INTERBEDDED SH-SL-SS-CG FG QTZ SS-1% MUSC	$SS_{76}$$SL_{11}$$SH_6$$CG_7$	MAJOR CHANNEL
SMALL SCALE TROUGH XB TWO SEPARATE 4" SH ZONES CLIMBING RIPPLES-FG QTZ SS PLANAR XB-BIT FG QTZ SS BIOTURB WK SAT SL BIT VFG QTZ-CURRENT RIPPLES		
STREAKY SAT SL FG QTZ SS-RICH BIT NONBIT VFG QTZ SS STREAKY SAT VFG QTZ SS-3 FT IFC BIT VFG QTZ SS-SLIGHT GAS 4.5 FT IFC-SL CLASTS		
BIT VFG QTZ SS-STREAKY SAT SL VFG BIT QTZ SS-PLANAR BEDDING GREEN-RED-GRAY PYRITIC SH WH NONBIT SL		
RED MOTTLED SH WH NONBIT SL & RED SH RED SH & NONBIT SL RED MOTTLED SH WH NONBIT SL	SL_{43} SH_{57}	MARSH
BIT SL & PALE GRAY PYRITIC SH NONBIT OSTRACODAL LS	SS_{12} SH_{25} LS_{63}	SHOREFACE
CO_2 ODOR-VFG QTZ SS-BIT & NONBIT	SS_{100}	BEACH BAR
6" NONBIT OSTRA LS-PYRITIC SH NONBIT QTZ SS	$SS_8$$SL_{24}$$SH_{66}$$LS_2$	SHOREFACE
PALE GRAY GREEN SH WH NONBIT SL NONBIT VFG QTZ SS	SS_{100}	BEACH BAR

T.D. 1077'

ENVIRONMENT OF DEPOSITION – MAJOR: LACUSTRINE; LACUSTRINE & DELTA; LACUSTRINE

Amoco Minerals Company
Denver Division

PROJECT: SUNNYSIDE TAR SANDS
T. 14S R. 14E SEC. 3 COUNTY: CARBON STATE: UTAH
HOLE NO. AMOCO NO. 17 COLLAR COORDINATES N. 478,995.0 (appx.) E. 2,328,340.0 (appx.)
STARTED: 7-19-81 COMPLETED: 8-18-81 ELEVATION: 9781.0 FT (APPRX GROUND
INCLINATION: VERTICAL BEARING: TOTAL DEPTH: 1015 FT
CONTRACTOR: LONGYEAR CORE SIZE: NQ LOGGED BY: W. CALKIN & R. ROY
SCALE: 1" = 10 FT AVE. CORE REC'Y / HOLE: SHEET: OF:
COMMENTS: DATA CONDENSED FROM ORIGINAL LOG AT SCALE 1" = 10 FT.

GAS ZONE
TAR ZONE
OIL SHALE
SS = SANDSTONE
SL = SILTSTONE
SH = SHALE
LS = LIMESTONE
CG = CONGLOMERATE
IFC = INTRAFORMATIONAL CONGLOMERATE
SAT = SATURATED

NONSAT = NONSATURATED
BIT = BITUMINOUS
NONBIT = NONBITUMINOUS
XB = CROSS BEDDED
XB 20 = CROSS BEDDING @ 20°
BP = BEDDING PLANE
CCO = COMPOSITE CHANNEL ORIENTATION
MUSC = MUSCOVITE
LAM = LAMINATED
MASS = MASSIVE

ALGAL ZONE
OSTRACODS
BONE FRAGMENT
FISH SCALES
FISH FOSSILS
OOLITE
BIOTURBATED
ROOTLET
PLANT DEBRIS
COAL

ELEVATION | FOOTAGE | FORMATION | MEMBER | TAR ZONE > 10' | LITHOLOGY

Elevation: 9700, 9600, 9500, 9400, 9300, 9200, 9100, 9000, 8900, 8800
Footage: 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000

FORMATION: GREEN RIVER FORMATION
MEMBER: PARACHUTE CREEK MBR; GARDEN GULCH MEMBER; DOUGLAS CREEK MEMBER

DETAILED DESCRIPTION	GROSS LITHOLOGY	ENVIRONMENT OF DEPOSITION: MINOR	ENVIRONMENT OF DEPOSITION: MAJOR
NO CORE RECOVERY OVERBURDEN SLUMPED & DISTORTED BEDDING THINLY LAMINATED GRAY SH		PRODELTA TO DELTA FRONT	LACUSTRINE
DISTURBED BEDDING-LAMINATED BIT SL ARTESIAN FLOW AT 70 FT-50 gpm VFG BIT QTZ SS-COALIFIED DEBRIS LT TAN LAMINATED SH BIT BIOMICRITE	SS_8 SL_2 SH_{90}		
LT GREEN MASSIVE SH DISTURBED INTERLAMINATED BIT SL BIT SL BIT VFG QTZ SS-WK BIOTURB	$SS_{TR}SL_3SH_{91}LS_6$	SHOREFACE	
PLANAR BEDDING 20 DEFORMED STRUCTURE-GAS HEAVE 18" IFC-LS CLASTS LT GREEN MASSIVE SH	SS_{84} SL_{11} CG_5	CHANNEL MOUTH BAR	
BIT OOLITIC LS-PALE GREEN SH	SL_5 SH_{91} LS_4	SHOREFACE	
MED GREEN MOTTLED SH-THIN SL LT GREEN MASSIVE SH-WK BIOTURB SL VFG BIT QTZ SS-1% FG MUSC PLANAR BEDDING & CLIMBING RIPPLES BIT FG QTZ SS-LS IFC-WH MICRITE	SS_{100}	BEACH BAR	
LAMINATED LT GREEN SH BIT WH-TAN MICRITE-GREEN SH BIT MICRITE-PALE GREEN SH-BIT SL BIOMICRITE-LT GRAY SH BIT SL-CLIMBING RIPPLES			LACUSTRINE AND DELTA
GREEN-OLIVE DRAB SH-BIT SS & SL MOTTLED MASSIVE-GREEN-OLIVE DRAB SH BIT BIOMICRITE-FISH SCALES IN SH BIT BIOMICRITE TO COQUINA MED GREEN MASSIVE SH	$SS_5SL_{10}SH_{58}LS_{27}$	SHOREFACE	
BIT OSTRACOD COQUINA BIT BIOMICRITES-LT GREEN SH WK BIT VFG QTZ SS MASSIVE LT GREEN SH MOTTLED GREEN-OLIVE DRAB SH			
LT MAROON-GREEN SH BIT SL-CURRENT RIPPLE LAMINATIONS	SS_{100}	LEVEE	
BIT FG-MG QTZ SS-PLANAR BEDDING 2 FT IFC-LS CLASTS-FISH SCALES BIT BIOMICRITE-LT GREEN SH	SS_{76} SH_9 CG_{15}	CHANNEL MOUTH BAR	
OSTRACODAL LS-GREEN SH MAROON-GRAY-OLIVE DRAB SH MOTTLED GREEN-OLIVE DRAB SH BIOTURB NONBIT SL FISH SCALES-BIT MICRITE-BIOTURB SL	SL_{19} SH_{69} LS_{12}	SHOREFACE	
LT GRAY-MAROON-GREEN SH BIT SL-MOTTLED MAROON SH OSTRACOD COQUINA-GRAY SH VFG BIT QTZ SS OSTRACOD COQUINA	SL_6 SH_{94}	MARSH	
GRAY-GREEN MOTTLED SH-BIT SL BIT BIOMICRITE-BASAL 3" ALGAL ZONE LT GREEN MOTTLED SH-BIOTURB SL	$SS_8SL_{25}SH_{49}LS_{18}$	SHOREFACE	
VFG BIT QTZ SS-1% FG MUSC BIOSPARITE-OSTRACODAL SS	$SS_{79}SL_{14}LS_4CG_3$	CHANNEL MOUTH BAR	
8" IFC-SL CLASTS LT GRAY-GREEN MASSIVE SH BIT OSTRACODAL LS-BIT SL BIT SL & BIT VFG QTZ SS MOTTLED MAROON SH-BIT SL	$SS_{14}SL_{22}SH_{60}LS_4$	SHOREFACE	
THINLY BEDDED MAROON & GRAY SH	SL_9 SH_{91}	BAY	
FG BIT QTZ SS-1% FG MUSC-LS TWO 4" IFC'S-SL CLASTS PLANAR BEDDING	SS_{96} LS_2 CG_2	CHANNEL MOUTH BAR	
GRAY GREEN MASSIVE SH IRREGULAR SAT-BIOTURB SL	SL_{31} SH_{69}	BAY	
FG BIT QTZ SS-1% PYR-1% MUSC MED SCALE HIGH ANGLE THROUGH XB 1 FT IFC-NONBIT SL CLASTS	SS_{89} SL_8 SH_1 CG_2	CHANNEL MOUTH BAR	
WK SAT-NONSAT BIOTURB SL BIT FG QTZ SS-PLANAR BEDDING GRAY-TAN SH-BIOTURB SL-BIT SS 1 FT IFC-SL CLASTS VFG BIT QTZ SS-1% DISS PYR	SS_8 SL_{71} SH_{21}	LEVEE	
6" IFC-ANGULAR SL CLASTS 7" SH PARTING & 3" IFC-SH CLASTS VFG BIT QTZ SS STREAKY SAT SL-CURRENT RIPPLES PLANAR BEDDING-BIT VFG QTZ SS	SS_{85} SL_7 SH_4 CG_4	CHANNEL MOUTH BAR	DELTA
LT GRAY SH-BIOTURB SL-WK BIT STREAKY SAT SL & SS-CURRENT RIPPLES BIT VFG QTZ SS-PLANAR BEDDING BIT VFG QTZ SS-PLANAR BEDDING	SS_{22} SL_{33} SH_{45}	LEVEE	
AT 905'-ARTESIAN FLOW 50-75 gpm & CO_2 GAS BUBBLES OUT HOLE VFG BIT QTZ SS-PLANAR BEDDING-LTD CURRENT RIPPLES INTERBEDDED BIT SS-BIT SL-SH STREAKY SAT-CURRENT RIPPLES	SS_{87} SL_4 SH_9	CHANNEL MOUTH BAR	
VFG BIT QTZ SS-PLANAR BEDDING GRAY-GREEN-MAROON SH SPARITE-LTD OSTRACODS MAROON MASSIVE SH LT GRAY LAMINATED SH-PLANT DEBRIS	$SS_1SL_{17}SH_{79}LS_3$	MARSH	
NONBIT PYRITIC SL-3" LS ZONE NONBIT SL-MAROON SH			

T.D. 1015 FT

APPENDIX D

Correspondence

INVOICE

Professional Title Services
107 South 100 East • Price, Utah 84501
(435) 637-2320 • (435) 637-2323
order@ptsfirst.net

ATTN: WILLIAM GIBBS
AMERICAN SANDS ENERGY CORP.

Date 02-18-14
Case No. 7710
Name OIL SANDS CORP. et al
Legal SUNNYSIDE NO. 4,5,6&7, S10 T14SR
Your File No: N/A

Owners Policy of Title Insurance	$
Lenders Policy of Title Insurance	
Endorsements #	
Recording Fees	
Deeds	
Trust Deed	
Releases	
Assignments	
Other	
Reconveyance Fee	
Document Preparation	
Escrow Fees	
Courier Fees	
Wire Fees	
Cancellation Fee	
Foreclosure/Litigation Report	
Plats and Copies	50.00
Other Fees UPDATED REPORT & MINERAL OWNERSHIP	500.00
Other Fees	
Other Fees	
TOTAL DUE	$ 550.00

17991

Representing *STEWART TITLE GUARANTY COMPANY*
"Please Return Yellow Copy With Payment"

ALTA Commitment Form

COMMITMENT FOR TITLE INSURANCE
Issued by

stewart
title guaranty company

Stewart Title Guaranty Company, a Texas Corporation ("Company"), for a valuable consideration, commits to issue its policy or policies of title insurance, as identified in Schedule A, in favor of the Proposed Insured named in Schedule A, as owner or mortgagee of the estate or interest in the land described or referred to in Schedule A, upon payment of the premiums and charges and compliance with the Requirements; all subject to the provisions of Schedules A and B and to the Conditions of this Commitment.

This Commitment shall be effective only when the identity of the Proposed Insured and the amount of the policy or policies committed for have been inserted in Schedule A by the Company.

All liability and obligation under this Commitment shall cease and terminate six months after the Effective Date or when the policy or policies committed for shall issue, whichever first occurs, provided that the failure to issue the policy or policies is not the fault of the Company.

The Company will provide a sample of the policy form upon request.

This commitment shall not be valid or binding until countersigned by a validating officer or authorized signatory.

IN WITNESS WHEREOF, Stewart Title Guaranty Company has caused its corporate name and seal to be hereunto affixed by its duly authorized officers on the date shown in Schedule A.

Countersigned:

Authorized Countersignature

Professional Title Services
Company Name

Price, UT
City, State

stewart
title guaranty company

STEWART TITLE GUARANTY CO. INCORPORATED 1908 TEXAS

Senior Chairman of the Board

Chairman of the Board

President

SCHEDULE A

Order Number: 7710

Commitment Number: N/A

1. Effective Date: February 7, 2014 at 08:00 AM

2. Policy or Policies to be issued: Amount of Insurance

   (a) A.L.T.A. Owner's Premium: $

   Proposed Insured:

   (b) A.L.T.A. Mortgagee's Premium: $

   Proposed Insured:

   (c) Endorsement Premium: $0.00
   Endorsements

UPDATED SPECIAL REPORT
CHARGE: $500.00
This report should not be considered as a Commitment for Title Insurance, but is given for informational purpoes only.

3. The estate or interest in the land described or referred to in this Commitment and covered herein is:
   Fee Simple

4. Title to the above estate or interest in said land is at the effective date hereof vested in:
   SURFACE OWNERS:
   ----

   13 1/3% Interest: OIL SANDS CORPORATION of UTAH, a Wyoming Corporation

   5% Interest: WILLIAM G. GIBBS

   71 2/3% Interest: RESOURCE ASSOCIATES, LLC

   10% Interest: HELENE E. RICHARDS, as Trustee of THE HELENE E. RICHARDS TRUST, dated January 6, 2009

   MINERAL OWNERS:
   ----

   13 1/3% Interest: OIL SANDS CORPORATION of UTAH, a Wyoming Corporation

   5% Interest: WILLIAM G. GIBBS

   16 2/3% Interest: MEANY FAMILY LLC

   27 1/2% Interest: ROBERT SCHONLAU

   27 1/2% Interest: NANCY SCHONLAU

   10% Interest: HELENE E. RICHARDS, as Trustee of THE HELENE E. RICHARDS TRUST, dated January 6, 2009

5. The land referred to in the Commitment is described as follows:
   (Continued)

SCHEDULE A
(Continued)

Order Number: 7710

Commitment Number: N/A

That certain mining claim or premises, known as the Sunnyside No. 4, Sunnyside No. 5, Sunnyside No. 6, and Sunnyside No. 7, placer mining claims, described as follows: the Sunnyside No. 4 claim comprising the Northwest Quarter of Section 10 in Township 14 South of Range 14 East, of the Salt Lake Meridian; the Sunnyside No. 5 claim comprising the Northeast Quarter of said Section 10, the Sunnyside No. 6 claim comprising the Southeast Quarter of said Section 10, and the Sunnyside No. 7 claim comprising the Southwest Quarter of Section 3, said Township and Range.

(Tax ID # 2A-1356-A, 2A-1366-A, SA-516, SA-9515-1, SA-9670-1 and SA-9567-1)
Situate in Carbon County, State of Utah.

SCHEDULE B - SECTION 1

Order Number: 7710 | Commitment Number: N/A

REQUIREMENTS

The following are the requirements to be complied with:

NOTE: ANY MATTER IN DISPUTE BETWEEN YOU AND THE COMPANY MAY BE SUBJECT TO ARBITRATION AS AN ALTERNATIVE TO COURT ACTION PURSUANT TO THE TITLE INSURANCE RULES OF THE AMERICAN ARBITRATION ASSOCIATION, A COPY OF WHICH IS AVAILABLE FROM THE COMPANY. ANY DECISION REACHED BY ARBITRATION SHALL BE BINDING UPON BOTH YOU AND THE COMPANY. THE ARBITRATION AWARD MAY INCLUDE ATTORNEY'S FEES IF ALLOWED BY THE STATE LAW AND MAY BE ENTERED AS A JUDGEMENT IN ANY COURT OF PROPER JURISDICTION.

NOTICE TO APPLICANT: The land described in this commitment may be serviced by services provided by Cities, Towns, pubic utility companies and other firms providing municipal type services which do not constitute liens upon the land and for which no notice of the existence of such service charges are evidenced in the Public Records. The applicant should directly contact all entities providing such services and make the necessary arrangements to insure payment for such services and continuation of services to the land.

NOTICE TO APPLICANT: If you require copies of any documents identified in this Commitment for Title Insurance, the Company will furnish the same upon request, either free of charge, or for the actual cost of duplication for those copies requiring payment by the Company to obtain.

SCHEDULE B - SECTION 2

Order Number: 7710

Commitment Number: N/A

The policy or policies to be issued will contain exceptions to the following unless the same are disposed of to the satisfaction of the Company:

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records. Proceedings by a public agency which may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Any facts, rights, interests or claims which are not shown by the Public Records but which could be ascertained by an inspection of the land or by making inquiry of persons in possession thereof.
3. Easements, liens or encumbrances, or claims thereof, which are not shown by the Public Records.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.
5. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water, whether or not the matters excepted under (a), (b) or (c) are shown by the Public Records.
6. Any lien, or right to a lien, for services, labor or material heretofore or hereafter furnished, imposed by law and not shown by the Public Records.
7. Taxes for the year 2014 and subsequent years, not yet due and payable. Taxes for the year 2013 have been paid as to Serial Numbers 2A-1356-A, 2A-1366-A, SA-516, SA-9515-1, SA-9670-1 and SA-9567-1.
8. The property described herein does not front on any dedicated street or right of way, and therefore lacks public access thereto.
9. A perpetual easement in favor of Mountain Fuel Supply Company, its successors and/or assigns, to construct, operate, maintain, repair, and remove a microwave equipment building, tower, and other related facilities within a portion of said Section 3, together with all rights and privileges incident thereto, as reserved in that certain Warranty Deed recorded November 10, 1961, as Entry No. 96628, in that certain Warranty Deed recorded November 10, 1961, as Entry No. 96628, in Book 75 at Page 278, and as granted in those certain Grants of Easement recorded November 29, 1961, as Entry No. 96799, in Book 75 at Page 435 and recorded March 18, 1964, as Entry No. 105729, in Book 89, at Page 266, of Official Records.
10. Agreement Not to Sell, Transfer or Encumber said land executed by William S. Batchelder and Jessie M. Batchelder, his wife, in favor of First National Beach Bank, Jacksonville Beach dated June 13, 1967, recorded July 29, 1968, as Entry No. 117139, in Book 113, at Page 173, of Official Records.
11. A Mortgage to secure an indebtedness of the amount stated herein and any other amounts payable under the terms thereof:
    Dated: January 10, 1981
    Executed by: AMOCO PRODUCTION COMPANY, a Delaware Corporation
    Amount: 1,485,000.00
    In Favor Of: PETER W. RICHARDS
    Recorded: January 12, 1981 as Entry No. 156791 in Book 203 at Page 780 of Official Records.

SCHEDULE B - SECTION 2
(Continued)

Order Number: 7710 Commitment Number: N/A

12. Obligations, conditions, and any other matter set forth in that certain Decree of Divorce recorded January 4, 1988, as Entry No. 19410, in Book 277, at Page 812, filed November 30, 1987 in the records of the Circuit Court, Third Judicial Circuit, in and for Suwannee County, Florida, entitled WILLIAM STEWART BATCHELDER, husband, vs. PATRICIA S. BATCHELDER, Wife; Case No. 85-299-CA.

13. A claim of Lien, Notice of which was filed by THE STEWART - THOMAS COMPANY, INC., as Claimant, recorded November 28, 1988 as Entry No. 22373 in Book 284 at Page 587 of Official Records. Amount of claim $11,525.00, and subsequent Hold Harmless Agreement recorded February 23, 1998 as Entry No. 64482 in Book 403 at Page 509 of Official Records.

14. Reservations regarding some minerals, mining and other matters as contained in the Patent to said lands recorded January 3, 1929, as Entry No. 17592, in Book 6A, at Page 135, of Official Records.

15. Tar Sand Lease dated May 1, 1979 by and between BARBARA P. SCHONLAU and WILLIAM G. GIBBS, as Lessors, and W.H. HUDSON, as Lessee, and Amendment thereto dated September 15, 1981, as disclosed by that certain Memorandum of Tar Sand Lease and Amendment recorded November 12, 1982, as Entry No. 166018 and 166019, in Book 222, at Page 645 and 653, and any assignment and other agreements relating to Lessee's interest therein.

16. Any Claim based on the assertion or assumption that, of that certain Deed recorded December 22, 1997, as Entry No. 63454, in Book 400, at Page 361, of Official Records did not pass after-acquired title. (Grantor, Amoco Production Company acquired title by that certain Quit Claim Deed dated April 21, 1998, recorded October 6, 1998, as Entry No. 69224, in Book 418, at Page 454, of Official Records.)

17. "Subject to the terms of an unrecorded Letter Agreement dated December 17, 1997" as disclosed by that certain Deed recorded December 22, 1997, as Entry No. 63454, in Book 400, at Page 361, of Official Records.

18. Any claim based on any inadequacy of or misrepresentation by William S. Batchelder as to his right or ability to convey the interest of Justin C. Montgomery and Jessie M. Batchelder, Trustees under the provisions of a certain Trust Indenture dated September 26, 1968, to Oil Sands Corporation of Utah, a Wyoming corporation, in that certain Disclaimer and Quit Claim Deed recorded May 19, 2005, as Entry No. 111507, in Book 591, at Page 146 and that certain Quit Claim Deed recorded June 9, 2005 as Entry No. 111840 in Book 592 at Page 561.

19. A Memorandum of Lease giving notice of a Lease Agreement dated as of January 14, 2005, by and between Meany Land & Exploration, Inc., as Lessor, and Bleeding Rock LLC, a Utah company, as Lessee, recorded November 10, 2005 as Entry No. 114400 in Book 606 at Page 22; a Notice of Assignment by Bleeding Rock LLC to Green River Resources, Inc. of said Lease Agreement, recorded November 10, 2005 as Entry No. 114401, in Book 606 at Page 23 of Official Records.

20. Oil and Gas Lease dated May 8, 2006, from MEANY LAND & EXPLORATION, INC., a Colorado Corporation, to PETRO-CANADA RESOURCES (USA) INC., for a term of 5 years from May 8, 2006, and so long thereafter as oil and gas are produced in paying quantities upon the terms, conditions an covenants therein provided, recorded September 29, 2006, as Entry No. 119668, in Book 629, at Page 686, of the Official Records, and any subsequent Assignments, Modifications, etc., thereof; an Assignment, Bill of Sale and Conveyance from Petro-Canada Resources (USA) Inc., a Colorado Corporation, to Questar Exploration and Production Company, recorded April 13, 2010 as Entry No. 805291 in Book 720 at Page 266.

SCHEDULE B - SECTION 2
(Continued)

Order Number: 7710

Commitment Number: N/A

21. An Acknowledgement and Notice of Acknowledgement by The State of Utah regarding "Dry Canyon Road", the same as may traverse a portion of said land, recorded June 23, 2008 as Entry No. 129761 in Book 676 at Page 54, of Official Records.

22. A Memorandum of Lease giving notice of a Lease Agreement dated as of October 22, 2009, by and between William G. Gibbs, as Lessor, and Green River Resources, Inc., a Utah company as Lessee, recorded October 29, 2009 as Entry No. 803350 in Book 711 at Page 137 of Official Records.

CONDITIONS

1. The term mortgage, when used herein, shall include deed of trust, trust deed, or other security instrument.

2. If the proposed Insured has or acquired actual knowledge of any defect, lien, encumbrance, adverse claim or other matter affecting the estate or interest or mortgage thereon covered by this Commitment other than those shown in Schedule B hereof, and shall fail to disclose such knowledge to the Company in writing, the Company shall be relieved from liability for any loss or damage resulting from any act of reliance hereon to the extent the Company is prejudiced by failure to so disclose such knowledge. If the proposed Insured shall disclose such knowledge to the Company, or if the Company otherwise acquires actual knowledge of any such defect, lien, encumbrance, adverse claim or other matter, the Company at its option may amend Schedule B of this Commitment accordingly, but such amendment shall not relieve the Company from liability previously incurred pursuant to paragraph 3 of these Conditions.

3. Liability of the Company under this Commitment shall be only to the named proposed Insured and such parties included under the definition of Insured in the form of policy or policies committed for and only for actual loss incurred in reliance hereon in undertaking in good faith (a) to comply with the requirements hereof, or (b) to eliminate exceptions shown in Schedule B, or (c) to acquire or create the estate or interest or mortgage thereon covered by this Commitment. In no event shall such liability exceed the amount stated in Schedule A for the policy or policies committed for and such liability is subject to the insuring provisions and Conditions and the Exclusions from Coverage of the form of policy or policies committed for in favor of the proposed Insured which are hereby incorporated by reference and are made a part of this Commitment except as expressly modified herein.

4. This Commitment is a contract to issue one or more title insurance policies and is not an abstract of title or a report of the condition of title. Any action or actions or rights of action that the proposed Insured may have or may bring against the Company arising out of the status of the title to the estate or interest or the status of the mortgage thereon covered by this Commitment must be based on and are subject to the provisions of this Commitment.

5. *The policy to be issued contains an arbitration clause. All arbitrable matters when the Amount of Insurance is $2,000,000 or less shall be arbitrated at the option of either the Company or the Insured as the exclusive remedy of the parties. You may review a copy of the arbitration rules at< http://www.alta.org/>.*

stewart
title guaranty company

All notices required to be given the Company and any statement in writing required to be furnished the Company shall be addressed to it at P.O. Box 2029, Houston, Texas 77252.

CARBON COUNTY CORPORATION

Tax Roll Master Record

February 13, 2014 11:06:10AM

Parcel: SA-0516-0000 Entry:
Name: OIL SANDS CORP OF UTAH
c/o Name: TAX DEPARTMENT
Address 1: P O BOX 9549
Address 2:
City State Zip: JACKSON WY 83002-0000
Mortgage Co:
Status: **Active**

Property Address:

Acres: 0.00

Year: **2014** District: **009 COUNTY OUTSIDE DISTRICT 0.010744**

Owners	Interest	Entry	Date of Filing	Comment
OIL SANDS CORP OF UTAH				

Property Information	2014 Values & Taxes				2013 Values & Taxes		
	Units/Acres	Market	Taxable	Taxes	Market	Taxable	Taxes
LP01 LATE PENALTY	0.00	0	0	0.00	0	0	10.00
PU07 NON-METALLIFEROUS MINING	0.00	21,332	21,332	229.19	21,332	21,332	229.19
Totals:	0.00	21,332	21,332	229.19	21,332	21,332	239.19

****** SPECIAL NOTE ******
Tax Rates for 2014 have NOT been set or approved.
Any levied taxes or values shown on this printout for the year 2014 are subject to change!!

2014 Taxes:	229.19	2013 Taxes:	229.19
Special Taxes:	0.00		
Penalty:	0.00		
Abatements:	(0.00)		
Payments:	(0.00)		
Amount Due:	229.19	**NO BACK TAXES!**	

01/13/2014 10:34 AM 0129682 2013 WILLIAM BATCHELDER	Redemption - Check	10.00	colosimo
	Total Payments:	10.00	

Back Tax Summary

Year	Principal	Specials Total	Penalty	Interest Due	Interest Rate	Total Payments	Total Due
2013	0.00	0.00	0.00	0.00	7.00%	10.00	0.00
Totals:	0.00	0.00	0.00	0.00		10.00	0.00

Legal Description

°°°STATE ASSESSED PROPERTY°°°

History

Original Account/Serial Number:9000516 SA-0516

CARBON COUNTY CORPORATION

Tax Roll Master Record

February 13, 2014 11:06:19AM

Parcel: SA-9515-0001 Entry:
Name: GIBBS WILLIAM G
c/o Name:
Address 1: 657 18TH AVE
Address 2:
City State Zip: SALT LAKE CITY UT 84103-0000
Mortgage Co:
Status: **Active**

Property Address:

Acres: 0.00

Year: **2014** District: **009 COUNTY OUTSIDE DISTRICT 0.010744**

Owners	Interest	Entry	Date of Filing	Comment
GIBBS WILLIAM G				

Property Information	2014 Values & Taxes Units/Acres	Market	Taxable	Taxes	2013 Values & Taxes Market	Taxable	Taxes
LP01 LATE PENALTY	0.00	0	0	0.00	0	0	10.00
PU07 NON-METALLIFEROUS MINING	0.00	11,000	11,000	118.18	11,000	11,000	118.18
Totals:	0.00	11,000	11,000	118.18	11,000	11,000	128.18

****** SPECIAL NOTE ******

Tax Rates for 2014 have NOT been set or approved. Any levied taxes or values shown on this printout for the year 2014 are subject to change!!

2014 Taxes:	118.18
Special Taxes:	0.00
Penalty:	0.00
Abatements:	(0.00)
Payments:	(0.00)
Amount Due:	118.18

2013 Taxes: 118.18

NO BACK TAXES!

01/15/2014	10:07 AM	0129724	2012	GIBBS WILLIAM G	Interest - Check	8.11	colosimo
01/15/2014	10:07 AM	0129724	2012	GIBBS WILLIAM G	Penalty - Check	10.00	colosimo
01/15/2014	10:07 AM	0129724	2012	GIBBS WILLIAM G	Redemption - Check	114.81	colosimo
01/15/2014	10:07 AM	0129724	2013	GIBBS WILLIAM G	Penalty - Check	10.00	colosimo
01/15/2014	10:07 AM	0129724	2013	GIBBS WILLIAM G	Redemption - Check	118.18	colosimo
					Total Payments:	261.10	

Back Tax Summary

Year	Principal	Specials Total	Penalty	Interest Due	Interest Rate	Total Payments	Total Due
2013	0.00	0.00	0.00	0.00	7.00%	128.18	0.00
2012	0.00	0.00	0.00	0.00	7.00%	132.92	0.00
Totals:	0.00	0.00	0.00	0.00		261.10	0.00

Legal Description

°°°°STATE ASSESSED°°°°

CARBON COUNTY CORPORATION

Tax Roll Master Record

February 13, 2014 11:07:08AM

Parcel: SA-9670-0001
Name: RESOURCE ASSOCIATES
c/o Name: ROBERT SCHONLAU
Address 1: PO BOX 219
Address 2:
City State Zip: WALLSBURG UT 84082-0000
Mortgage Co
Status: **Active** Year: **2014** District: **009 COUNTY OUTSIDE DISTRICT 0.010744**

Entry:
Property Address:
Acres: 0.00

Owners	Interest	Entry	Date of Filing	Comment
RESOURCE ASSOCIATES	1/0			ENTRY NOT FOUND

Property Information	2014 Values & Taxes Units/Acres	Market	Taxable	Taxes	2013 Values & Taxes Market	Taxable	Taxes
PU07 NON-METALLIFEROUS MINING	0.00	114,672	114,672	1,232.04	114,672	114,672	1,232.04
Totals:	0.00	114,672	114,672	1,232.04	114,672	114,672	1,232.04

****** SPECIAL NOTE ******
Tax Rates for 2014 have NOT been set or approved. Any levied taxes or values shown on this printout for the year 2014 are subject to change!!

2014 Taxes:	1,232.04
Special Taxes:	0.00
Penalty:	0.00
Abatements:	(0.00)
Payments:	(0.00)
Amount Due:	1,232.04

2013 Taxes: 1,232.04

NO BACK TAXES!

Legal Description

STATE ASSESSED

CARBON COUNTY CORPORATION

February 13, 2014

Tax Roll Master Record

11:07:26AM

Parcel: SA-9567-0001
Name: RICHARDS HELENE E TRUST
c/o Name: %KATHY OHLAND
Address 1: PO BOX 530482 DEBARY
Address 2:
City State Zip: DEBARY FL 32713-0000
Mortgage Co
Status: **Active**

Entry:

Property Address:

Acres: 0.00

Year: **2014** District: **009 COUNTY OUTSIDE DISTRICT 0.010744**

Owners	Interest	Entry	Date of Filing	Comment
RICHARDS HELENE E TRUST	1/0			ENTRY NOT FOUND

	2014 Values & Taxes				2013 Values & Taxes		
Property Information	Units/Acres	Market	Taxable	Taxes	Market	Taxable	Taxes
PU07 NON-METALLIFEROUS MINING	0.00	16,000	16,000	171.90	16,000	16,000	171.90
Totals:	0.00	16,000	16,000	171.90	16,000	16,000	171.90

****** SPECIAL NOTE ******

Tax Rates for 2014 have NOT been set or approved. Any levied taxes or values shown on this printout for the year 2014 are subject to change!!

2014 Taxes:	171.90	2013 Taxes:	171.90
Special Taxes:	0.00		
Penalty:	0.00		
Abatements:	(0.00)		
Payments:	(0.00)		
Amount Due:	171.90	**NO BACK TAXES!**	

Legal Description

°°STATE ASSESSED PROPERTY°°

CARBON COUNTY CORPORATION

Tax Roll Master Record

February 13, 2014 10:42:47AM

Parcel: 2A-1366-000A Entry: 121611
Name: RESOURCE ASSOCIATES LLC
c/o Name:
Address 1: PO BOX 219
Address 2:
City State Zip: WALLSBURG UT 84082-0000
Mortgage Co:
Status: **State Assessed** Year: **2014** District: **009 COUNTY OUTSIDE DISTRICT 0.010744**

Property Address:

Acres: 480.00

Owners	Interest	Entry	Date of Filing	Comment
RESOURCE ASSOCIATES LLC	55%	121611	02/01/2007	(0528/0263)
BATCHELDER WM S, ETAL	20%			
GIBBS WM G	5%			(0199/0723)
RICHARDS PETER W	10%	132083	12/03/2008	(0687/0109)
RICHARDS HELENE E TR	10%	133034	02/18/2009	(0692/0194)

****** SPECIAL NOTE ******

Tax Rates for 2014 have NOT been set or approved. Any levied taxes or values shown on this printout for the year 2014 are subject to change!!

2014 Taxes:	0.00	2013 Taxes:	0.00
Special Taxes:	0.00		
Penalty:	0.00		
Abatements:	(0.00)		
Payments:	(0.00)		
Amount Due:	0.00	**NO BACK TAXES!**	

Legal Description

NW4 (SUNNYSIDE #4) NE4 (SUNNYSIDE #5) SE4 (SUNNYSIDE #6) SEC 10, T14S, R14E, SLB&M. 480.00 AC

History

Original Account/Serial Number:0133365 2A-1366-00A

CARBON COUNTY CORPORATION

Tax Roll Master Record

February 13, 2014 10:43:01AM

Parcel: 2A-1356-000A
Entry: 121611
Name: RESOURCE ASSOCIATES LLC
c/o Name:
Address 1: PO BOX 219
Address 2:
City State Zip: WALLSBURG UT 84082-0000
Mortgage Co
Status: **State Assessed** Year: **2014** District: **009 COUNTY OUTSIDE DISTRICT 0.010744**

Property Address:
Acres: 160.00

Owners	Interest	Entry	Date of Filing	Comment
RESOURCE ASSOCIATES LLC	55%	121611	02/01/2007	(0528/0263)
BATCHELDER WM S, ETAL	20%			
GIBBS WM G	5%			(0199/723)
RICHARDS PETER W	10%	132083	12/03/2008	(0687/0109)
RICHARDS HELENE E TR	10%	133034	02/18/2009	(0692/0194)

****** SPECIAL NOTE ******

Tax Rates for 2014 have NOT been set or approved. Any levied taxes or values shown on this printout for the year 2014 are subject to change!!

2014 Taxes:	0.00	2013 Taxes:	0.00
Special Taxes:	0.00		
Penalty:	0.00		
Abatements:	(0.00)		
Payments:	(0.00)		
Amount Due:	0.00	**NO BACK TAXES!**	

Legal Description

SW4 SEC 3, T14S, R14E, SLB&M. (SUNNYSIDE #7) 160.00 AC

History

Original Account/Serial Number:0133340 2A-1356-00A

MEMORANDUM OF LEASE

This Memorandum of Lease is to give notice of a Lease Agreement ("Lease") dated as of the 22 day of October, 2009, by and between William G. Gibbs ("Lessor") and GreenRiver Resources, Inc., a Utah company ("Lessee"). General information regarding the lease is as follows:

1. Real Property involved:

Township 14 South, Range 14 East, SLM
Section 3: SW/4
Section 10: E/2, NW/4
Containing 640.00 acres, more or less

2. Term of Lease: The term of the lease is years 6 years, with provisions for extending the lease, beginning at the end of the initial term and extending so long thereafter as at least 500 barrels of bitumen per day are produced. The lease may be earlier terminated by default in its terms.

Lessee:

GreenRiver Resources Inc.

By: ______________________
William C. Gibbs, President

Ent 803350 Bk 711 Pg 137
Date: 29-OCT-2009 4:17PM
Fee: $10.00 Charge
Filed By: KR
VIKKI BARNETT, Recorder
CARBON COUNTY CORPORATION
For: PROFESSIONAL TITLE SERVICES

PROFESSIONAL TITLE SERVICES
7710

STATE OF UTAH }
} ss.
COUNTY OF SALT LAKE}

The foregoing instrument was acknowledged before me this __ day of October, 2009 by William C. Gibbs, known to me to be the person described in and who executed the within and foregoing instrument and acknowledged to me that he executed the same on behalf of GreenRiver Resources, Inc..

NOTARY PUBLIC
LINDSAY RENCHER
4641 S 2300 E
Holladay, Utah 84117
My Commission Expires
October 17, 2010
STATE OF UTAH

____
Notary Public
Residing at: Holladay, Utah

My Commission Expires:

10/17/2010

ACCOMMODATION RECORDING ONLY
PROFESSIONAL TITLE SERVICES
NOT RESPONSIBLE FOR FORM,
PREPARATION, CONTENT, EFFECT

54

ASSIGNMENT, BILL OF SALE ANI

P O BOX 671787
HOUSTON, TX 77267-1787

THIS ASSIGNMENT, BILL OF SALE AND CONVEYANCE ("Assignment"), dated effective April 1, 2010 at 12:01 AM (the "Effective Time"), is from Petro-Canada Resources (USA) Inc., a Colorado corporation, whose address is 999 18th Street, Suite 600, Denver, Colorado 80202 ("Assignor"), to QUESTAR EXPLORATION & PRODUCTION COMPANY, whose address is 1050 17TH STREET, SUITE 500, DENVER, CO. 80265 ("Assignee"):

For $10.00 and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Assignor hereby sells, assigns, transfers, grants, bargains, conveys to Assignee all of Assignor's right, title and interest, in and to the following (all of which are called the "Assets"):

1. The oil and gas leases specifically described in Exhibit A ("Leases") insofar and only insofar as the Leases cover the lands specifically described on Exhibit A ("Lands"), subject to all pre-existing depth or other limitations, if any and whether or not set forth on Exhibit A; the royalties, overriding royalties, net profits interests, production payments and other interests, if any, owned by Assignor burdening the Leases, and all right, title and interest in and to the oil, gas and all other hydrocarbons in, on or under the Lands and non-hydrocarbons and other products, whether liquid or gaseous, produced in association therewith ("Hydrocarbons") after the Effective Time, and the fee surface interests and fee mineral interests, if any, described on Exhibit A or otherwise relating solely to the Leases and Lands or leases and lands pooled or unitized therewith (the "Fee Interests").

2. All oil and gas wells, injection wells, disposal wells and any other wells located on the Leases as to the Lands, or on lands pooled or unitized therewith, including, without limitation, the oil and gas wells specifically described in Exhibit B, whether producing, non-producing or plugged and whether fully or properly described or not ("Wells"), and all personal property and equipment located on and used in the operation of the Wells as of the Effective Time, but excluding all vehicles, tools, administrative computer equipment and other personal property of Assignor not intended by Assignor to be included in the Assets.

3. The rights, to the extent transferable, in and to all existing and effective unitization, pooling and communitization agreements, declarations and orders, and the properties covered and the units created thereby to the extent that they relate to or affect any of Assignor's properties and interests described in Paragraphs 1 and 2 or the production of Hydrocarbons, if any, attributable to said properties and interests after the Effective Time.

4. The rights, to the extent transferable, in and to existing and effective oil, gas, liquids, condensate, casinghead gas and natural gas sales, purchase, exchange, gathering, transportation and processing contracts, operating agreements, balancing agreements, joint venture agreements, partnership agreements, farmout agreements and other contracts, agreements and instruments insofar and only insofar as they relate to any of Assignor's properties and interests described in Paragraphs 1, 2 and 3, excluding, however, any bonds or insurance contracts.

5. All of the personal property, fixtures, improvements, permits, licenses, approvals, servitudes, rights-of-way and easements, including, without limitation, the rights-of-way and easements set forth on Exhibit A, if any, surface leases and other surface rights (including, but not limited to, any wells, tanks, boilers, buildings, injection facilities, saltwater disposal facilities, compression facilities, gathering systems, other appurtenances and facilities), if any, located on and used exclusively in connection with or otherwise related to the exploration for or production, gathering, treatment, processing, storing, sale, treatment, processing or disposal of Hydrocarbons or water produced from the properties and interests described in Paragraphs 1 through 4 to the extent that they are located on and used in the operation of such properties and interests as of the Effective Time, and all contract rights (including rights under leases to third parties) related thereto, but excluding all vehicles, tools, administrative computer equipment and other personal property of Assignor not intended by Assignor to be included in the Assets.

6. The files, records, data and information relating to the items described in Paragraphs 1 through 5, maintained by Assignor ("Records"), but excluding the following: (i) all of Assignor's internal appraisals and interpretive data related to the Fee Interests, Leases, Lands and Wells, (ii) all information and data under contractual restrictions on assignment, (iii) all geological and seismic data, (iv) all privileged information and intellectual property, (v) Assignor's corporate, financial, employee and general tax records that do not relate exclusively to the Assets, and (vi) all accounting files that do not relate exclusively to the Assets.

TO HAVE AND TO HOLD the Assets unto Assignee and its successors and assigns forever.

This Assignment is made and accepted expressly subject to the following terms and conditions:

A. THIS ASSIGNMENT IS MADE WITHOUT WARRANTY OF TITLE AND WITHOUT WARRANTY OF ANY OTHER KIND, EITHER EXPRESS, IMPLIED OR STATUTORY. ASSIGNEE ACKNOWLEDGES AND AFFIRMS THAT THE ASSETS HAVE BEEN UTILIZED FOR THE PURPOSE OF EXPLORATION, PRODUCTION AND DEVELOPMENT OF OIL AND GAS, AND THAT THE ASSETS ARE CONVEYED IN THEIR "AS IS, WHERE IS" CONDITION, WITH ALL EXISTING FAULTS. ASSIGNOR EXPRESSLY DISCLAIMS AND NEGATES ANY WARRANTY, EITHER EXPRESS OR IMPLIED, AS TO THE CONDITION OF ANY PERSONAL PROPERTY, EQUIPMENT, FIXTURES AND ITEMS OF MOVABLE PROPERTY COMPRISING ANY PART OF THE ASSETS, INCLUDING (i) MERCHANTABILITY OR CONDITION, (ii) FITNESS FOR A PARTICULAR PURPOSE, (iii) CONFORMITY TO MODELS OR SAMPLES OF MATERIALS, (iv) ANY RIGHTS OF ASSIGNEE UNDER APPLICABLE STATUTES TO CLAIM DIMINUTION OF CONSIDERATION, AND (v) ANY CLAIM BY ASSIGNEE FOR DAMAGES BECAUSE OF DEFECTS, WHETHER KNOWN OR UNKNOWN, IT BEING EXPRESSLY UNDERSTOOD BY ASSIGNEE THAT SAID PERSONAL PROPERTY, FIXTURES, EQUIPMENT, AND ITEMS ARE BEING CONVEYED TO ASSIGNEE "AS IS," "WHERE IS," WITH ALL FAULTS, AND IN THEIR PRESENT CONDITION AND STATE OF REPAIR.

ASSIGNOR IS EXPERIENCED AND KNOWLEDGEABLE IN THE OIL AND GAS BUSINESS AND IS AWARE OF ITS RISKS. IN ENTERING INTO THIS ASSIGNMENT, ASSIGNEE ACKNOWLEDGES THAT IT HAS RELIED SOLELY ON ITS INDEPENDENT ANALYSIS, EVALUATION AND INVESTIGATION OF AND JUDGMENT WITH RESPECT TO THE BUSINESS, ECONOMIC, LEGAL, TAX AND/OR OTHER CONSEQUENCES OF THIS ASSIGNMENT, INCLUDING ITS OWN ESTIMATE AND APPRAISAL OF THE EXTENT AND VALUE OF THE PETROLEUM, NATURAL GAS AND OTHER RESERVES OF THE ASSETS. ASSIGNEE ACKNOWLEDGES THAT IT HAS REVIEWED THE MATERIALS MADE AVAILABLE BY ASSIGNOR IN CONNECTION WITH THE TRANSACTION CONTEMPLATED BY THIS ASSIGNMENT ("MATERIALS") AND THAT ASSIGNOR MAKES NO REPRESENTATION OR WARRANTY WITH RESPECT TO THE ACCURACY OR COMPLETENESS OF THE MATERIALS. THE MATERIALS, CONTRACTS AFFECTING THE ASSETS, AND/OR DOCUMENTS AFFECTING THE ASSETS MAY CONTAIN RESTRICTIONS THAT AFFECT THE LEASES AND LANDS, AND ASSIGNEE ACCEPTS THE ASSETS SUBJECT TO ANY AND ALL SUCH RESTRICTIONS.

B. Notwithstanding the disclaimer of warranties set forth in Paragraph A above, if within 10 days after the execution by Assignee of this Assignment and the payment by Assignee of the consideration for the Assets, Assignee gives Assignor written notice at the address set forth above that the Assets conveyed by this Assignment are less than the interests described for sale in the Materials, then within 30 days after receipt by Assignor of adequate proof of such claim, Assignor shall the option to either (i) cure the defect giving rise to such interest discrepancy to Assignee's reasonable satisfaction; (ii) refund to Assignee the consideration paid by Assignee to Assignor for the Assets in exchange for a mutually acceptable, recordable reassignment of the Assets, effective as of the Effective Time, and containing a warranty of title by Assignee against claims arising by, through or under Assignee, but not otherwise; or (iii) refund to Assignee a proportionate part of the consideration paid by Assignee to Assignor for the Assets, as mutually agreed between Assignor and Assignee.

C. To the extent permitted by law, Assignee shall be subrogated to Assignor's rights in and to representations, warranties and covenants given by others with respect to the Assets. Assignor hereby grants and transfers to Assignee, its successors and assigns, to the extent so transferable and permitted by law, the benefit of and the right to enforce such covenants, representations and warranties, if any, which Assignor is entitled to enforce with respect to the Assets, but only to the extent not enforced by Assignor.

D. Assignee accepts the Assets subject to and assumes and agrees to pay, perform, fulfill and discharge all claims, costs, expenses, liabilities and obligations accruing or relating to (i) gas imbalances; (ii) any change in condition or diminution in the value of the Assets or casualty loss, including, but not limited to the period between the execution of this Assignment by Assignor and the Effective Time, and (iii) all environmental matters and obligations, including but not limited to (a) the violation of, or compliance with past, present or future laws (including common law), rules, regulations and orders, (b) remediation and restoration of the Assets, including, without limitation, plugging and abandonment of the Wells and reclamation of the Well sites, (c) normally occurring radioactive materials, (d) man-made material fibers, (e) laws relating to public or employee health and safety; and (f) damage or injury to persons or property on account of chemicals or industrial, toxic or hazardous substances, in any way associated with or related to the Assets, for all periods before, on and after the Effective Time, including, without limitation including but not limited to, all obligations arising under all agreements covering or relating to the Assets. Assignee agrees to defend, indemnify, save and hold harmless Assignor and its affiliates, officers, directors, shareholders, representatives, employees, agents, successors and assigns forever from and against all claims, costs, expenses, losses, damages and liabilities incurred by any such indemnified party for any of the matters enumerated in this Paragraph D arising in connection with the Assets, regardless of whether incurred with respect to events occurring before, on or after the Effective Time and regardless whether such liabilities and obligations may have been caused by the active or passive, joint, sole or concurrent negligence of Assignor.

E. In addition to the assumption and indemnification obligations of Assignee set forth in Paragraph D, Assignee accepts the Assets subject to and also assumes and agrees to pay, perform, fulfill and discharge any and all other claims, costs, expenses, liabilities and obligations accruing or relating to the owning, developing, exploring, operating or maintaining of the Assets or the producing, transporting and marketing of Hydrocarbons from the Assets, relating to periods before, on and after the Effective Time, including, without limitation, obligations arising under all agreements covering or relating to the Assets, regardless of whether incurred with respect to events occurring before, on or after the Effective Time and regardless whether such liabilities and obligations may have been caused by the active or passive, joint, sole or concurrent negligence of Assignor. Provided, however, that for a limited period of thirty (30) days following the Effective Time Assignor shall be responsible for the payment of any unpaid normal and recurring joint interest billing expenses associated with the ownership or operation of the Assets prior to the Effective Time *other than and excluding* those expenses relating to the matters enumerated in Paragraph D above. Subject only to Assignor's agreement to pay certain pre-Effective Time expenses pursuant to the immediately preceding sentence, Assignee agrees to defend, indemnify, save and hold harmless Assignor and its affiliates, officers, directors, shareholders, representatives, employees, agents, successors and assigns forever from and against all claims, costs, expenses, losses, damages and liabilities incurred by any such indemnified party for any of the matters set forth in the first sentence of this Paragraph E, arising in connection with the Assets whether arising before, on, or after the Effective Time regardless of whether incurred with respect to events occurring before, on or after the Effective Time and regardless whether such liabilities and obligations may have been caused by the active or passive, joint, sole or concurrent negligence of Assignor.

F. Unless provided otherwise, all recording references in the Exhibits hereto are to the official real property records of the county in which the Assets are located.

G. Separate governmental form assignments of the Assets may be executed on officially approved forms by Assignor to Assignee, in sufficient counterparts to satisfy applicable statutory and regulatory requirements. Those assignments shall be deemed to contain all of the exceptions, warranties, rights, titles, power and privileges set forth herein as fully as though they were set forth in each such assignment. The interests conveyed by such separate assignments are the same as, and not in addition to, the interest in the Assets conveyed herein.

H. This Assignment binds and inures to the benefit of Assignor and Assignee and their respective successors and assigns.

I. This Assignment may be executed in any number of counterparts, each of which shall be deemed to be an original instrument, but all of which together shall constitute but one instrument.

J. Assignee shall be responsible for and shall bear and pay all applicable sales taxes, transfer taxes, and documentary, filing and recording fees required by or associated with the conveyance of the Assets hereby. Following recording, Assignee shall promptly furnish Assignor with a photocopy of this recorded Assignment.

K. For a period of six years after this Assignment, Assignor reserves the right to review the Records at Assignee's offices, during normal business hours and on reasonable notice to Assignee. If Assignees desires to destroy or dispose of the Records before that time, Assignee agrees to give Assignor prior written notice of Assignee's intent to dispose of or destroy the Records and give Assignor the opportunity to either copy the Records or take possession of the Records.

L. The Assets may include funds being held by Assignor in suspense for the benefit of a third party or parties. Assignor shall transfer and pay to Assignee, and Assignee agrees to accept from Assignor and hold for the benefit of Assignor and the party or parties entitled to receive payment therefore, and any and all such monies representing the value or proceeds of production removed or sold from the Assets and then held by Assignor for accounts from which payment has been suspended. Assignee shall be responsible for the proper distribution of such monies to the party or parties entitled to receive payment of same, and shall defend, indemnify and hold Assignor harmless from any claims, costs, expenses, liabilities and obligations resulting therefrom.

EXECUTED on the dates contained in the acknowledgments of this instrument, to be effective for all purposes as of the Effective Time.

ASSIGNOR:

Petro-Canada Resources (USA) Inc.

By: Dennis J. Gustafson
Name: Dennis J. Gustafson
Title: Vice President

ACKNOWLEDGMENT

STATE OF COLORADO §
CITY AND §
COUNTY OF DENVER §

The foregoing instrument was acknowledged before me this 24th day of FEBRUARY, 2010, by Dennis J. Gustafson, as Vice President of Petro-Canada Resources (USA) Inc., a Colorado corporation, on behalf of such corporation.

Witness my hand and official seal.

My commission expires:

KATHLEEN R. VIGIL NOTARY PUBLIC STATE OF COLORADO My Commission Expires 9/6/2013

Kathleen R. Vigil
Notary Public: Kathleen R. Vigil

ASSIGNEE:

QUESTAR EXPLORATION & PRODUCTION COMPANY

By:
Name: J.B. Neese, Executive Vice President
Title:

ACKNOWLEDGMENTS

STATE OF Colorado §
§
COUNTY OF Denver §

Before me, the undersigned, a Notary Public in and for said County and State, on this day personally appeared J. B. Neese, as Executive Vice President of Questar Exploration and Production, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he/she executed the same for the purposes and consideration therein expressed and in the capacity therein stated.

GIVEN UNDER MY HAND AND SEAL OF OFFICE this 5 day of April, 2010.

My commission expires:

4-29-2012

NICOLE A. RUIZ NOTARY PUBLIC STATE OF COLORADO My Commission Expires April 29, 2012

Notary Public:

2D

Lessor Name	Lessee Name	Lease Description	Lease Date	County	Book	Page	Entry
GREG JENSEN, PRESIDENT OF THE	PETRO-CANADA RESOURCES (USA) INC.	TOWNSHIP 14 SOUTH, RANGE 14 EAST, SLB&M	6/1/2006	CARBON	629	692	119670
OSTERBROEN FAMILY LIMITED		SEC. 2: LOTS 1(40.03-NENE), 2(39.97-NWNE), 3(39.91-NENW), 4(39.85-NWNW),					
PARTNERSHIP		S/2N/2, S/2					
		(ALL)					
		SEC. 3: LOTS 1(39.84-NENE), 2(39.89-NWNE), 3(39.93-NENW), 4(39.98-NWNW),					
		S/2N/2, SE/4					
GARY PESTORIOUS AND DAWN	PETRO-CANADA RESOURCES (USA) INC.	TOWNSHIP 14 SOUTH, RANGE 14 EAST, SLB&M	6/1/2006	CARBON	629	698	119672
PESTORIOUS, HUSBAND AND WIFE		SEC. 2: LOTS 1(40.03-NENE), 2(39.97-NWNE), 3(39.91-NENW), 4(39.85-NWNW),					
		S/2N/2, S/2					
		(ALL)					
		SEC. 3: LOTS 1(39.84-NENE), 2(39.89-NWNE), 3(39.93-NENW), 4(39.98-NWNW),					
		S/2N/2, SE/4					
STEVEN A. LADLIE AND PENNIE S.	PETRO-CANADA RESOURCES (USA) INC.	TOWNSHIP 14 SOUTH, RANGE 14 EAST, SLB&M	6/2/2006	CARBON	629	695	119671
LADLIE, HUSBAND AND WIFE		SEC. 2: LOTS 1(40.03-NENE), 2(39.97-NWNE), 3(39.91-NENW), 4(39.85-NWNW),					
		S/2N/2, S/2					
		(ALL)					
		SEC. 3: LOTS 1(39.84-NENE), 2(39.89-NWNE), 3(39.93-NENW), 4(39.98-NWNW),					
		S/2N/2, SE/4					
JEFFREY G. DRESS AND WILLIAM G.	PETRO-CANADA RESOURCES (USA) INC.	TOWNSHIP 14 SOUTH, RANGE 14 EAST, SLB&M	6/5/2006	CARBON	633	192-194	120400
DRESS, INDIVIDUALLY, AND AS		SEC. 2: LOTS 1(40.03-NENE), 2(39.97-NWNE), 3(39.91-NENW), 4(39.85-NWNW),					
PARTNERS		S/2N/2, S/2					
OF DRESS INVESTMENTS		(ALL)					
		SEC. 3: LOTS 1(39.84-NENE), 2(39.89-NWNE), 3(39.93-NENW), 4(39.98-NWNW),					
		S/2N/2, SE/4					
MEANY LAND & EXPLORATION, INC., A	PETRO-CANADA RESOURCES (USA) INC.	TOWNSHIP 14 SOUTH, RANGE 14 EAST, SLB&M	5/8/2006	CARBON	629	686	119668
COLORADO CORP.		SEC. 3: SW/4					
		SEC. 10: N/2, SE/4					
UTU-84624	LAND GROUP	T13S-R14E	7/1/2006	CARBON	630	763	119909
		Sec. 22: ALL					
		Sec. 23: N/2, SW/4, NW/4SE/4					
		Sec. 26: W/2					
		Sec. 27: SE/4					
UTU-84625	LAND GROUP	T13S-R14E	7/1/2006	CARBON	630	769	119911
		SEC. 31: LOTS 2-4, S/2NE/4, SE/4NW/4, E/2SW/4, SE/4					
		SEC. 33: S/2NE/4NE/4, S/2N/2, N/2S/2, SW/4SW/4					

Ent 815998 Bk 775 Pg 672
Date: 13-AUG-2012 12:01:29PM
Fee: $12.00 Check
Filed By: VB
VIKKI BARNETT, Recorder
CARBON COUNTY CORPORATION
For: MEANY LAND & EXPLORATION INC

MINERAL DEED

KNOW ALL MEN BY THESE PRESENTS THAT Meany Land & Exploration, Inc., of 410 17th Street Suite 1300 Denver, Colorado 80202 hereinafter called Grantor, (whether one or more) for and in consideration of the sum of TEN AND MORE dollars ($10.00+) cash in hand paid and other good and valuable considerations, the receipt of which is hereby acknowledged, does hereby grant, bargain, sell, convey, transfer, assign and deliver unto Meany Family LLC, of 4719 E. Pinewood Cr. Centennial, Colorado 80121 hereinafter called Grantee, all of the interests owned by said Meany Land & Exploration, Inc., as set forth below, in and to all of the oil, gas and other minerals in and under and that may be produced from the following described lands situated in Carbon County, State of Utah, to-wit:

Township 14 South, Range 14 East, SLM
Section 2: All
Section 3: N/2, SE/4
Township 14 South, Range 14 East, SLM
Section 3: SW/4 (Sunnyside #7 Placer Mining Claim)
Section 10: N/2, SE/4 (Sunnyside 4,5,6, Placer Mining Claims)

Containing 1,760.00 acres, more or less, together with the right of ingress and egress at all times for the purpose of mining, drilling, exploring, operating and developing said lands for oil, gas, and other minerals, and storing, handling, transporting and marketing the same therefrom with the right to remove from said land all of Grantee's property and improvements.

This sale is made subject to any rights now existing to any lessee or assigns under any valid and subsisting oil and gas lease of record heretofore executed; it being understood and agreed that said Grantee shall have, receive, and enjoy the herein granted interests in and to all bonuses, rents, royalties and other benefits which may accrue under the terms of said lease insofar as it covers the above described land from and after the date hereof, precisely as if the Grantee herein had been at the date of the making of said lease the owner of similar interests in and to the lands described and Grantee one of the lessors therein.

Grantor agrees to execute such further assurances as may be requisite for the full and complete enjoyment of the rights herein granted and likewise agrees that Grantee herein shall have the right at any time to redeem for said Grantor by payment, any mortgage, taxes, or other liens on the above described land, upon default in payment by Grantor, and be subrogated to the rights of the holder thereof.

TO HAVE AND TO HOLD, The above described property and easement with all and singular the rights, privileges, and appurtenances thereunto or in any wise belonging to the said Grantee herein its heirs, successors, personal representatives, administrators, executors, and assigns forever, and Grantor does hereby warrant said title to Grantee its heirs, executors, administrators, personal representatives, successors and assigns forever and does hereby agree to defend all and singular the said property unto the said Grantee herein its heirs, successors, executors, personal representatives, and assigns against every person whomsoever claiming or to claim the same on any part thereof.

WITNESS my hand this 9th day of August, 2012.

Meany Land & Exploration, Inc.

BY: E. Michael Meany
E. Michael Meany, President

State of Colorado }
} ss.
County of Denver }

The foregoing instrument was acknowledged before me this 9th day of August, 2012, by E. Michael Meany, president of Meany Land n & Exploration, Inc

My commission expires:
03/05/14

Notary Public

1400 Broadway Denver CO 80202
Address of Notary Public

ALLISON HERRERA
NOTARY PUBLIC
STATE OF COLORADO
MY COMMISSION EXPIRES 03/05/14

Professional Title Services

107 South 100 East • Price, Utah 84501
Telephone: (435) 637-2320 • FAX: (435) 637-2323
Email: order@ptsfirst.net

February 7, 2014

Mr. Gibbs:

In regards to your request to research the ownership (surface and mineral) of the requested lands adjacent to your lands described in the accompanying Updated Special Report dated February 7, 2014, File No. 7710, we find the following of record, as of the effective date above:

Township 13 South, Range 14 East, Salt Lake Base and Meridian

Section 34: S1/2 SE1/4

1.) UNITED STATES OF AMERICA, as to "all the coal and other minerals," by Patent recorded March 30, 1925, as Entry No. 8790, in Book 6A, at Page 69;
2.) THORALD RICH, as to a 7/16 interest in "all oil, gas and other minerals" not previously reserved by the United States, if any, by Quit Claim Deed recorded February 14, 1953, as Entry No. 66417, in Book 19, at Page 220, and by Quit Claim Deed recorded December 17, 1954, in Book 30, at Page 350;
3.) FREED RANCH COMPANY, as to a 5/16 interest in "all oil, gas and other minerals" not previously reserved by the United States, if any, by Quit Claim Deed recorded February 14, 1953, as Entry No. 66419, in Book 19, at Page 222;
4.) HUMBERT PRESSETT, as to a ¼ interest in "all oil, gas and minerals" not previously reserved by the United States, if any, by Quit Claim Deed recorded February 14, 1953, as Entry No. 66418, in Book 19, at Page 221;
5.) ZACHARY ROBINSON, as to a ½ interest in the surface only of the SE1/4 SE1/4, by Warranty Deed recorded August 3, 2007, as Entry No. 124881, in Book 652, at Page 243;
6.) MARVIN M. ROBINSON, as to a ½ interest in the surface only of the SE1/4 SE1/4, by Warranty Deed recorded August 3, 2007, as Entry No. 124881, in Book 652, at Page 243;
7.) RANGE CREEK PROPERTIES LLC, a Utah limited liability company, as to the surface only of the SW1/4 SE1/4, by Warranty Deed recorded September 28, 2007, as Entry No. 125775, in Book 656, at Page 527

Township 14 South, Range 14 East, Salt Lake Base and Meridian

Sec tion 1: W1/2 W1/2

1.) UNITED STATES OF AMERICA, as to "all coal," by Patent recorded May 8, 1954, as Entry No. 69980, in Book 26, at Page 258;
2.) VIRGINIA S. ANDERSON, as to a 1.0975% undivided mineral royalty interest, by Mineral Royalty Deed recorded August 3, 1981, as Entry No. 159633, in Book 209, at Page 262;
3.) KATHERINE S. HODKIN, as to a 1.0475% undivided mineral royalty interest, by Mineral Royalty Deed recorded August 3, 1981, as Entry No. 159633, in Book 209, at Page 262;
4.) REKLAW & COMPANY, NOMINEE OF FIRST INTERSTATE BANK OF UTAH, TRUSTEE UNDER THE WILL OF CATHERINE N. STORY, DECEASED, as to a 0.1500% undivided mineral royalty interest, by Mineral Royalty Deed recorded August 3, 1981, as Entry No. 159633, in Book 209, at Page 262;
5.) WILLIAM D. HURLEY & JUANITA J. HURLEY, TRUSTEE OF THE KATHERINE STORY HODKIN CHILDREN'S TRUST, as to a 0.2000% undivided mineral royalty interest, by Mineral Royalty Deed recorded August 3, 1981, as Entry No. 159633, in Book 209, at Page 262;
6.) FIRST SECURITY BANK OF UTAH, N.A. and AMY ALLEN PRICE, as Co-Trustees, as to a 1.2525% undivided mineral royalty interest, by Mineral Deed recorded December 21, 1987, as Entry No. 19319, in Book 277, at Page 583;
7.) ALICE BLAKELEY WINN, Trustee of The Alice Blakeley Winn Trust U/T/A dated June 6, 1992, as to a 1.2525% undivided mineral royalty interest, by Trustee's Assignment recorded October 21, 2013, as Entry No. 821769, in Book 806, at Page 454;
8.) HUNT OIL COMPANY, a Delaware corporation, as to all surface and any remaining mineral estate not described above, by Special Warranty Deed recorded February 22, 1993, as Entry No. 38093, in Book 324, at Page 702

Section 4: E1/2 E1/2

1.) UNITED STATES OF AMERICA, as to any minerals reserved according to terms of Patents recorded February 20, 1922, as Entry Nos. 2589 and 2590, in Book 6A, at Pages 1 and 3;
2.) CARBON COUNTY, as to the surface only of any portion within the tract of land described in Deed recorded April 1, 1948, as Entry No. 51921, in Book 12, at Page 238;
3.) CROSBY CORPORATION, a Utah corporation, Trustee, as to a ½ interest in the surface and any remaining mineral estate, by Quit Claim Deed recorded April 6, 1967, as Entry No. 113508, in Book 104, at Page 327;
4.) ST. MARY LAND & EXPLORATION COMPANY, as to a ½ interest in the surface and any remaining mineral estate, subject to a 2% net smelter return royalty in favor of DALLAS MINES, INC., a Delaware corporation, by Trustee's Deed recorded December 2, 1976, as Entry No. 138844, in Book 164, at Page 405; Trustee's Deed of Correction recorded October 17/28, 1977, as Entry No. 142902/143045, in Book 173, at Page 53/323; Deed recorded June 8, 1982, as Entry No. 163761,

in Book 217, at Page 482; and Affidavit Regarding Change of Corporate Name recorded May 27, 1993, as Entry No. 39494, in Book 328, at Page 818

Section 9: E1/2 NE1/4

1.) UNITED STATES OF AMERICA, as to any minerals reserved in the NE1/4 NE1/4, according to terms of Patents recorded February 20, 1922, as Entry Nos. 2589 and 2590, in Book 6A, at Pages 1 and 3;
2.) UNITED STATES OF AMERICA, as to "all the coal and other minerals" in the SE1/4 NE1/4, by Patent recorded February 28, 1955, as Entry No. 72463, in Book 6A, at Page 356;
3.) CROSBY CORPORATION, a Utah corporation, Trustee, as to a ½ interest in the surface and any remaining mineral estate in the NE1/4 NE1/4, by Quit Claim Deed recorded April 6, 1967, as Entry No. 113508, in Book 104, at Page 327;
4.) ST. MARY LAND & EXPLORATION COMPANY, as to a ½ interest in the surface and any remaining mineral estate in the NE1/4 NE1/4, subject to a 2% net smelter return royalty in favor of DALLAS MINES, INC., a Delaware corporation, by Trustee's Deed recorded December 2, 1976, as Entry No. 138844, in Book 164, at Page 405; Trustee's Deed of Correction recorded October 17/28, 1977, as Entry No. 142902/143045, in Book 173, at Page 53/323; Deed recorded June 8, 1982, as Entry No. 163761, in Book 217, at Page 482; and Affidavit Regarding Change of Corporate Name recorded May 27, 1993, as Entry No. 39494, in Book 328, at Page 818;
5.) LEVADA EF FIVE, LLC, a Delaware limited liability company, as to the surface and a 2/3 interest in the remaining mineral estate, if any, in the SE1/4 NE1/4, by General Warranty Deed recorded June 10, 2011, as Entry No. 810969, in Book 748, at Page 534, subject to the "revenue interest" of Osprey Utah, LLC, described below;
6.) OSPREY UTAH, LLC, a Utah limited liability company, as to a 1/3 interest in the remaining mineral estate, if any, in the SE1/4 NE1/4, by Special Warranty Deed recorded June 10, 2011, as Entry No. 810970, in Book 748, at Page 548, together with an addition 1/3 "revenue interest" described in Special Warranty Deed recorded June 10, 2011, as Entry No. 810971, in Book 748, at Page 566

Copies of the cited instruments of record are attached hereto the assist in providing a base of contact for the individuals and entities named above. Further copies of the chains of title (which may or may not include all relevant instruments of record) of the above lands can be provided, but will incur an additional fee (the chains of title for some of the above, the said SE1/4 NE1/4 of Section 9 in particular, are extensive and convoluted).

This report is provided for informational purposes only; it is based on a limited search and examination of the records of Carbon County and is not to be construed as a guarantee of title nor as a commitment to provide title insurance. Should such assurances be required, title insurance or an abstract of title may be purchased. The liability of this company in connection with the information provided in this report shall be limited to twice the amount paid for this report.

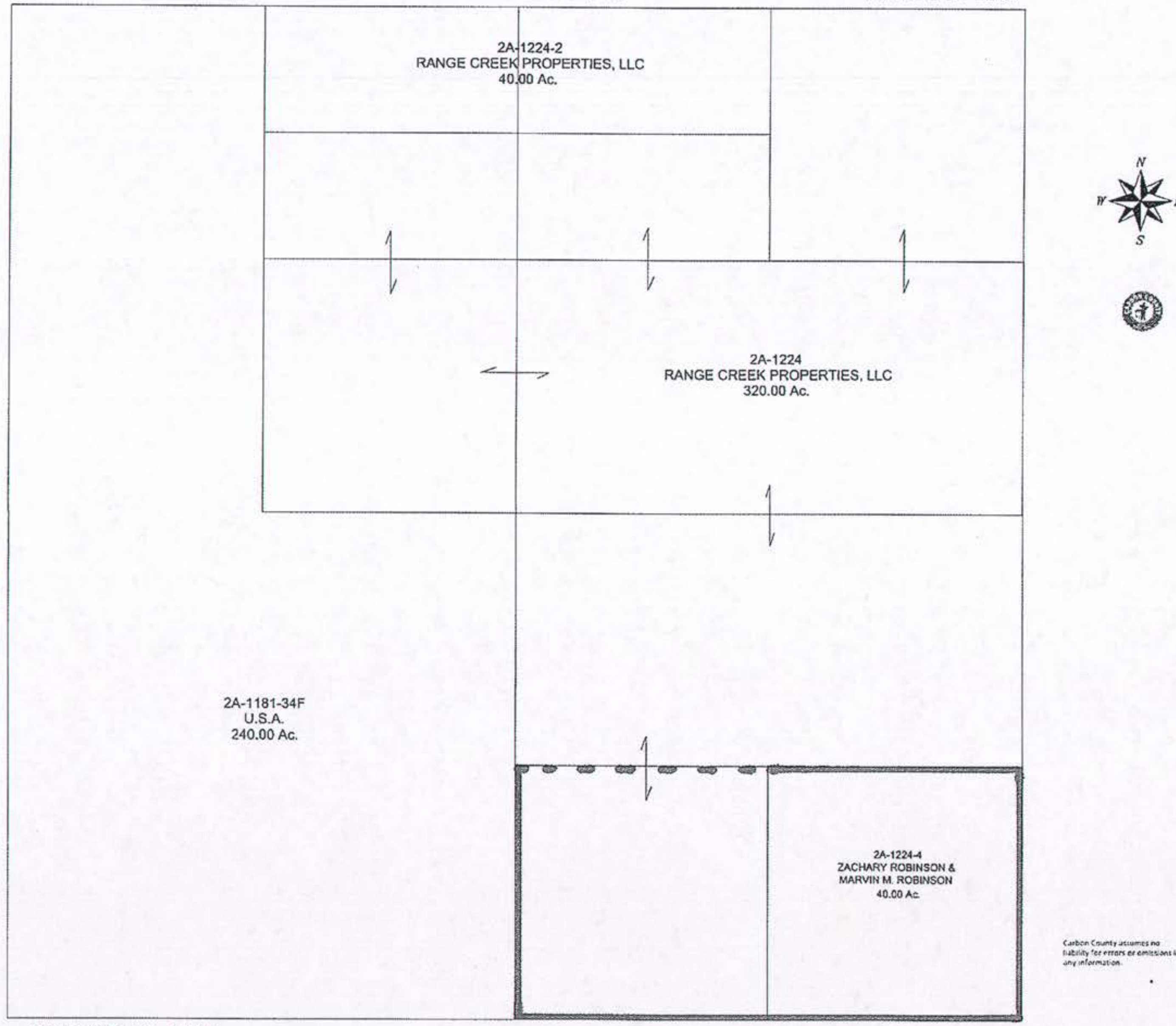
Erik Houghton

Erik Houghton

Professional Title Services

CARBON COUNTY PLATS

SECTION 34 TOWNSHIP 13 SOUTH RANGE 14 EAST



SCALE: 400 FEET = 1 INCH

Carbon County assumes no liability for errors or omissions in any information.

6/13/2013 10:29:51 AM

2S4
14034
11550
15052

Entry No. 8790

PATENT.

Salt Lake City 019722

6A-69

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME, GREETING:

WHEREAS, A Certificate of the Register of the Land Office at Salt Lake City, Utah, has been deposited in the General Land Office, whereby it appears that, pursuant to the Act of Congress of May 20, 1862, "To Secure Homesteads to Actual Settlers on the Public Domain," and the acts supplemental thereto, the claim of The Legal Representatives of James Wesley Chipman has been established and duly consummated, in conformity to law, for the northeast quarter, the Southeast quarter and the east half of the northwest quarter of Section thirty-four and the southeast quarter and the south half of the northeast quarter of Section twenty-seven in Township thirteen south of Range fourteen east of the Salt Lake Meridian, Utah, containing six hundred forty acres, according to the Official Plat of the Survey of the said Land, returned to the GENERAL LAND OFFICE, by the Surveyor-General:

Now Know Ye, That there is, therefore, granted by the UNITED STATES unto to the said claimants the tract of Land above described;

TO HAVE AND TO HOLD the said tract of Land with the appurtenances thereof, unto the said claimants and to the heirs and assigns of the said claimants forever; subject to any vested and accrued water rights for mining agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights, as may be recognized and acknowledged by the local customs, laws and decisions of courts; and there is reserved from the lands hereby granted, a right of way thereon for ditches or canals constructed by the authority of the United States. Excepting and reserving, however, to the United States all the coal and other minerals in the lands so entered and patented, together with the right to prospect for, mine and remove the same pursuant to the provisions and limitations of the Act of December 29, 1916 (39 Stat., 862)

IN TESTIMONY WHEREOF, I, Calvin Coolidge, President of the United States of America, have caused these letters to be made Patent, and the seal of the General Land Office to be hereunto affixed.

(S E A L)

GIVEN under my hand, at the City of Washington, the Twentieth day of August in the year of our Lord one thousand nine hundred and twenty-three and of the Independence of the United States the one hundred and Forty-Eighth.

By the President: Calvin Coolidge

By Viola B. Pugh Secretary

John O'Connell
Acting Recorder of the General Land Office.

Recorded: Patent Number 914307.

Recorded March 30, 1925 at 11:50 A. M. Request of John W. Chipman

Jesse F. Sanford

R E C O R D E R

QUIT-CLAIM DEED

Thorald Rich and Lucille Rich, husband and wife, grantors of Price, Carbon County, State of Utah, hereby quit-claim to Carlyle Pace and Dave Nordell of Price, Carbon County, State of Utah, for the sum of Ten Dollars ($10.00), and other valuable consideration receipt of which is hereby acknowledged, all of our right, title and interests of the following described tract of land located in Carbon County, State of Utah, together with all water rights, appurtenances and improvements thereto belonging:

SE$\frac{1}{4}$ of the SW$\frac{1}{4}$, Section 15; NW$\frac{1}{4}$ of the NE$\frac{1}{4}$, Section 20; NW$\frac{1}{4}$ of the NW$\frac{1}{4}$, NW$\frac{1}{4}$ of the NE$\frac{1}{4}$, and the SE$\frac{1}{4}$ of the SE$\frac{1}{4}$, Section 21; SE$\frac{1}{4}$ and the S$\frac{1}{2}$ of the NE$\frac{1}{4}$, Section 27; NW$\frac{1}{4}$ of the NE$\frac{1}{4}$, Section 28; E$\frac{1}{2}$, and the E$\frac{1}{2}$ of the NW$\frac{1}{4}$, Section 34; All in Township 13 South, Range 14 East, SLM. Together with all water rights.

Excepting and reserving to the grantor all Taylor grazing rights ~~[illegible]~~ appurtaining thereto.

Excepting and reserving to the grantors all Oil, Gas and other minerals in and under, and that may be produced from the above described lands, together with the right of ingress and egress over, upon and across said lands for the purpose of exploring, developing, drilling, mining, storing and transporting said oil, gas and other minerals, and with the right to remove from said land all of the improvements that the grantors may place thereon.

WITNESS the hands of said grantors, this 13 day of February A.D. 1953.

Signed in the presence of:

Ben Ward

Thorald Rich

Lucille Rich

STATE OF UTAH } ss.
COUNTY OF Carbon }

On the 13 day of February, 1953, personally appeared before me Thorald Rich and Lucille Rich, his wife, the signers of the foregoing instrument, who duly acknowledged to me that they executed the same.

Ben Ward
Price Municipal Corp
NOTARY PUBLIC, residing at
Price, Utah

ENTRY No. 66417
INDEXED ✓ ✓
ABSTRACTED ✓
REC. FEE $2.30

STATE OF UTAH } SS
COUNTY OF CARBON }
FILED AND RECORDED FOR
Carlyle Pace
FEB 14 11 10 AM '53
IN BOOK 19 OF Records
PAGE 220
Effie Liddell
COUNTY RECORDER

My Commission Expires:
12-31-1953

[illegible] $2.30

at ______ M. Fee Paid $ ______

by ______ Dep. Book ______ Page ______

Mail tax notice to ______ Address ______

STATE OF UTAH } SS
COUNTY OF CARBON }
FILED AND RECORDED FOR
Carlyle Pace
FEB 14 11 10 AM '53
Ref.:
IN BOOK 19 of Records
PAGE 221
Effie Liddell
COUNTY RECORDER

QUIT-CLAIM DEED

Humbert Pressett, an unmarried man grantor of Price, County of Carbon, State of Utah, hereby QUIT-CLAIM to Carlyle Pace and Dave Nordell grantee of Price, Utah for the sum of Ten Dollars and other consideration - - - - - - - - - - - - - - - - - - DOLLARS the following described tracts of land in Carbon County, State of Utah:

SE¼ of the SW¼, Section 15; NW¼ of the NE¼, Section 20 NW¼ of the NW¼, NW¼ of the NE¼, and the SE¼ of the SE¼, Section 21; SE¼ and the S½ of the NE¼, Section 27; NW¼ of the NE¼, Section 28; E½, and the E½ of the NW¼, Section 34; all in Township 13 South, Range 14 East, SLM. Together with all water rights.

Excepting and reserving to the grantor all Taylor grazing rights and range rights appurtaining thereto.

Excepting and reserving to the grantors all Oil, Gas and other minerals in and under, and that may be produced from the above described lands, together with the right of ingress and egress over, upon and across said lands for the purpose of exploring, developing, drilling, mining, storing and transporting said oil, gas and other minerals, and with the right to remove from said land all of the improvements that the grantors may place thereon.

WITNESS the hand of said grantor, this 13th day of February, A. D. one thousand nine hundred and fifty-three

Signed in the presence of
Ben Ward

~~[illegible]~~
~~[illegible]~~
Humbert Pressett

STATE OF UTAH, } ss.
County of Carbon }

On the 13th day of February A. D. one thousand nine hundred and fifty-three personally appeared before me ~~Daniel G. [illegible]~~
Humbert Pressett, an unmarried man
the signer of the foregoing instrument, who duly acknowledge to me that he executed the same.

Ben Ward
Price Municipal Corp
Notary Public.

My commission expires 12-31-1953 Address: Recorder
Price, Utah

BLANK NO. 103 [illegible]

Recorded at Request of ______ ENTRY No. 66419 INDEXED ✓ ABSTRACTED ✓ REC. FEE $2.30

at ______ M. Fee Paid $ ______

by ______ Dep. Book ______ Page ______ Ref.: ______

Mail tax notice to ______ Address ______

STATE OF UTAH } SS
COUNTY OF CARBON }
FILED AND RECORDED FOR
Carlyle Pace
FEB 14 11 10 AM '53
IN BOOK 19 OF Records
PAGE 222
Effie Liddell
COUNTY RECORDER

QUIT-CLAIM DEED

Freed Ranch Company, grantor
of Salt Lake City, , County of Salt Lake , State of Utah, hereby
QUIT-CLAIM to

Carlyle Pace and Dave Nordell

grantee
of Price, Utah for the sum of
Ten Dollars and other consideration - - - - - - - - - - - - - - - - DOLLARS
the following described tracts of land in Carbon County,
State of Utah:

SE¼ of the SW¼, Section 15; NW¼ of the NE¼, Section 20; NW¼ of the NW¼, NW¼ of the NE¼, and the SE¼ of the SE¼, Section 21; SE¼ and the S½ of the NE¼, Section 27; NW¼ of the NE¼, Section 28; E½, and the E½ of the NW¼, Section 34; All in Township 13 South, Range 14 East, SLM. Together with all water rights.

Excepting and reserving to the grantor all Taylor grazing rights ~~xxxxxxxxxxxxxx~~ appurtaining thereto.

Excepting and reserving to the grantors all Oil, Gas and other minerals in and under, and that may be produced from the above described lands, together with the right of ingress and egress over, upon and across said lands for the purpose of exploring, developing, drilling, mining, storing and transporting said oil, gas and other minerals, and with the right to remove from said land all of the improvements that the grantors may place thereon.

WITNESS the hand of said grantor , this 13th day of February , A. D. one thousand nine hundred and fifty-three

Signed in the presence of
Ben Ward

Freed Ranch Co.
By Daniel [illegible]

STATE OF UTAH, } ss.
County of Carbon }

On the 13th day of February A. D. one thousand nine hundred and fifty-three personally appeared before me

Daniel G. Freed for the Freed Ranch Co.

the signer of the foregoing instrument, who duly acknowledge to me that he executed the same.

Ben Ward
City Recorder for Price Municipal Corp.
Notary Public.

My commission expires 12-31-1953 Address: Price, Utah

BLANK NO. 103—ARROW PRESS, 62 W. SECOND SO.—SALT LAKE

STATE OF UTAH } SS
COUNTY OF CARBON }
FILED AND RECORDED FOR
T.N. Jensen
DEC 17 10 28 AM '54
IN BOOK 30 of records
PAGE 350
Effie Liddell
COUNTY RECORDER

[illegible]
[illegible] 3.90

QUITCLAIM DEED

FREED RANCH COMPANY, a Utah corporation, grantor, hereby quitclaims to THORALD [illegible] of Price, Utah, grantee, for the sum of Ten Dollars ($10.00) and other good and valuable consideration, an undivided one-half interest of grantor's interest in and to all the oil, petroleum, gas, coal, asphalt and all other minerals and mineral substances, of every kind and character in, on and under, and that may be produced from the following described lands situated in Carbon County, State of Utah, to-wit:

[illegible] Section [illegible], Township [illegible] South, Range 14 East of the Salt Lake [illegible]. All of Section [illegible], Township 13 South, Range 14 East of the [illegible] Meridian. The Southeast quarter of the Southwest quarter of Section 15, Township [illegible] South, Range 14 East of the Salt Lake Meridian.

The Northeast quarter of the Northeast quarter of Section 20, Township 13 South, Range 14 East of the Salt Lake Meridian.

The Northwest quarter of the Northwest quarter, the Northwest Quarter of the Northeast quarter, the Southeast quarter of the Southeast quarter of Section 21, Township 13 South, Range 14 East of the Salt Lake Meridian.

The South half of the Northeast quarter of Section 27, Township 13 South, Range 14 East of the Salt Lake Meridian. The Southeast quarter of Section 27, Township 13 South, Range 14 East of the Salt Lake Meridian.

The Northwest quarter of the Northeast quarter of Section 28, Township 13 South, Range 14 East of the Salt Lake Meridian.

The East half of Section 34, and the East half of the Northwest quarter of Section 34, in Township 13 South, Range 14 East of the Salt Lake Meridian.

Lot 4, Section 3, the Northeast quarter of the Southwest quarter of Section 13; The South half of the Southeast quarter and the Northeast quarter of the Northwest quarter of Section 20;
The Southwest quarter of the Southwest quarter of Section 21;
The South half of the Northeast quarter of Section 27;
The Southwest quarter of the Southwest quarter and the Northwest quarter of the Northeast quarter of Section 28;
The Northeast quarter of the Northwest quarter; the Southeast quarter; and the East half of the Southwest quarter of Section 29;
and the Northeast quarter of the Southeast quarter of Section 31; all in Township 12 South, Range 14 East of the Salt Lake Meridian.
Also the North half of the South half of Section 9, Township 12 South, Range 16 East of the Salt Lake Meridian.

It is understood that this conveyance is made subject to all valid oil and gas leases now on said premises, and grantor shall have a one-half interest therein.

WITNESS the hand of said grantor this 30 day of November, 1954.

ATTEST:

FREED RANCH COMPANY, Grantor

SECRETARY BY
President

STATE OF UTAH) SS
COUNTY OF ~~SALT LAKE~~ CARBON)

On the 30 day of November, 1954 personally appeared before me Daniel G. Freed, who, being by me duly sworn, did say that he is the President of Freed Ranch Company, and that said instrument was signed in behalf of said corporation by resolution of its Board of Directors, and said Daniel G. Freed acknowledged ~~to me that said~~ corporation executed the same.

My Commission Expires:
August 4, 1958

NOTARY PUBLIC
Residing at ~~Salt Lake City~~, Utah
Price, Utah

WHEN RECORDED MAIL TO:

ZACHARY ROBINSON
570 East 300 North
price, Utah 84501
Order No.: 14934

RECORDED FOR PROFESSIONAL TITLE SERVICES

Ent 124881 Bk 652 Pg 243
Date: 03-AUG-2007 12:27PM
Fee: $12.00 Charge
Filed By: VB
VIKKI BARNETT, Recorder
CARBON COUNTY CORPORATION
For: PROFESSIONAL TITLE SERVICES

WARRANTY DEED

ZOILA CALDER, Trustee of the JOSE ELIAS CALDER IRREVOCABLE TRUST

grantor

of FRUIT HEIGHTS, County of DAVIS, State of Utah, hereby CONVEY and WARRANT to

ZACHARY ROBINSON, a single man, and MARVIN M. ROBINSON, a married man

grantee

of PRICE, UTAH for the sum of

TEN DOLLARS and other good and valuable consideration,

the following described tract of land in Carbon County, State of Utah:

The Southeast Quarter of the Southeast Quarter of Section 34, Township 13 South, Range 14 East, Salt Lake Base and Meridian.

EXCEPTING therefrom all oil, gas and other minerals and mineral rights in and to said lands. (Part of Tax ID # 2A-1224)

TOGETHER WITH AND SUBJECT TO a right of way and easement 66 feet in width for ingress and egress, and for the installation and maintenance of all utilities along a center line described as follows: Beginning at the Northwest Corner of the lands described above, and running thence South 400 feet, more or less, along the West boundary of said land to the existing government road.

SUBJECT to current general taxes, reservations, restrictions and easements existing or of record.

SUBJECT A Tax Sale for the year 2006 in the amount of $5,200.89 plus penalties and interest, as to Serial No. 2A-1224, which the Grantor agrees to discharge in a timely manner. Grantor hereby agrees to indemnify Grantees against any loss or damage therefrom.

WITNESS, the hand of said grantor, this 2nd day of August, A.D. 20 07

Signed in the Presence of

Zoila L. Calder
ZOILA CALDER

STATE OF UTAH,

County of CARBON } ss.

On the 2nd day of August, A.D. 20 07 personally appeared before me ZOILA CALDER, Trustee of the JOSE ELIAS CALDER IRREVOCABLE TRUST

the signer of the within instrument, who duly acknowledged to me that he executed the same.

CLAY G. HOLBROOK
NOTARY PUBLIC • STATE of UTAH
248 EAST MAIN
PRICE, UTAH 84501
COMM. EXPIRES 8-23-2008

C.G. Holbrook
Notary Public

My commission expires 08-23-08 Residing in PRICE, UTAH

This form furnished by PROFESSIONAL TITLE SERVICES.

Ent 125775 Bk 656 Pg 527
Date: 28-SEP-2007 3:18PM
Fee: $25.00 Charge
Filed By: VB
VIKKI BARNETT, Recorder
CARBON COUNTY CORPORATION
For: PROFESSIONAL TITLE SERVICES

When Recorded Mail to:
MIKE A. SIAPERAS
11352 S. Janalynn Dr
South Jordan, Utah 84095

WARRANTY DEED

JOHN RICHARD CALDER, Trustee of the DEANNA MARIE RICHARDSON IRREVOCABLE TRUST dated October 23, 1998, JOHN RICHARD CALDER, Trustee of the ELISABETH CALDER IRREVOCABLE TRUST dated October 23, 1998, JOHN RICHARD CALDER, Trustee of the DAVID CALDER IRREVOCABLE TRUST, ZOILA CALDER, Trustee of the JUAN RICARDO CALDER IRREVOCABLE TRUST, ZOILA CALDER, individually, JOHN RICHARD CALDER, individually, and WEST TEXAS OIL CO.
grantors of Fruit Heights, County of Davis, State of Utah, hereby CONVEY and WARRANT to
RANGE CREEK PROPERTIES LLC, a Utah limited liability company,
grantee of South Jordan, Utah, for the sum of TEN DOLLARS AND OTHER GOOD AND VALUABLE CONSIDERATION, the following described tract of land in **CARBON** County, State of Utah:

Township 13 South, Range 14 East, Salt Lake Base and Meridian

Section 27: SE1/4; S1/2NE1/4
Section 34: SW1/4SE1/4; N1/2SE1/4; S1/2NE1/4; NE1/4NE1/4; S1/2NW1/4NE1/4; SE1/4NW1/4; S1/2NE1/4NW1/4

TOGETHER WITH AND SUBJECT TO a right of way and easement 66 feet in width for ingress and egress, and for the installation and maintenance of all utilities along a center line described as follows: BEGINNING at the Northwest corner of the Southeast Quarter of the Southeast Quarter of said Section 34, and running thence South 400 feet, more or less, along the West boundary of said land to the existing government road.

(Tax ID # 2A-1216, 2A-1224, 2A-1224-1, 2A-1224-3)

ALSO TOGETHER WITH all of Grantors' interest in and to Ten Shares of water in the Minnie Maude Irrigation Company, and together with all of Grantors'' interest in and to any and all other water rights appurtenant to, or in use upon, said lands.

SUBJECT A Tax Sale for the year 2006 in the amount of $6,645.82 plus penalties and interest, as to Serial No. 2A-1224 and 2A-1224-0003, which the Grantor agrees to discharge in a timely manner. Grantor hereby agrees to indemnify Grantees against any loss or damage therefrom.

(Continued)

RECORDED FOR PROFESSIONAL TITLE SERVICES
PTS
15052

(continued)

Subject to current general taxes, reservations, easements and restrictions of record, or enforceable at law or equity.

WITNESS, the hand of said grantor, this 28th day of September, A.D. 2007.

JOHN RICHARD CALDER, Trustee

ZOILA CALDER, Trustee

ZOILA CALDER, individually

JOHN RICHARD CALDER, individually

WEST TEXAS OIL CO.

by: JOHN RICHARD CALDER, Pres. & Director

(Continued)

Ent 125775 Bk 0656 Pg 0528

(continued)

STATE OF UTAH)
)ss
COUNTY OF CARBON)

On the 28th day of September, A.D. 2007, personally appeared before me **JOHN RICHARD CALDER, Trustee of the DEANNA MARIE RICHARDSON IRREVOCABLE TRUST dated October 23, 1998, JOHN RICHARD CALDER, Trustee of the ELISABETH CALDER IRREVOCABLE TRUST dated October 23, 1998, JOHN RICHARD CALDER, Trustee of the DAVID CALDER IRREVOCABLE TRUST, ZOILA CALDER, Trustee of the JUAN RICARDO CALDER IRREVOCABLE TRUST, ZOILA CALDER, individually, and JOHN RICHARD CALDER, individually,** the signer(s) of the within instrument, who duly acknowledged to me that they executed the same.

CLAY G. HOLBROOK
NOTARY PUBLIC • STATE of UTAH
248 EAST MAIN
PRICE, UTAH 84501
COMM. EXPIRES 8-23-2008

notary public

My commission expires: 08-23-08
Residing in: Price, Utah

State of Utah)
)ss.
County of Carbon)

On this 28th day of September, 2007, personally appeared before me JOHN RICHARD CALDER, who being by me duly sworn (or affirmed) did say that he is the President and Director of WEST TEXAS OIL CO. a corporation, and that said instrument was signed in behalf of said corporation by authority of its by-laws (or by a resolution of its board of directors), and said JOHN RICHARD CALDER acknowledged to me that said corporation executed the same.

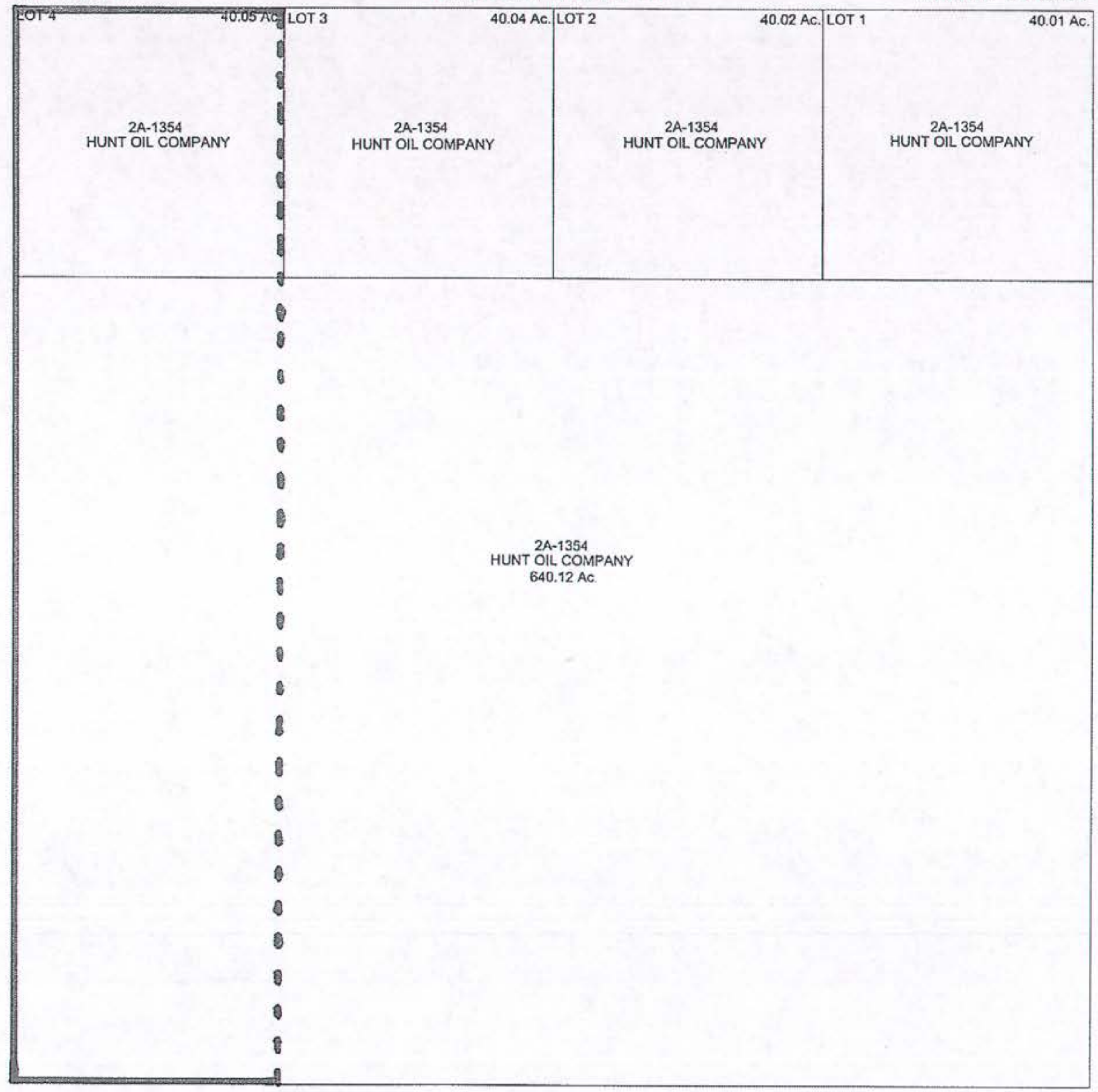
Notary Public

CLAY G. HOLBROOK
NOTARY PUBLIC • STATE of UTAH
248 EAST MAIN
PRICE, UTAH 84501
COMM. EXPIRES 8-23-2008

Commission Expires: 08-23-08
Residing in: Price, Utah

CARBON COUNTY PLATS

SECTION 1 | TOWNSHIP 14 SOUTH | RANGE 14 EAST



SCALE: 400 FEET = 1 INCH

Carbon County assumes no liability for errors or omissions in any information

5/23/2013 1:32:44 PM

STATE OF UTAH }
COUNTY OF CARBON } SS
FILED AND RECORDED FOR
State of Utah
MAY 8 10 32 AM '54
IN BOOK 26 OF Record
PAGE 258-259
Effie Liddell
COUNTY RECORDER

Entry No. 69980
Indexed ✓ RA
Abstracted ✓ RA
Rec. Fee

No.

To All to Whom These Presents Shall Come, Greeting:

Whereas PRESTON NUTTER of PRICE

of the County of CARBON State of UTAH heretofore purchased from the State of Utah, the lands hereinafter described, pursuant to the laws of said State in such case made and provided,

And Whereas, the said PRESTON NUTTER

has paid for said lands, pursuant to the conditions of said sale, and the laws of the state duly enacted in relation thereto, the sum of FIFTEEN HUNDRED AND 27/100 ($1500.27) Dollars, and all legal interest thereon accrued, as fully appears by the certificate of the proper officer, now on file in the office of the Secretary of State of the State of Utah;

Now, Therefore, I, CHAS R. MABEY Governor, in consideration of the premises, and by virtue of the power and authority vested in me by the laws of the State of Utah, in such case made and provided, do issue this PATENT, in the name and by the authority of the State of Utah, hereby granting and confirming unto the said

PRESTON NUTTER

and to HIS heirs and assigns forever, the following piece or parcel of land, situate in the County of ~~DUCHESNE~~ Carbon State aforesaid, to wit: South Half (S½) of the North Half (N½); South Half (S½); and Lots Two (2), Three (3) and Four (4) (Reserving to the United States all coal in the above lands, and to it, or persons authorized by it, the right to prospect for: mine and remove coal from the same, upon compliance with the conditions and subject to the limitations of the Act of Congress, approved June 22, 1910 (36 Stat., 583), as amended by the Act of April 30, 1912 (37 Stat., 105.).

Of Section One (1) in Township Fourteen (14) South, Range Fourteen (14) East of the Salt Lake Meridian.

containing Six Hundred & 11/100 acres according to the said certificate.

To Have and to Hold the above described and granted premises unto the said

PRESTON NUTTER

and to HIS heirs and assigns forever, subject to any easement or right of way of the public, to use all such highways as may have been established according to law, over the same or any part thereof, and subject also to all rights of way for ditches, tunnels, and telephone and transmission lines that may have been constructed by authority of the United States.

In Testimony Whereof, I have hereunto set my hand and caused the great seal of the State of Utah to be hereunto affixed.

Done at Salt Lake City, this TWENTY FIFTH day of JANUARY in the year of our Lord, one thousand nine hundred and TWENTY ONE and of the independence of the United States of America the one hundred and FORTY FOURTH and in the 25th year of the State of Utah.

GREAT

SEAL

By the Governor: CHAS. R. MABEY

H. E. CROCKETT
Secretary of State.

ARTHUR KUHN
Secretary of the State Board of Land Commissioners

Recorded Patent Book 26 Page 132

Certificate of Sale No. 17983

STATE OF UTAH, }
COUNTY OF SALT LAKE. }

I, J.T. Oldroyd xxxxxxxx State xxxxxx Land Commissionerx of the State of Utah, hereby certify that the foregoing is a full, true and correct copy of Patent No. 12626, as compared with Book 26, page 132, Record of Patents in my office.

IN WITNESS WHEREOF I have hereunto set my hand and affixed the official seal of the said State Board of Land Commissioners on this 3d day of January, 1923xxxx at Salt Lake City, Utah.

J.T. Oldroyd
xxxxxxxx State xxxxxx Land Commissionerx

ATTEST: [illegible]
CHIEF CLERK

17983

25375

Recorded at request of Preston Nutter
February 16 A.D. 1923
at 9:00 a. m. book 4
of Patents page 425-6
Helen [illegible]
Recorder, Duchesne County, Utah.
By .... Deputy
Fees 1.30
Salt Lake City Utah

STATE OF UTAH)
COUNTY OF CARBON) 262
FILED AND RECORDED FOR
Van Cott, Bagley etc.
AUG 3 9 37 AM '81

BOOK 209 OF Records
PAGE 262-269
ANN O'BRIEN
COUNTY RECORDER

WHEN RECORDED, RETURN TO:

Howard C. Price, Jr.
1133 Harvard Avenue
Salt Lake City, Utah 84105

Entry No. 159633
Indexed ✓ ✓
Abstracted ✓
Rec. Fee 130.00

MINERAL ROYALTY DEED

PRESTON NUTTER CORPORATION, a Nevada corporation, GRANTOR, for and in consideration of TEN DOLLARS ($10.00) and other good and valuable consideration, hereby conveys and warrants to each of the persons identified below, GRANTEES, an undivided, perpetual, non-executive royalty in the amount specified beside the name of each Grantee, aggregating for all of the Grantees five percent (5% of 8/8), in all Minerals in, upon or under the lands described in Exhibit "A", attached hereto and by this reference made a part hereof.

GRANTEES

Name	Undivided Royalty Interest Conveyed	Address
Howard C. Price, Jr.	2.5050% of 8/8	1133 Harvard Avenue Salt Lake City, Utah 84105
Virginia S. Anderson	1.0975% of 8/8	780 North 8th East Price, Utah 84501
Katherine S. Hodkin	1.0475% of 8/8	2051 East 900 South Salt Lake City, Utah 84108
Reklaw & Company, Nominee of First Interstate Bank of Utah, Trustee under the Will of Catherine N. Story, deceased	.1500% of 8/8	Second South and Main Salt Lake City, Utah 84111
William D. Hurley & Juanita J. Hurley, Trustee of the Katherine Story Hodkin Children's Trust	.2000% of 8/8	2051 East 900 South Salt Lake City, Utah 84108

For purposes of this Mineral Royalty Deed, the term "Minerals" shall include all mineral substances and resources of any kind or nature, whether now or hereafter recognized as existing in the said lands or as having any value for any purpose, and whether now or hereafter mined or extracted through wells or surface, underground, or in situ mining techniques or extraction methods; including, without limitation, oil, gas, coal, oil shale, bituminous tar sands and all other hydrocarbons, or combinations thereof, metallic and non-metallic minerals, geothermal heat and associated steam and hot water, byproducts extracted from brines or geothermal steam, and all other minerals.

In the event the Grantor owns less than the full, undivided fee mineral interest as to any parcel of the said lands, then the mineral royalties conveyed by this Mineral Royalty Deed shall be proportionately reduced with respect to such parcel to the extent the Grantor owns less than the full, undivided fee mineral interest in such parcel.

To have and to hold unto the Grantees and their respective heirs, successors and assigns, forever.

Dated this 20th day of July, 1981.

PRESTON NUTTER CORPORATION

By Howard C. Price Jr
Its President

ATTEST:

Cheryl A. Price
Secretary

STATE OF UTAH)
: ss.
COUNTY OF SALT LAKE)

On the 20th day of July, 1981, personally appeared before me HOWARD C. PRICE, JR., who being by me duly sworn, did say that he is the President of PRESTON NUTTER CORPORATION, and that the foregoing instrument was signed in behalf of said corporation by authority of a resolution of its Board of Directors, and said HOWARD C. PRICE, JR. acknowledged to me that said corporation executed the same.

Notary Public
Residing at Salt Lake City, Utah

My Commission Expires:
April 16, 1985

SURFACE AND MINERAL OWNERSHIP OF PRESTON-NUTTER CORPORATION

SECTION A: SURFACE OWNERSHIP

T. 11 S., R. 14 E., DUCHESNE COUNTY, UTAH

Section 36 - N/2 SE/4

T. 11 S., R. 15 E., DUCHESNE COUNTY, UTAH

Section 22 - SW/4; SW/4 SE/4

Section 27 - NW/4; W/2 NE/4; N/2 SW/4; N/2 SE/4

Section 28 - E/2 SE/4

Section 31 - Lot 3; E/2 SW/4; S/2 SE/4

Section 32 - SE/4; S/2 SW/4

Section 33 - SW/4; S/2 SE/4

T. 11 S., R. 18 E., UINTAH COUNTY, UTAH

Section 26 - Lots 1, 2, 3

Section 27 - S/2 NE/4; E/2 SW/4; NW/4 SE/4

Section 33 - S/2 NE/4; N/2 SW/4

Section 34 - N/2 NW/4; NW/4 SE/4; Lots 1, 2, 3, 4

Section 35 - Lots 1, 2

T. 12 S., R. 15 E., CARBON COUNTY, UTAH

Section 3 - Lot 4, NW/4 SE/4; SE/4 SE/4

Section 4 - Lot 1

T. 12 S., R. 16 E., CARBON COUNTY, UTAH

Section 1 - N/2 SW/4

T. 12 S., R. 18 E., CARBON COUNTY, UTAH

Section 3 - Lot 1

T. 13 S., R. 14 E., CARBON COUNTY, UTAH

Section 13 - SE/4; SE/4 NE/4

Section 23 - S/2 SE/4; NE/4 SE/4

Section 24 - S/2; NE/4; S/2 NW/4; NE/4 NW/4

Section 25 - All

Section 26 - NE/4; S/2 SE/4; NE/4 SE/4

Section 35 - All

Section 36 - All

EXHIBIT "A"

T. 13 S., R. 15 E., CARBON COUNTY, UTAH

Section 18 - SW/4 SE/4

Section 19 - NE/4 NW/4; N/2 SE/4; SE/4 SE/4

Section 20 - S/2

Section 21 - SW/4; W/2 SE/4

Section 28 - W/2 NE/4; SW/4 NW/4; SW/4 SE/4

Section 29 - NW/4 SE/4

Section 31 - SE/4 NE/4

Section 35 - SE/4 SE/4

T. 13 S., R. 16 E., CARBON COUNTY, UTAH

Section 17 - SW/4 NE/4

Section 19 - SE/4 SW/4

Section 30 - SE/4 NW/4; E/2 SW/4

Section 31 - Lots 2, 3, 4; NE/4 NW/4; SE/4 SW/4; S/2 SE/4

T. 14 S., R. 14 E., CARBON COUNTY, UTAH

Section 1 - All

T. 14 S., R. 15 E., CARBON COUNTY, UTAH

Section 1 - All

Section 2 - All

Section 3 - All

Section 4 - All

Section 5 - All

Section 6 - All

Section 7 - All

Section 8 - N/2; N/2 S/2; S/2 SW/4; SW/4 SE/4

Section 9 - All

Section 10 - All

Section 11 - All

Section 12 - All

Section 13 - All

Section 14 - All

Section 15 - All

Section 16 - All

Section 17 - All

Section 18 - All

Section 19 - Lots 1, 2; E/2 NW/4; E/2; NE/4 SW/4

Section 20 - All

Section 21 - All

Section 22 - All

Section 23 - All

Section 24 - N/2; N/2 S/2; SW/4 SW/4; SW/4 SE/4

Section 28 - W/2; SE/4; W/2 NE/4

Section 29 - All

Section 30 - NE/4; N/2 SE/4; SE/4 SE/4

Section 31 - E/2 NE/4

Section 32 - All

Section 33 - N/2; N/2 SW/4; SW/4 SW/4; SE/4 SE/4

Section 34 - SW/4 NW/4; N/2 SW/4; SW/4 SW/4

T. 14 S., R. 16 E., CARBON COUNTY, UTAH

Section 5 - Lot 4; SW/4 NW/4

Section 6 - All

Section 13 - E/2 NW/4; NW/4 SW/4

Section 14 - S/2; SW/4 NW/4

Section 15 - SE/4 NE/4; SE/4

Section 22 - SE/4 NE/4

SECTION B: FULL MINERAL INTEREST OWNERSHIP

T. 11 S., R. 18 E., UINTAH COUNTY, UTAH

Section 26 - Lots 1, 2, 3

Section 34 - Lots 1, 2, 3, 4; NW/4 SE/4

Section 35 - Lots 1, 2

T. 12 S., R. 18 E., CARBON COUNTY, UTAH

Section 3 - Lot 1

T. 13 S., R. 14 E., CARBON COUNTY, UTAH

Section 24 - E/2

Section 25 - E/2 SE/4

Section 35 - W/2

T. 14 S., R. 14 E., CARBON COUNTY, UTAH

Section 1 - Lots 2, 3, 4; S/2 N/2; S/2

T. 14 S., R. 15 E., CARBON COUNTY, UTAH

Section 1 - All

Section 3 - All

Section 4 - All

Section 5 - All

Section 6 - All

Section 7 - All

Section 8 - N/2; SW/4; N/2 SE/4

Section 9 - All

Section 10 - N/2; SE/4; N/2 SW/4; SE/4 SW/4

Section 11 - All

Section 12 - All

Section 13 - All

Section 14 - All

Section 15 - All

Section 17 - N/2; SE/4; W/2 SW/4; SE/4 SW/4

Section 18 - All

Section 19 - Lots 1, 2; E/2 NW/4; E/2; NE/4 SW/4

Section 20 - All

Section 21 - N/2; SE/4; SW/4 SW/4; N/2 SW/4

Section 22 - All

Section 23 - All

Section 24 N/2; N/2 S/2; SW/4 SW/4; SW/4 SE/4

Section 28 - SW/4 NE/4; S/2; NW/4

Section 29 - All

Section 30 - NE/4; N/2 SE/4; SE/4 SE/4

Section 33 N/2; N/2 SW/4; SW/4 SW/4; SE/4 SE/4

Section 34 - SW/4 NW/4; N/2 SW/4; SW/4 SW/4

SECTION C ONE-HALF MINERAL INTEREST OWNERSHIP

T. 15 S., R. 15 E., CARBON COUNTY, UTAH

Section 1 - S/2

Section 3 - SE/4 SW/4

Section 4 - Lots 2, 3, 4; S/2 NW/4; N/2 SW/4; SE/4 SW/4

Section 9 - NE/4; E/2 SE/4

Section 10 - N/2

Section 11 - S/2

Section 12 - All

Section 13 - W/2

Section 14 - NW/4; NE/4; SE/4; NE/4 SW/4

Section 15 - NW/4 SE/4; S/2 NW/4; NW/4 SW/4

Section 29 - SW/4 NE/4

Section 33 - NW/4 NW/4; S/2 NW/4; SW/4 SE/4; E/2 SW/4

T. 15 S., R. 16 E., CARBON COUNTY, UTAH

Section 30 - Lot 3

T. 16 S., R. 15 E., EMERY COUNTY, UTAH

Section 3 - Lots 3, 4; SE/4 NW/4; W/2 SE/4

Section 10 - SE/4 NE/4; E/2 SE/4

Section 11 - SW/4 SW/4

Section 14 - W/2 NW/4; NW/4 SW/4; SW/4 SE/4

Section 23 - N/2 NE/4

Section 24 - NE/4 SW/4; S/2 SE/4

T. 16 S., R. 16 E., EMERY COUNTY, UTAH

Section 30 - SE/4 NW/4; SW/4 NE/4; N/2 SE/4

Section 31 - NE/4 NE/4

T. 17 S., R. 16 E., EMERY COUNTY, UTAH

Section 10 - W/2 W/2

Section 27 - SW/4 NW/4; W/2 SE/4

T. 18 ., R. 16 E., EMERY COUNTY, UTAH

Section 10 - NW/4 SE/4

STATE OF UTAH } ss.
COUNTY OF CARBON
FILED AND RECORDED FOR

First Security Bank

DEC 21 10 02 AM '87

BOOK 277 OF RECORDS

PAGE 583-586

COUNTY RECORDER

Entry No. 019319

Indexed ✓

Abstracted ✓

Rcdg. Fee 106.50

AFTER RECORDING PLEASE RETURN NOTICE TO:
FIRST SECURITY BANK OF UTAH, N.A.
TRUST DEPARTMENT
P.O. BOX 30007
SALT LAKE CITY, UTAH 84125 30
ATTN: PEGGY KOHKONEN

MINERAL DEED

KNOW ALL MEN BY THESE PRESENTS, that First Security Bank of Utah, N.A. as Personal Representative of the Estate of Howard C. Price, Jr., deceased, of P.O. Box 30007, Salt Lake City, Utah, 84130 hereinafter called Grantor, for and in consideration of the sum of Ten and No/100 dollars ($10.00) and other good and valuable considerations, the receipt of which is hereby acknowledged, does hereby grant, bargain, sell, convey, transfer, assign and deliver unto First Security Bank of Utah, N.A. and Amy Allen Price, as Co-Trustees, of P.O. Box 30007, Salt Lake City, Utah, 84130, hereinafter called Grantees an undivided 1.2525% of 8/8 interest in and to all of the oil, gas and other minerals in and under and that may be produced from the lands described in Exhibit "A", attached hereto and by this reference made a part hereof, together with the right to ingress and egress at all times for the purpose of mining, drilling, exploring, operating and developing said lands for oil, gas and other minerals, and storing, handling, transporting and marketing the same therefrom with the rights to remove from said land all of Grantees' property and improvements.

The sale is made subject to any rights now existing to any lessee or assigns under any valid and subsisting oil and gas lease of record heretofore executed; it being understood and agreed that said Grantees shall have, receive, and enjoy the herein granted undivided interest in and to all bonuses, rents, royalties and other benefits which may accrue under the terms of said lease insofar as it covers the above described land from and after the date hereof, precisely as if the Grantees herein had been at the date of the making of said lease the owner of a similar undivided interest in and to the lands described and Grantees one of the lessors therein.

Grantor agrees to execute such further assurances as may be requisite for the full and complete enjoyment of the rights herein granted and likewise agrees that Grantees herein shall have the right at any time to redeem for said Grantor by payment, any mortgage, taxes, or other liens on the above described land, upon default in payment by Grantor, and be subrogated to the rights of the holder thereof.

TO HAVE AND TO HOLD the above described property and easement with all the singular rights, privileges, and appurtenances thereunto or any wise belonging to the said Grantees herein their heirs, successors, personal representatives, administrators, executors, and assigns forever.

WITNESS hand of said Grantor this 2nd day of October, 1987.

Witness:

Peggy A. Kohkonen

Elizabeth A. McBee

First Security Bank of Utah, N.A.,
Personal Representative of the Estate
of Howard C. Price, Jr., deceased

BY: Robert B. Edgar
Assistant Trust Officer

STATE OF UTAH)
) ss.
COUNTY OF SALT LAKE)

On the 2nd day of October, 1987, personally appeared before me, Robert B. Edgar, who being duly sworn did say, that he, Robert B. Edgar, is an Assistant Trust Officer of First Security Bank of Utah, N.A., as Personal Representative of the Estate of Howard C. Price, Jr., and that the foregoing instrument was signed in behalf of said Association by authority of a resolution of its Board of Directors, and the said Robert B. Edgar duly acknowledged to me that said Association executed the same as Personal Representative.

NOTARY PUBLIC STATE OF UTAH

Jenny L. Peterson
Notary Public
Residing at Salt Lake City, Utah

My Commission Expires:
My Commission Expires Sept. 4, 1990

EXHIBIT A

Section A: Surface Ownership

T. 11 S., R. 14 E., DUCHESNE COUNTY, UTAH

Section 36 - N/2 SE/4

T. 11 S., R. 15 E., DUCHESNE COUNTY, UTAH

Section 22 - SW/4; SW/4 SE/4
Section 27 - NW/4; W/2 NE/4; N/2 SW/4; N/2 SE/4
Section 28 - E/2 SE/4
Section 31 - Lot 3; E/2 SW/4; S/2 SE/4
Section 32 - SE/4; S/2 SW/4
Section 33 - SW/4; S/2 SE/4

T. 11 S., R. 18 E., UINTAH COUNTY, UTAH

Section 26 - Lots 1, 2, 3
Section 27 - S/2 NE/4; E/2 SW/4; NW/4 SE/4
Section 33 - S/2 NE/4; N/2 SW/4
Section 34 - N/2 NW/4; NW/4 SE/4; Lots 1, 2, 3, 4
Section 35 - Lots 1, 2

T. 12 S., R. 15 E., CARBON COUNTY, UTAH

Section 3 - Lot 4, NW/4 SE/4; SE/4 SE/4
Section 4 - Lot 1

T. 12 S., R. 16 E., CARBON COUNTY, UTAH

Section 1 - N/2 SW/4

T. 12 S., R. 18 E., CARBON COUNTY, UTAH

Section 3 - Lot 1

T. 13 S., R. 14 E., CARBON COUNTY, UTAH

Section 13 - SE/4; SE/4 NE/4
Section 23 - S/2 SE/4; NE/4 SE/4
Section 24 - S/2; NE/4; S/2 NW/4; NE/4 NW/4
Section 25 - All
Section 26 - NE/4; S/2 SE/4; NE/4 SE/4
Section 35 - All
Section 36 - All

T. 13 S., R. 15 E., CARBON COUNTY, UTAH

Section 18 - SW/4 SE/4
Section 19 - NE/4 NW/4; N/2 SE/4; SE/4 SE/4
Section 20 - S/2
Section 21 - SW/4; W/2 SE/4
Section 28 - W/2 NE/4; SW/4 NW/4; SW/4 SE/4
Section 29 - NW/4 SE/4
Section 31 - SE/4 NE/4
Section 35 - SE/4 SE/4

T. 13 S., R. 16 E., CARBON COUNTY, UTAH

Section 17 - SW/4 NE/4
Section 19 - SE/4 SW/4
Section 30 - SE/4 NW/4; E/2 SW/4
Section 31 - Lots 2, 3, 4; NE/4 NW/4; SE/4 SW/4; S/2 SE/4

T. 14 S., R. 14 E., CARBON COUNTY, UTAH

Section 1 - All

T. 14 S., R. 15 E., CARBON COUNTY, UTAH

Section 1 - All
Section 2 - All
Section 3 - All
Section 4 - All
Section 5 - All
Section 6 - All
Section 7 - All
Section 8 - N/2; N/2 S/2; S/2 SW/4; SW/4 SE/4
Section 9 - All
Section 10 - All
Section 11 - All
Section 12 - All
Section 13 - All
Section 14 - All
Section 15 - All
Section 16 - All
Section 17 - All
Section 18 - All
Section 19 - Lots 1, 2; E/2 NW/4; E/2; NE/4 SW/4
Section 20 - All
Section 21 - All
Section 22 - All
Section 23 - All
Section 24 - N/2; N/2 S/2; SW/4 SW/4; SW/4 SE/4
Section 28 - W/2; SE/4; W/2 NE/4
Section 29 - All
Section 30 - NE/4; N/2 SE/4; SE/4 SE/4
Section 31 - E/2 NE/4
Section 32 - All
Section 33 - N/2; N/2 SW/4; SW/4 SW/4; SE/4 SE/4
Section 34 - SW/4 NW/4; N/2 SW/4; SW/4 SW/4

T. 14 S., R. 16 E., CARBON COUNTY, UTAH

Section 5 - Lot 4; SW/4 NW/4
Section 6 - All
Section 13 - E/2 NW/4; NW/4 SW/4
Section 14 - S/2; SW/4 NW/4
Section 15 - SE/4 NE/4; SE/4
Section 22 - SE/4 NE/4

Section B: Full Mineral Interest Ownership

T. 11 S., R. 18 E., UINTAH COUNTY, UTAH

Section 26 - Lots 1, 2, 3
Section 34 - Lots 1, 2, 3, 4; NW/4 SE/4
Section 35 - Lots 1, 2

T. 12 S., R. 18 E., CARBON COUNTY, UTAH

Section 3 - Lot 1

T. 13 S., R. 14 E., CARBON COUNTY, UTAH

Section 24 - E/2
Section 25 - E/2 SE/4
Section 35 - W/2

T. 14 S., R. 14 E., CARBON COUNTY, UTAH

Section 1 - Lots 2, 3, 4; S/2 N/2; S/2

T. 14 S., R. 15 E., CARBON COUNTY, UTAH

Section 1 - All
Section 3 - All
Section 4 - All
Section 5 - All
Section 6 - All

Section 7 - All
Section 8 - N/2; SW/4; N/2 SE/4
Section 9 - All
Section 10 - N/2; SE/4; N/2 SW/4; SE/4 SW/4
Section 11 - All
Section 12 - All
Section 13 - All
Section 14 - All
Section 15 - All
Section 17 - N/2; SE/4; W/2 SW/4; SE/4 SW/4
Section 18 - All
Section 19 - Lots 1, 2; E/2 NW/4; E/2; NE/4 SW/4
Section 20 - All
Section 21 - N/2; SE/4; SW/4 SW/4; N/2 SW/4
Section 22 - All
Section 23 - All
Section 24 - N/2; N/2 S/2; SW/4 SW/4; SW/4 SE/4
Section 28 - SW/4 NE/4; S/2; NW/4
Section 29 - All
Section 30 - NE/4; N/2 SE/4; SE/4 SE/4
Section 33 - N/2; N/2 SW/4; SW/4 SW/4; SE/4 SE/4
Section 34 - SW/4 NW/4; N/2 SW/4; SW/4 SW/4

Section C: One-half Mineral Interest Ownership

T. 15 S., R. 15 E., CARBON COUNTY UTAH

Section 1 - S/2
Section 3 - SE/4 SW/4
Section 4 - Lots 2, 3, 4; S/2 NW/4; N/2 SW/4; SE/4 SW/4
Section 9 - NE/4; E/2 SE/4
Section 10 - N/2
Section 11 - S/2
Section 12 - All
Section 13 - W/2
Section 14 - NW/4; NE/4; SE/4; NE/4 SW/4
Section 15 - NW/4 SE/4; S/2 NW/4; NW/4 SW/4
Section 29 - SW/4 NE/4
Section 33 - NW/4 NW/4; S/2 NW/4; SW/4 SE/4; E/2 SW/4

T. 15 S., R. 16 E., CARBON COUNTY,UTAH

Section 30 - Lot 3

T. 16 S., R. 15 E., EMERY COUNTY, UTAH

Section 3 - Lots 3, 4; SE/4 NW/4; W/2 SE/4
Section 10 - SE/4 NE/4; E/2 SE/4
Section 11 - SW/4 SW/4
Section 14 - W/2 NW/4; NW/4 SW/4; SW/4 SE/4
Section 23 - N/2 NE/4
Section 24 - NE/4 SW/4; S/2 SE/4

T. 16 S., R. 16 E., EMERY COUNTY, UTAH

Section 30 - SE/4 NW/4; SW/4 NE/4; N/2 SE/4
Section 31 - NE/4 NE/4

T. 17 S., R. 16 E., EMERY COUNTY, UTAH

Section 10 - W/2 W/2
Section 27 - SW/4 NW/4; W/2 SE/4

T. 18 S., R. 16 E., EMERY COUNTY, UTAH

Section 10 - NW/4 SE/4

Ent 821769 Bk 806 Pg 454
Date: 21-OCT-2013 12:06:27PM
Fee: $119.00 Check
Filed By: VB
VIKKI BARNETT, Recorder
CARBON COUNTY CORPORATION
For: SCHMIDT & HOLMES LLP

Carbon County, Utah

TRUSTEE'S ASSIGNMENT

STATE OF UTAH §
§
COUNTY OF CARBON §

Grantor:	The Alice Blakeley Winn (Johnson) Irrevocable Trust (the "Trust") created under The Howard C. Price, Jr. Revocable Trust (the "Price Trust") U/T/A dated December 29, 1981 Bank of America, N.A., through its Merrill Lynch Trust Company division, Trustee P.O. Box 830308 Dallas, TX 75283-0308
Grantee:	The Alice Blakeley Winn Trust (the "Winn Trust") U/T/A dated June 6, 1992 Alice Blakeley Winn, Trustee 664 Rimini Rd. Del Mar, CA 92014
Effective Date:	13 June 2013

Whereas:

1. Bank of America, N.A., through its Merrill Lynch Trust Company division, is Trustee of the Alice Blakeley Winn (Johnson) Irrevocable Trust created under the Howard C. Price, Jr. Revocable Trust U/T/A dated December 29, 1981. In such capacity, it owns the mineral interests in the property described in Exhibit A.

2. During his lifetime, Howard C. Price, Jr. acquired real property and mineral interests located in Carbon County, Utah including, but not limited to, the lands described in Exhibit A. Mr. Price died on December 20, 1982 and under the terms of his will, these interests went to the Trustee of the Howard C. Price, Jr. Revocable Trust U/T/A dated December 29, 1981 ("Price Trust"). The Price Trust created the Alice Winn Johnson Trust ("Trust"), which received a portion of the Price Trust assets upon the death of Mr. Price.

3. On October 2, 1987, First Security Bank of Utah, N.A., as Personal Representative of the Estate of Howard C. Price, Jr., Deceased, conveyed certain mineral interests to Home Fed Trust as trustee for the Trust via that certain Mineral Deed filed in the office of the Carbon County Recorder on December, 21 1987 in Book 277, Page 587. Home Fed Trust was renamed Danielson Trust Company on October 26,1993.

4. On June 24, 1994, Alice Winn Johnson, a/k/a Alice Blakeley Winn, appointed Merrill Lynch Trust Company as Trustee of the Trust in lieu of Danielson Trust Company pursuant to powers reserved to her in Article Twentieth of the Price Trust.

5. On October 25, 1994, Home Fed Trust, Trustee for the Trust, conveyed these interests to Merrill Lynch Trust Company, as successor trustee of the Trust, which is sometimes referred to as the Alice Blakely Winn (Johnson) Irrevocable Trust.

6. On November 2, 2009, Merrill Lynch Bank & Trust Co., FSB, a/k/a Merrill Lynch Trust Company, merged with and into Bank of America, N.A. The current Trustee of the Trust is Bank of America, N.A., through its Merrill Lynch Trust Company division.

7. On June 13, 2013, the Superior Court of California, County of San Diego, issued

an order terminating the trusteeship of Bank of America, N.A., Trustee, and discharging it from administration of the Trust.

8. Pursuant to the requests of Trust beneficiary Alice Blakeley Winn, Bank of America, N.A., is assigning to Alice Blakeley Winn, as Trustee of the Alice Blakeley Winn Trust U/T/A dated June 6, 1992 ("Winn Trust"), those mineral interests in the property described in Exhibit A.

Now Therefore:

Bank of America, N.A., through Merrill Lynch Trust Company, in consideration of the terms of the Alice Blakeley Winn (Johnson) Irrevocable Trust, and acting solely in its capacity as Trustee of the Trust, hereby GRANTS, DISTRIBUTES, ASSIGNS, and CONVEYS unto Alice Blakeley Winn, as Trustee of the Winn Trust, the Trust's surface estates and mineral interests, which are located in Carbon County, Utah, the same being more particularly described in "Exhibit A" to this Assignment.

The interests conveyed herein include all appurtenant rights such as all rights held under operating agreements; other contracts and agreements; leases; rights-of-way; easements; unitization and pooling agreements; governmental ordinances, laws, orders and regulations; and any other rights, estates, interests, causes of action, or other incidents and appurtenances, which are attached or related to the surface estates and mineral interests assigned herein and all interests in income from such surface estates and mineral interests accruing after the effective date of this Trustee's Assignment.

The interests conveyed herein are conveyed subject to all oil and gas leases, operating agreements, unit agreements, pooling agreements, oil and gas purchase agreements or any other agreements covering the property described above, to the extent the same are effective.

The conveyance is made without warranty, express or implied. Nonetheless, Grantor Trustee fully subrogates and substitutes Grantee to all claims, rights and causes of action that the Trustee has or may have against any third party for breach of any warranty or representation of title.

This instrument is executed and delivered on the dates indicated below, but shall be effective for all purposes as of 13 June 2013.

The Alice Blakeley Winn (Johnson) Irrevocable Trust
created under The Howard C. Price, Jr. Revocable Trust
U/T/A dated December 29, 1981
Bank of America, N.A., through its
Merrill Lynch Trust Company division, Trustee
P.O. Box 830308
Dallas, TX 75283-0308

By: ______________________

Name: J.N. Long, RPL
Title: Vice President

ACKNOWLEDGMENT

STATE OF TEXAS §
§
COUNTY OF DALLAS §

Before me, the undersigned, a Notary Public in and for said County and State, on this day personally appeared J.N. Long, Vice President of Bank of America, N.A., known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purposes and consideration therein expressed, in the capacity therein stated, and as the act and deed of the Bank in the capacity therein stated.

Given under my hand and seal of office this the 11TH day of October, 2013.

CHASE W. RAETZ
Notary Public, State of Texas
My Commission Expires
March 31, 2015

____
Notary Public in and for the State of Texas

EXHIBIT A

All right, title and interest in and to the lands in Carbon County, Utah, which are described below; all rights under leases, contracts, and other agreements pertaining to the same; and all other rights appurtenant thereto. The description of the estate or quantum of the interest in the lands is not intended as a limitation. All rights and interests different from, or in addition to, those specifically described are also included.

"The property" referred to in the Trustee's Assignment:

An undivided 1/64 interest in the oil, gas and other minerals in and under and that may be produced from the following described lands:

Township 13 South, Range 14 East

Section 24:	E/2
Section 25:	SW/4
	all minerals less & except rights to oil, gas, coal, and nitrogen
Section 25:	E/2 SE/4
Section 35:	W/2

Township 14 South, Range 14 East

Section 1:	Lot 1
	all minerals less & except rights to oil, gas, coal, and nitrogen
Section 1:	Lots 2, 3, and 4; S/2 N/2, S/2
	all oil , gas and other minerals less & except rights to coal

Township 14 South, Range 15 East

Section 1:	All
Section 2:	All
	less & except rights to oil and gas
Section 3:	All
Section 4:	All
Section 5:	All
Section 6:	All
Section 7:	All
Section 8:	N/2, N/2 S/2, S/2 SW/4
Section 8:	SW/4 SE/4
	all minerals less & except rights to oil, gas, oil shale, coal and nitrogen
Section 9:	All
Section 10:	N/2, N/2 S/2, S/2 SE/4, SE/4 SW/4
Section 10:	SW/4 SW/4
	all minerals less & except rights to oil, gas, oil shale, and nitrogen
Section 11:	All
Section 12:	All
Section 13:	All
Section 14:	All
Section 15:	All
Section 16:	N/2 NE/4, SE/4 NE/4, NE/4 SE/4
	all minerals less & except rights to oil and gas
Section 16:	SW/4 NE/4, W/2, W/2 SE/4, SE/4 SE/4
	all minerals less & except rights to oil, gas, and coal
Section 17:	N/2, W/2 SW/4, SE/4 SW/4, SE/4
Section 17:	NE/4 SW/4
	all minerals less & except rights to oil, gas, oil shale, coal and nitrogen

Township 14 South, Range 15 East (cont.)

Section 18:	All
Section 19:	Lots 1 and 2; E/2 NW/4, E/2, NE/4 SW/4
Section 20:	All

Section 21:	N/2, N/2 S/2, S/2 SE/4, SW/4 SW/4 *all minerals less & except rights to oil, gas, oil shale, coal and nitrogen*
Section 22:	All
Section 23:	All
Section 24:	N/2, N/2 S/2, SW/4 SE/4, SW/4 SW/4 *all minerals less & except rights to oil, gas, oil shale, coal and nitrogen*
Section 28:	W/2, SE/4, SW/4 NE/4
Section 28:	SW/4 NE/4 *all minerals less & except rights to oil, gas, oil shale, coal and nitrogen*
Section 29:	All
Section 30:	NE/4, N/2 SE/4, SE/4 SE/4
Section 32:	All *all minerals less & except rights to oil, gas, and coal*
Section 33:	N/2, N/2 SW/4, SW/4 SW/4, SE/4 SE/4
Section 34:	SW/4 NW/4, N/2 SW/4, SW/4 SW/4

Township 15 South, Range 15 East

Section 1:	S/2
Section 3:	SE/4 SW/4
Section 4:	Lot 2 *all minerals less & except rights to oil, gas, oil shale, coal and nitrogen*
Section 4:	Lots 3 and 4: S/2 NW/4, N/2 SW/4, SE/4 SW/4
Section 9:	NE/4, NE/4 SE/4
Section 9:	SE/4 SE/4 *all minerals less & except rights to oil, gas, oil shale, coal and nitrogen*
Section 10:	N/2
Section 11:	S/2
Section 12:	All
Section 13:	W/2
Section 14:	N2, SE/4, NE/4 SW/4
Section 15:	SE/4 NW/4
Section 28:	SW/4 NE/4 *all minerals less & except rights to coal*
Section 33:	NW/4 NW/4, S/2 NW/4, SW/4 SE/4, E/2 SW/4 *all minerals less & except rights to coal*

Township 15 South, Range 16 East

Section 30:	Lot 3 *all minerals less & except rights to oil, gas, oil shale, coal and nitrogen*

The same property description appears in the Affidavit filed May 29, 2012 and recorded in Carbon County, Utah in Book 771, Page 47 as Entry No. 815121.

After recording, please return to:

James Holmes, Esq.
Schmidt and Holmes LLP
3012 Fairmount St.
Dallas, TX 75201
(214) 520-8292, phone
(214) 521-9995, fax

Entry No. 38093
Indexed ✓✓
Abstracted ✓
Recdg. Fee 109.50

STATE OF UTAH } SS
COUNTY OF CARBON
FILED AND RECORDED FOR
Land Administration 702

FEB 22 10 00 AM '93

BOOK 324 OF RECORDS
PAGE 702-712
ANN B. O'BRIEN
COUNTY RECORDER

SPECIAL WARRANTY DEED AND BILL OF SALE

KNOW ALL MEN BY THESE PRESENTS:

PACIFIC ENTERPRISES OIL COMPANY (USA), a California corporation, whose address is 1700 Pacific Avenue, Suite 1200, Dallas, Texas 75201-4697 ("Grantor"), for and in consideration of the sum of One Hundred Dollars ($100.00) cash and other good and valuable consideration, to the Grantor paid by the Grantee hereinafter named, the full receipt and sufficiency of which are hereby acknowledged, has granted, sold, conveyed, and delivered, and does hereby **GRANT, SELL, CONVEY AND DELIVER** unto **HUNT OIL COMPANY,** a Delaware corporation, whose mailing address is Fountain Place, 1445 Ross at Field, Dallas, Texas 75202-2785 ("Grantee") all of the interests and lands which are fully described in Exhibit "A" attached hereto and made a part hereof for all purposes together with all personal property located on or used or obtained in connection with such interests and lands and all improvements, water rights, barns, structures, corrals, tanks, wells, vehicles, tools and brands. All such interests, lands and personal property and other properties or rights conveyed and assigned hereby are hereinafter collectively called the "Properties" and singularly a "Property."

TO HAVE AND TO HOLD the Properties and rights, together with all and singular the rights and appurtenances thereunto in anywise belonging, including but not limited to all of Grantor's right, title and interest, if any, in and to any (i) strips or gores between the Properties and abutting properties, and (ii) land lying in or under the bed of any road or right-of-way abutting or adjacent to the Properties, unto the said Grantee, its successors and assigns forever. Grantor hereby binds itself, its successors and assigns, to warrant and forever defend all and singular the Properties unto Grantee, its successors and assigns, against every entity or person whomsoever lawfully claiming or to claim the same or any part thereof by, through or under Grantor, but not otherwise.

Grantor hereby grants and assigns to Grantee all of its rights (to the extent so transferrable) of substitution and subrogation to enforce all covenants and warranties (including title-related warranties) to which Grantor (or any present or prior affiliate of Grantee or Pacific Enterprises Oil Company) is entitled related to or in connection with the Properties. With respect only to the personal property conveyed hereby, this conveyance is made AS IS AND WHERE IS AND WITHOUT WARRANTY OF MERCHANTABILITY, CONDITION OR FITNESS FOR A PARTICULAR PURPOSE, AND ANY AND ALL SUCH WARRANTIES, WHETHER EXPRESS OR IMPLIED ARE EXPRESSLY DENIED.

In addition to this Special Warranty Deed and Bill of Sale, Grantor and/or Grantor's affiliates shall, upon request, promptly execute, acknowledge, and deliver to Grantee, or Grantee's designee, without further consideration, any documents or instruments as Grantee may reasonably require, including, without limitation, certificates of title to vehicles, further assignments or conveyances required by any state or federal authority, deeds, and consents to further evidence the conveyance of the Properties by Grantor to Grantee.

It is the intention of Grantor to convey and divest itself of any and all interest it presently owns or has a latent, equitable or future interest in, in and to the real property described in this deed to Grantee.

This Special Warranty Deed and Bill of Sale is made and accepted subject to all valid easements, restrictions, rights of way, conditions, exceptions, reservations and covenants affecting the Properties which are existing and properly of record in Carbon County, Utah on the date of the execution hereof.

WITNESS THE EXECUTION HEREOF, this 4 JAN 1993, but effective as of April 1, 1992, at 7:00 a.m., local time with respect to the jurisdiction in which each of the Properties is located.

GRANTOR:

PACIFIC ENTERPRISES OIL COMPANY (USA), a California corporation

By: [signature]
R. E. Rinard
President

ATTEST:

[signature]
P. E. Fulbright
Assistant Secretary

ACKNOWLEDGMENT

STATE OF TEXAS)
) ss.
COUNTY OF DALLAS)

4 JAN 1993

On ______________________, personally appeared before me, R. E. Rinard, who, being by me duly sworn, did say that he is the President of PACIFIC ENTERPRISES OIL COMPANY (USA), and that said instrument was signed in behalf of said corporation by authority of a resolution of its Board of Directors and said R. E. Rinard acknowledged to me that said corporation executed the same.

SUSAN W. HUX
Notary Public
STATE OF TEXAS
My Commission Expires 3/12/94

Susan W. Hux
Notary Public

EXHIBIT "A"

Attached to and made a part of that certain
Special Warranty Deed and Bill of Sale between
PACIFIC ENTERPRISES OIL COMPANY (USA) and HUNT OIL COMPANY.

I. PRESTON NUTTER RANCH

A. Surface and Minerals

Township 13 South, Range 14 East, SLM, Carbon County, Utah

• Section 24:	E/2
• Section 25:	E/2 SE/4
• Section 35:	W/2

Township 14 South, Range 15 East, SLM, Carbon County, Utah

• Section 1:	All
• Section 3:	All
• Section 4:	All
• Section 5:	All
• Section 6:	All
• Section 7:	All
• Section 8:	N/2; SW/4; N/2 SE/4
• Section 9:	All
• Section 10:	N/2; SE/4; N/2 SW/4; SE/4 SW/4
• Section 11:	All
• Section 12:	All
• Section 13:	All
• Section 14:	All
• Section 15:	All
• Section 17:	N/2; SE/4; W/2 SW/4; SE/4 SW/4
• Section 18:	All
• Section 19:	Lots 1 and 2; E/2; E/2 NW/4; NE/4 SW/4
• Section 20:	All
• Section 21:	N/2; SE/4; N/2 SW/4; SW/4 SW/4
• Section 22:	All
• Section 23:	All
• Section 24:	N/2; N/2 S/2; SW/4 SW/4; SW/4 SE/4
• Section 28:	S/2; NW/4; SW/4 NE/4

- Section 29: All
- Section 30: NE/4; N/2 SE/4; SE/4 SE/4
- Section 33: N/2; N/2 SW/4; SW/4 SW/4; SE/4 SE/4
- Section 34: SW/4 NW/4; N/2 SW/4; SW/4 SW/4

<u>Township 13 South, Range 14 East, SLM, Carbon County, Utah</u>

- Section 25: SW/4
- Section 36: All

<u>Township 14 South, Range 14 East, SLM, Carbon County, Utah</u>

- Section 1: Lots 1, 2, 3 and 4; S/2 N/2; S/2

<u>Township 14 South, Range 15 East, SLM, Carbon County, Utah</u>

- Section 2: All
- Section 8: SW/4 SE/4
- Section 10: SW/4 SW/4
- Section 16: All
- Section 17: NE/4 SW/4
- Section 21: SE/4 SW/4
- Section 28: NW/4 NE/4
- Section 32: All

<u>Township 12 South, Range 15 East, SLM, Carbon County, Utah</u>

- Section 3: Lot 4; NW/4 SE/4; SE/4 SE/4
- Section 4: Lot 1

<u>Township 12 South, Range 16 East, SLM, Carbon County, Utah</u>

- Section 1: N/2 SW/4

<u>Township 13 South, Range 14 East, SLM, Carbon County, Utah</u>

- Section 13: SE/4 NE/4; SE/4
- Section 23: S/2 SE/4; NE/4 SE/4
- Section 24: S/2 NW/4; NE/4 NW/4; SW/4

Section 25:	N/2; W/2 SE/4
Section 26:	NE/4; S/2 SE/4; NE/4 SE/4
Section 35:	E/2

Township 13 South, Range 15 East, SLM, Carbon County, Utah

Section 18:	SW/4 SE/4
Section 19:	NE/4 NW/4; N/2 SE/4; SE/4 SE/4
Section 20:	S/2
Section 21:	SW/4; W/2 SE/4
Section 28:	W/2 NE/4; SW/4 NW/4; SW/4 SE/4
Section 29:	NW/4 SE/4
Section 31:	SE/4 NE/4
Section 35:	SE/4 SE/4

Township 13 South, Range 16 East, SLM, Carbon County, Utah

Section 17:	SW/4 NE/4
Section 19:	SE/4 SW/4
Section 30:	SE/4 NW/4; E/2 SW/4
Section 31:	Lots 2, 3 and 4; NE/4 NW/4; SE/4 SW/4; S/2 SE/4

Township 14 South, Range 15 East, SLM, Carbon County, Utah

Section 31:	E/2 NE/4

Township 14 South, Range 16 East, SLM, Carbon County, Utah

Section 5:	Lot 4; SW/4 NW/4
Section 6:	All
Section 13:	E/2 NW/4; NW/4 SW/4
Section 14:	S/2; SW/4 NW/4
Section 15:	SE/4 NE/4; SE/4
Section 22:	SE/4 NE/4

Township 15 South, Range 15 East, SLM, Carbon County, Utah

Section 1:	S/2
Section 3:	SE/4 SW/4
Section 4:	Lots 2, 3 and 4; S/2 NW/4; N/2 SW/4; SE/4 SW/4

Section 9:	NE/4; NE/4 SE/4
Section 10:	N/2
Section 11:	S/2
Section 12:	All
Section 13:	W/2
Section 14:	NW/4; NE/4; SE/4; NE/4 SW/4
Section 15:	SE/4 NW/4
Section 29:	SW/4 NE/4
Section 33:	NW/4 NW/4; S/2 NW/4; SW/4 SE/4; E/2 SW/4

Township 15 South, Range 16 East, SLM, Carbon County, Utah

Section 30:	Lot 3

Township 11 South, Range 15 East, SLM, Duchesne County, Utah

Section 22:	W/2 SW/4
Section 31:	Lot 3; E/2 SW/4; S/2 SE/4
Section 33:	SW/4; S/2 SE/4

Township 11 South, Range 15 East, SLM, Duchesne County, Utah

Section 32:	S/2 S/2; NE/4 SE/4

Township 11 South, Range 14 East, SLM, Duchesne County, Utah

Section 36:	N/2 SE/4

Township 11 South, Range 15 East, SLM, Duchesne County, Utah

Section 22:	E/2 SW/4; SW/4 SE/4
Section 27:	NW/4; W/2 NE/4; N/2 S/2
Section 28:	E/2 SE/4
Section 32:	NW/4 SE/4

Township 16 South, Range 15 East, SLM, Emery County, Utah

Section 3:	Lots 3 and 4; SE/4 NW/4; W/2 SE/4
Section 10:	SE/4 NE/4; E/2 SE/4
Section 11:	SW/4 SW/4

Section 14: W/2 NW/4; NW/4 SW/4; SW/4 SE/4
Section 23: N/2 NE/4
Section 24: NE/4 SW/4; S/2 SE/4

<u>Township 16 South, Range 16 East, SLM, Emery County, Utah</u>

Section 30: SE/4 NW/4; SW/4 NE/4; N/2 SE/4
Section 31: NE/4 NE/4

<u>Township 17 South, Range 16 East, SLM, Emery County, Utah</u>

Section 10: W/2 W/2

B. Federal Grazing Permits

<u>Township 12 South, Range 16 East, SLM, Carbon County, Utah</u>

Section 1: N/2 SW/4

<u>Township 12 South, Range 18 East, SLM, Carbon County, Utah</u>

Section 3: Lot 1

<u>Township 13 South, Range 14 East, SLM, Carbon County, Utah</u>

Section 13: SE/4 NE/4; SE/4
Section 23: S/2 SE/4; NE/4 SE/4
Section 24: E/2; S/2 NW/4; NE/4 NW/4; SW/4
Section 25: E/2 SE/4; SW/4; N/2; W/2 SE/4
Section 26: NE/4; S/2 SE/4; NE/4 SE/4
Section 35: W/2; E/2
Section 36: All

<u>Township 13 South, Range 15 East, SLM, Carbon County, Utah</u>

Section 18: SW/4 SE/4
Section 19: NE/4 NW/4; N/2 SE/4; SE/4 SE/4
Section 20: S/2
Section 21: SW/4; W/2 SE/4

Section 28:	W/2 NE/4; SW/4 NW/4; SW/4 SE/4
Section 29:	NW/4 SE/4
Section 31:	SE/4 NE/4
Section 35:	SE/4 SE/4

<u>Township 13 South, Range 16 East, SLM, Carbon County, Utah</u>

Section 17:	SW/4 NE/4
Section 19:	SE/4 SW/4
Section 30:	SE/4 NW/4; E/2 SW/4
Section 31:	Lots 2, 3 and 4; NE/4 NW/4; SE/4 SW/4; S/2 SE/4

<u>Township 14 South, Range 14 East, SLM, Carbon County, Utah</u>

Section 1:	Lots 1, 2, 3 and 4; S/2 N/2; S/2

<u>Township 14 South, Range 15 East, SLM, Carbon County, Utah</u>

Section 1:	All
Section 2:	All
Section 3:	All
Section 4:	All
Section 5:	All
Section 6:	All
Section 7:	All
Section 8:	N/2; SW/4; N/2 SE/4; SW/4 SE/4
Section 9:	All
Section 10:	N/2; SE/4; N/2 SW/4; SE/4 SW/4; SW/4 SW/4
Section 11:	All
Section 12:	All
Section 13:	All
Section 14:	All
Section 15:	All
Section 16:	N/2 NE/4; SE/4 NE/4; NE/4 SE/4; W/2; S/2 SE/4; NW/4 SE/4; SW/4 NE/4
Section 17:	N/2; SE/4; W/2 SW/4; SE/4 SW/4; NE/4 SW/4
Section 18:	All
Section 19:	Lots 1 and 2; E/2; E/2 NW/4; NE/4 SW/4
Section 20:	All
Section 21:	N/2; SE/4; N/2 SW/4; SW/4 SW/4; SE/4 SW/4
Section 22:	All
Section 23:	All
Section 24:	N/2; N/2 S/2; SW/4 SW/4; SW/4 SE/4

Section 28:	S/2; NW/4; SW/4 NE/4; NW/4 NE/4
Section 29:	All
Section 30:	NE/4; N/2 SE/4; SE/4 SE/4
Section 31:	E/2 NE/4
Section 32:	All
Section 33:	N/2; N/2 SW/4; SW/4 SW/4; SE/4 SE/4
Section 34:	SW/4 NW/4; N/2 SW/4; SW/4 SW/4

Township 14 South, Range 16 East, SLM, Carbon County, Utah

Section 5:	Lot 4; SW/4 NW/4
Section 6:	All
Section 13:	E/2 NW/4; NW/4 SW/4
Section 14:	S/2; SW/4 NW/4
Section 15:	SE/4 NE/4; SE/4
Section 22:	SE/4 NE/4

Township 15 South, Range 15 East, SLM, Carbon County, Utah

Section 1:	S/2
Section 3:	SE/4 SW/4
Section 4:	Lots 2, 3 and 4; S/2 NW/4; N/2 SW/4; SE/4 SW/4
Section 9:	NE/4; NE/4 SE/4; SE/4 SE/4
Section 10:	N/2
Section 11:	S/2
Section 12:	All
Section 13:	W/2
Section 14:	NW/4; NE/4; SE/4; NE/4 SW/4
Section 15:	SE/4 NW/4
Section 29:	SW/4 NE/4
Section 33:	NW/4 NW/4; S/2 NW/4; SW/4 SE/4; E/2 SW/4

Township 15 South, Range 16 East, SLM, Carbon County, Utah

Section 30:	Lot 3

Township 11 South, Range 15 East, SLM, Carbon County, Utah

Section 16:	ALL

Township 11 South, Range 18 East, SLM, Uintah County, Utah

Section 26:	Lots 1, 2 and 3
Section 27:	S/2 NE/4; E/2 SW/4; NW/4 SE/4
Section 33:	S/2 NE/4; N/2 SW/4
Section 34:	Lots 1, 2, 3 and 4; NW/4 SE/4; N/2 NW/4
Section 35:	Lots 1 and 2

C. State Grazing Permits

Township 12 South, Range 17 East, SLM, Carbon County, Utah

• Section 16: All

Township 13 South, Range 16 East, SLM, Carbon County, Utah

• Section 2: All
• Section 36: All

Township 13 South, Range 15 East, SLM, Carbon County, Utah

• Section 32: All
• Section 36: All

Township 14 South, Range 16 East, SLM, Carbon County, Utah

• Section 2: Lots 3 and 4; S/2 NW/4; S/2

Township 12 South, Range 15 East, SLM, Carbon County, Utah

• Section 36: All

Township 12 South, Range 16 East, SLM, Carbon County, Utah

• Section 16: All
• Section 32: All

Township 12 South, Range 17 East, SLM, Carbon County, Utah

Section 2: All

Township 13 South, Range 15 East, SLM, Carbon County, Utah

Section 2: All
Section 16: All

Township 13 South, Range 16 East, SLM, Carbon County, Utah

Section 16: All
Section 32: All

Township 14 South, Range 16 East, SLM, Carbon County, Utah

Section 16: All

Township 11 South, Range 17 East, SLM, Duchesne County, Utah

Section 32: All

Township 11 South, Range 18 East, SLM, Uintah County, Utah

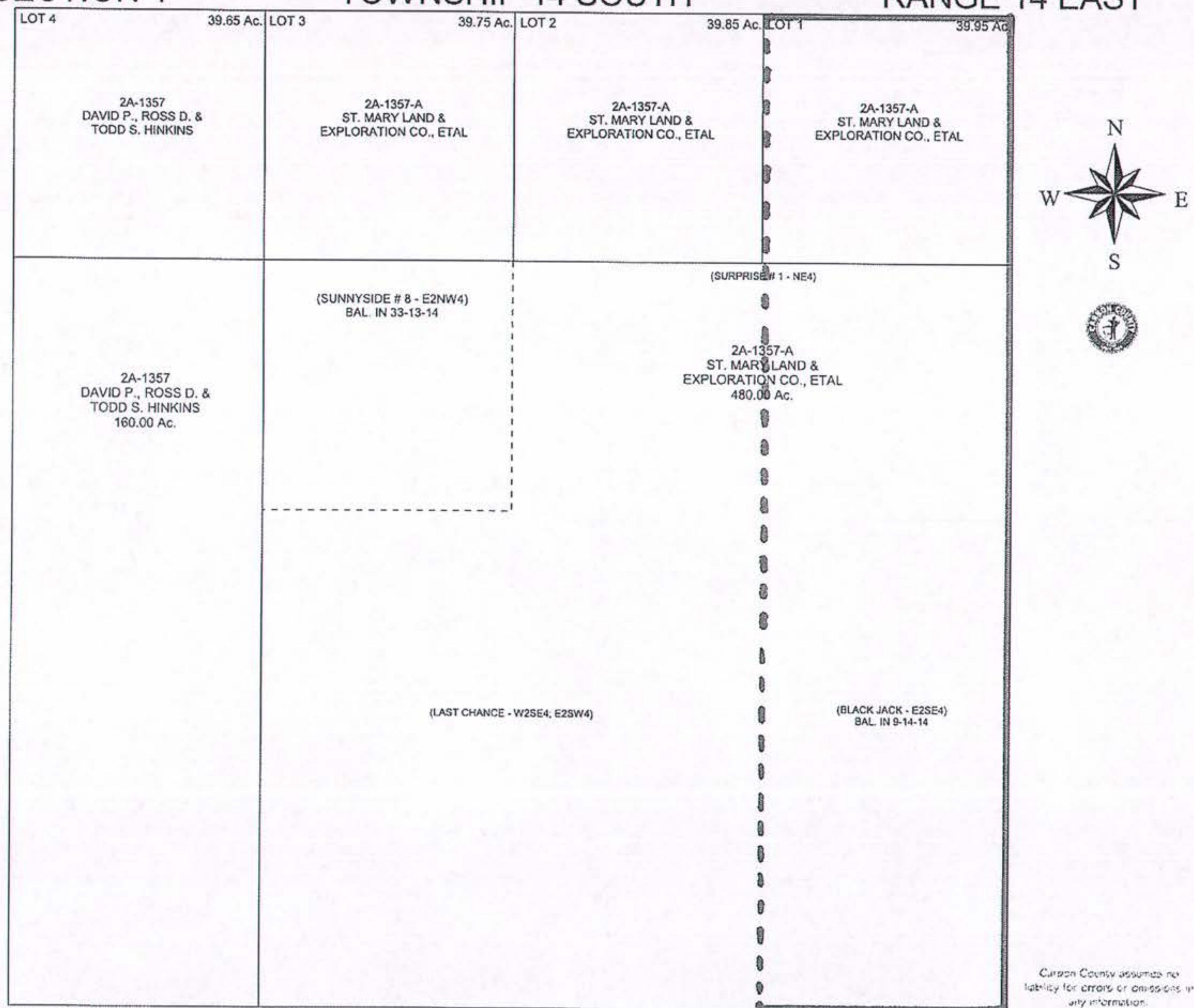
Section 32: All

Township 11 South, Range 17 East, SLM, Uintah County, Utah

Section 36: All

CARBON COUNTY PLATS

SECTION 4 TOWNSHIP 14 SOUTH RANGE 14 EAST



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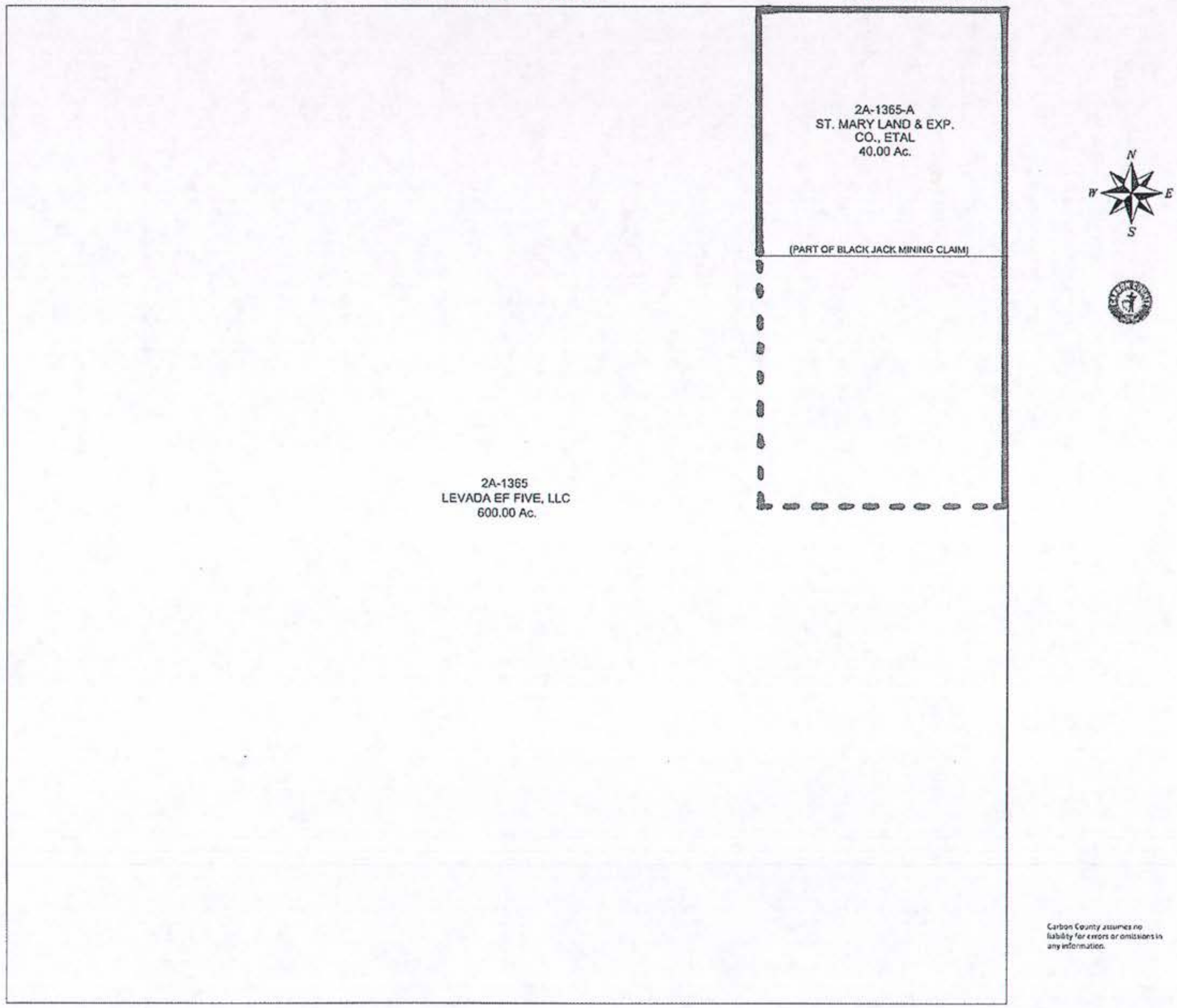
SCALE: 400 FEET = 1 INCH

CARBON COUNTY PLATS

SECTION 9 TOWNSHIP 14 SOUTH RANGE 14 EAST



SCALE: 400 FEET = 1 INCH

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Entry No. 2589 UNITED STATES PATENT

6A-1 4-1083

Salt Lake City 04898.

THE UNITED STATES OF AMERICA,

To all to whom these presents shall come, Greeting :

Nov 9 1918

WHEREAS, In pursuance of the provisions of the Revised Statutes of the United States, Chapter Six, Title Thirty-two, and legislation supplemental thereto, there has been deposited in the General Land Office of the United States the Certificate of the Register of the Land Office at Salt Lake City, Utah, accompanied by other evidence, whereby it appears that the Pittsburg-Salt Lake Oil Company did, on August 15, 1910, duly enter and pay for that certain mining claim or premises, Known as the Black Jack placer mining claim, situate in the Tidwell-Rideout Mining District, Carbon County, Utah, described as the east half of the southeast quarter of Section four and the northeast quarter of the northeast quarter of Section nine in Township fourteen south of Range fourteen east of the Salt Lake Meridian, and containing one hundred twenty acres.

1.

Salt Lake City 04898.

NOW KNOW YE, That there is therefore, pursuant to the laws aforesaid, hereby granted by the United States unto the said Pittsburg-Salt Lake Oil Company, the said placer mining premises hereinbefore described;

TO HAVE AND TO HOLD said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said grantee above named and to its successors and assigns forever; subject nevertheless to the following conditions and stipulations:

FIRST, That the grant hereby made is restricted in its exterior limits to the boundaries of the said mining premises, and to any veins or lodes of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits, which may have been discovered within said limits subsequent to and which were not known to exist on October 18, 1909.

SECOND, That should any vein or lode of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits, be claimed or known to exist within the above described premises at said last-named date, the same is expressly excepted and excluded from these presents.

THIRD, That the premises hereby conveyed shall be held subject to any vested and accrued water right for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of courts. And there is reserved from the lands hereby granted a right of way thereon for ditches or canals constructed by the authority of the United States.

FOURTH, That the absence of necessary legislation by Congress, the Legislature of Utah may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other necessary means to the complete development thereof.

IN TESTIMONY WHEREOF, I, Woodrow Wilson, President of the United States of America, have caused these letters to be made Patent, and the seal of the General

GIVEN under my hand, at the City of Washington, the FIRST day of NOVEMBER in the year of our Lord one thousand nine hundred and EIGHTEEN and of the Independence of the United States the one hundred and FORTY-THIRD.

By the President: Woodrow Wilson

By M. P. LeRoy, Secretary,

(GENERAL LAND OFFICE SEAL)

L. T. C. Lamar,
Recorder of the General Land Office.

RECORDED: Patent Number 652477

Recorded in Carbon County Recorder's Office, February 20th 1922, at 10:00 A. M.

Stan A. Ballinger Deputy
RECORDER.

Entry No. 2590 UNITED STATES PATENT

6A - 3 4-1083

SALT LAKE CITY 018363 Nov 28 1921

THE UNITED STATES OF AMERICA,

To all to whom these presents shall come, Greeting:

WHEREAS, In pursuance of the provisions of the Revised Statutes of the United States, Chapter Six, Title Thirty-two, and legislation supplemental thereto, there has been deposited in the General Land Office of the United States the Certificate of the Register of the Land Office at Salt Lake City, Utah, accompanied by other evidence, whereby it appears that the Utah Asphalt Company did, on January 12, 1917, duly enter and pay for that certain mining claim or premises, known as the Surprise No. 1, Last Chance, and Sunnyside No.8 placer mining claims, situate in the Tidwell-Rideout Mining District, Carbon County, Utah, described as follows: the Surprise No. 1 claim comprising the northeast quarter of Section four in Township fourteen south of Range fourteen east of the Salt Lake Meridian; the Last Chance claim, comprising the west half of the southeast quarter and the east half of the southwest quarter of said Section four; and the Sunnyside No. 8 claim comprising the east half of the northwest quarter of said Section four and the southwest quarter of the southeast quarter and the southeast quarter of the southwest quarter of Section thirty-three in Township thirteen south of Range fourteen east of the Salt Lake Meridian; the premises herein granted, containing four hundred seventy-nine and eight-hundredths acres.

NOW KNOW YE, That there is therefore, pursuant to the laws aforesaid, hereby grant by the United States unto the said Utah Asphalt Company, the said placer mining premises hereinbefore described;

TO HAVE AND TO HOLD said mining premises, together with all the rights, privileges, immunities, and appurtenances of whatsoever nature thereunto belonging, unto the said grantee above named and to its successors and assigns forever; subject nevertheless to the following conditions and stipulations:

FIRST, That the grant hereby made is restricted in its exterior limits to the boundaries of the said mining premises, and to any veins or lodes of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits, which may have been discovered within said limits subsequent to and which were not known to exist on October 19, 1916.

SECOND, That should any vein or lode of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits, be claimed or known to exist within the above-described premises at said last-named date, the same is expressly excepted and excluded from these presents.

THIRD, That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs, and decisions of the courts. And there is reserved from the lands hereby granted a right of way thereon for ditches or canals constructed by the authority of the United States.

FOURTH, That in the absence of necessary legislation by Congress, the Legislature of Utah may provide rules for working the mining claim or premises hereby granted, involving easements, drainage, and other necessary means to the complete development thereof

IN TESTIMONY WHEREOF, I, Warren G. Harding, President of the United States of America, have caused these letters to be made Patent, and the Seal of the General Land Office to be hereunto affixed.

(GENERAL LAND OFFICE SEAL)

GIVEN under my hand, at the City of Washington, the TWENTY-FIRST day of NOVEMBER in the year of our Lord one thousand nine hundred and TWENTY-ONE and of the Independence of the United States the one hundred and FORTY-SIXTH.

By the President: Warren G. Harding,

By Viola B Pugh, Secretary,

M. P. Le Roy
Recorder of the General Land Office.

RECORDED: Patent Number 833452

Recorded in the Office of Carbon County Recorder, February 20th 1922, at 10:00 A.M.

Stan B Dallinger - Deputy
RECORDER.

Entry No. 51921 DEED

12-238

ROCK ASPHALT COMPANY OF UTAH, a corporation of the State of Utah, Grantor, hereby quitclaims to CARBON COUNTY, a political division of the State of Utah, Grantee, for the sum of One ($1.00) Dollar and other consideration, the following described tract of land in Carbon County, Utah, to-wit:

A 60 foot strip ofland being 30 feet on each side of the center line described more particularly as follows -

Beginning at a point from which the East 1/4 Corner Section 4, Township 14 South, Range 14 East, S.L.M. bears N. 51° 15' E., 1495.0 feet; thence S. 82° 40' W., 40.0 feet; thence on a 25° curve to the left 206.7 feet; thence 331° 00' W., 204.6 feet; thence on a 10° curve to the right 271.7 feet; thence S. 58° 10' W., 27.7 feet; thence on a 2° curve to the left 435.8 feet; thence S. 49° 27' W., 91.8 feet; thence on a 20° curve to the right 142.5 feet;thence S. 77° 57' W., 71.2 feet; thence on a 20° curve to the left 250.0 feet; thence S. 27° 57' W., 99.8 feet; thence on a 50° curve to the right 117.0 feet; thence S. 86° 27' W., 70.5 feet; thence on a 40° curve to the left 118.7 feet and thence on a 5° durve to the right 350 feet; thence on a 10° curve to the right 350 feet; thence on a 114° 35' curve to the left, 175.2 feet; thence on a 10° curve to the right, 245 feet; thence on a S. 85° 3' E., 80 feet; thence on an 13° curve to the left, 294.4 feet; thence on a 50° curve to the right, 195 feet; thence on a 25° curve to the left 292 feet; thence on a 14° curve to the right, 260.7 feet; thence on a 30° curve to the left, 224 feet; thence on a 114° 35' curve to the right 182 feet; thence on a 4° curve to the left, 190 feet; thence on a 4° curve to the right 330 feet; thence on a 4° curve from which a S. 1/4 Corner of Section 4, Township 14 S., Range 14 E., Salt Lake Meridian, bears West 170 feet distance out.

Grantee intends to use said property to construct and maintain a road thereon; to the extent it is not so used, or shall be abandoned, title shall revert to Grantor.

And the Grantor hereby reserves all mineral and mining rights beneath the surface of the above described premises, provided that all mining operations beneath said premises shall be so conducted as to leave proper and sufficient support for the surface and so as not to interfere with the safe and convenient use thereof for road purposes.

IN WITNESS WHEREOF, Grantor has caused this deed to be executed by its duly authorized officers, this 19th day of March, 1948.

ROCK ASPHALT COMPANY OF UTAH

Attest:

By Howard C. Means
Its President

Wm. H. Gibson
Secretary

(SEAL)

STATE OF UTAH
COUNTY OF SALT LAKE } ss.

On this 19 day of March, A. D. 1948, personally appeared before me Howard C. Means, who being by me duly sworn did say that he is the President of Rock Asphalt Company of Utah, a corporation, and that the above instrument was signed in behalf of said corporation by authority of a resolution of its Board of Directors, and said Howard C. Means acknowledged to me that said corporation executed the same.

(SEAL)
My Commission Expires: April 27, 1951

Viola De Hon
Notary Public
Salt LakeCity, Utah

Recorded April 1, 1948 at 11:20 A.M. at the request of Carbon Co. Attorney.

Lena F. Siedenburg, County Recorder by Mary Fines Deputy.

Entry No. 113508
Indexed ✓✓
Abstracted ✓
Rec. Fee 2.00

STATE OF UTAH } ss
COUNTY OF CARBON
FILED AND RECORDED FOR
Fabian & Clendenin
APR 6 9 05 AM '67
BOOK 104 OF Records
PAGE 327
ANN O'BRIEN
COUNTY RECORDER

QUIT-CLAIM DEED

DeWITT VAN EVERA, a bachelor, Grantor, of Salt Lake County, State of Utah, hereby QUIT-CLAIMS to CROSBY CORPORATION, a Utah Corporation, Trustee, for the sum of TEN DOLLARS ($10.00) the following described tracts of land in Carbon County, State of Utah:

The Surprise No. 1, comprising the Northeast Quarter of Section 4, in Township 14 South, Range 14 East, Salt Lake Meridian;

The Last Chance comprising the West Half of the Southeast Quarter and the East Half of the Southwest Quarter of Section 4, Township 14 South, Range 14 East, Salt Lake Meridian;

Sunnyside No. 8, comprising the East Half of the Northwest Quarter of Section 4, Township 14 South, Range 14 East, and the Southwest Quarter of the Southeast Quarter and the Southeast Quarter of the Southwest Quarter of Section 33, in Township 13 South, Range 14 East, Salt Lake Meridian;

Black Jack comprising the East Half of the Southeast Quarter of Section 4, Township 14 South, Range 14 East, and the Northeast Quarter of the Northeast Quarter of Section 9, in Township 14 South, Range 14 East, Salt Lake Meridian;

Also all right, title and interest under lease from Utah Fuel Company to Rock Asphalt Company of Utah, a corporation, dated January 3, 1944, to tract of land therein described.

Together with all and singular the tenements, hereditaments and appurtenances thereunto belonging or in any wise appertaining, and easements for construction, maintenance and operation of aerial tramway.

WITNESS the hand of said Grantor this 31st day of March, 1967.

DeWitt Van Evera

STATE OF UTAH)
: ss
COUNTY OF SALT LAKE)

On the 31 day of March, 1967, personally appeared before me DeWITT VAN EVERA, a bachelor, the signer of the within instrument, who duly acknowledged to me that he executed the same.

Karen Rysgaard
Notary Public
Residing in Salt Lake County, Utah

My commission expires:
July 14 1969

LAW OFFICES
FABIAN & CLENDENIN
SUITE 800 CONTINENTAL BANK BUILDING
SALT LAKE CITY 1, UTAH

Entry No. 138844
Indexed ✓ ✓
Abstracted ✓
Rec. Fee 4.60

St.Mary Parish Land Co.
DEC 2 2 52 PM 76
BOOK 164 - Records
PAGE 405-406-407
ANN O'BRIEN
COUNTY RECORDER

TRUSTEE'S DEED

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS, Combined Metals Reduction Company did cause a petition to be filed in the United States District Court for the District of Nevada under the provisions of Chapter X of the Bankruptcy Act, which petition was approved and the undersigned was duly appointed as the qualified and acting trustee of said debtor; and

WHEREAS, said District Court did make and enter its order, dated September 22, 1976, authorizing and confirming the sale of the above-named debtor's undivided one-half interest in certain real property situated in Carbon County, State of Utah, to St. Mary Parish Land Company, said property being more particularly described as follows:

The Surprise No. 1, comprising the Northeast Quarter of Section 4, in Township 14 South, Range 14 East, Salt Lake Meridian;

The Last Chance, comprising the West Half of the Southeast Quarter and the East Half of the Southwest Quarter of Section 4, Township 14 South, Range 14 East, Salt Lake Meridian;

Sunnyside No. 8, comprising the East Half of the Northwest Quarter of Section 4, Township 14 South, Range 14 East, and the Southwest Quarter of the Southeast Quarter and the Southeast Quarter of the Southwest Quarter of Section 33, in Township 13 South, Range 14 East, Salt Lake Meridian;

Black Jack, comprising the East Half of the Southeast Quarter of Section 4, Township 14 South, Range 14 East, and the Northeast Quarter of the Northeast Quarter of Section 9, in Township 14 South, Range 14, East, Salt Lake Meridian.

NOW, THEREFORE, I, the undersigned trustee of the estate of said debtor, by virtue of the title and power vested in me by the provisions of the Bankruptcy Act and by said order, do hereby release, remise and forever quit-claim and convey to St. Mary Parish Land Company all of the debtor's right, title and interest, which I may now own or hereafter acquire in and to the above-described undivided one-half interest in real property situated in Carbon County, State of Utah, free and clear of all liens and encumbrances, for the sum of TEN DOLLARS ($10.00) and other good and valuable consideration, receipt of which is hereby acknowledged, but, reserving in favor of the undersigned trustee those rights of the debtor as set forth in a certain "Participation Agreement" of February 16, 1950, between the debtor and DeWitt Van Evera to the extent that the debtor shall be entitled to obtain payment of the sum of FIFTY THOUSAND FIVE HUNDRED SIXTY-EIGHT AND 28/100 DOLLARS ($50,568.28) from the "first proceeds," under said Participation Agreement as set forth therein, representing 32.5572 percent of said "first proceeds."

TO HAVE AND TO HOLD THE SAME TO St. Mary Parish Land Company as fully and completely as I, the undersigned trustee, by virtue of the power and authority so vested in me, might and should release, remise and forever quit-claim and convey the same.

0.56 12/20/76

IN WITNESS THEREOF, I, as such trustee have hereunder set my hand this 30 day of November, 1976.

W. LaMonte Robison

W. LaMonte Robison, as and only as Trustee of Combined Metals Reduction Company, and not inidividually

STATE OF UTAH)
: ss.
COUNTY OF SALT LAKE)

On this 30 day of November, 1976, personally appeared before me, W. LaMonte Robison, as trustee, the signer of the foregoing instrument, who duly acknowledged to me that he executed the same.

NOTARY PUBLIC residing in
Salt Lake County, Utah

My Commission Expires:
4-25-79

STATE OF UTAH
COUNTY OF CARBON
FILED AND RECORDED FOR
St.Mary Parish Land
Oct 28 10 31 AM '77
BOOK 173 of Records
PAGE 323-325
ANN O'BRIEN
COUNTY RECORDER

Entry No. 143045
Indexed ✓ ✓
Abstracted ✓
Rec. Fee 9.00

Entry No. 142902
Indexed ✓ ✓
Abstracted ✓
Rec. Fee 5.00

STATE OF UTAH
COUNTY OF CARBON } SS
FILED AND RECORDED FOR
St.Mary Parish Land Co
Oct 17 9 44 AM '77
BOOK 173 OF Records
PAGE 53-54
ANN O'BRIEN
COUNTY RECORDER

TRUSTEE'S DEED OF CORRECTION

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS, on the 30th day of November, 1976, W. Lamonte Robison, as and only as trustee of Combined Metals Reduction Company, as debtor, executed a Trustee's Deed conveying said debtors undivided one-half interest in certain real property (Exhibit "A") situated in Carbon County, State of Utah, to St. Mary Parish Land Company, which deed was recorded on the 2nd day of December, 1976, in the office of the County Recorder of Carbon County, Utah, as Entry No. 138844, in Book 164 at Pages 405-407; and

WHEREAS, said Deed, by oversight, omitted the recitations of a portion of the consideration for the making and delivery of said Deed, and this Deed of Correction is intended to correct said omission and error by setting forth the language which should have been and is hereby included in said Deed, which language is as follows:

> There is reserved unto the trustee or his successors a two percent (2%) net smelter return royalty (representing a royalty of two percent upon 50% of the total of the net smelter returns) as said net smelter return is hereinafter defined, payable until the trustee or his successors have received the sum of $500,000.00 therefrom. Net smelter return, as used herein, shall mean the net proceeds received from the sale of ores, minerals, mineral concentrates and/or mill products produced from the property by St. Mary Parish Land Company, its successors and assigns, when sold to a bona fide purchaser, after deducting from said proceeds ordinary smelter charges, penalties, transportation costs and gross production, severence and similar taxes on or measured by production or sales. Said net smelter return royalties shall be payable on a calendar quarter basis, said payment being due and payable on or before the 25th day of the month succeeding each calendar quarter. Each such royalty payment is to be accompanied by a duplicate copy of the mill or smelter return or by copies of the sales documents for other sales.

NOW, THEREFORE, the undersigned trustee of the estate of said debtor does hereby incorporate said Trustee's Deed herein as if set forth fully, to the end that the foregoing language, which was omitted therefrom, shall be included therein.

IN WITNESS WHEREOF, I, as such trustee, have hereunto set my hand this 20 day of September, 1977.

W. LaMonte Robison
W. LAMONTE ROBISON, as and only as Trustee of Combined Metals Reduction Company, and not individually

STATE OF UTAH)
ss.
COUNTY OF SALT LAKE)

On this 20 day of September, 1977, personally appeared before me W. LaMonte Robison, as trustee, the signer of the foregoing instrument, who duly acknowledged to me that he executed the same.

Lonka A. Hausen
NOTARY PUBLIC
Residing at Salt Lake County, Utah

NOTARY PUBLIC STATE OF UTAH

My Commission Expires:
April 11, 1981

St. Mary Parish Land Company, a Delaware corporation, has executed this Deed of Correction for the purpose of acknowledging the foregoing reservation and giving and granting its agreement to be bound by the same.

ST. MARY PARISH LAND COMPANY

By [signature]
Its Vice Pres

EXHIBIT "A"

(Attached to and made a part of that certain Trustee's Deed of Correction dated September 20, 1977)

PATENTED MINING CLAIMS

SURPRISE NO. 1

comprising the NE/4 of Section 4, Township 14 South, Range 14 East, Salt Lake Meridian

LAST CHANCE

comprising the W/2 SE/4 and E/2 SW/4 of Section 4, Township 14 South, Range 14 East, Salt Lake Meridian.

SUNNYSIDE NO. 8

comprising E/2 NW/4 of Section 4, Township 14 South, Range 14 East, and the SW/4 SE/4 and SE/4 SW/4 of Section 33, Township 13 South, Range 14 East, Salt Lake Meridian

BLACK JACK

comprising E/2 SE/4 of Section 4, Township 14 South, Range 14 East, and the NE/4 NE/4 of Section 9, Township 14 South, Range 14 East, Salt Lake Meridian

all of the above claims situated in Carbon County, State of Utah

STATE OF UTAH) SS
COUNTY OF CARBON)
FILED AND RECORDED FOR
Minerals Management, Inc.
JUN 8 9 40 AM '82
BOOK 217 OF Records
PAGE 482-483
ANN O'BRIEN
COUNTY RECORDER

Entry No. 163761
Indexed ✓ ✓
Abstracted ✓
Recdg. Fee 7.00

DEED

Pursuant to that certain Joint Formation Agreement dated January 1, 1981 by and between Dallas Explorations, Ltd., a body corporate under the laws of British Columbia, and Combined Metals Reduction Company, a Utah corporation ("Grantor"), Grantor does hereby grant, bargain and sell to Dallas Mines, Inc., a Delaware corporation, all of its right, title and interest in and to that certain reserved royalty described in Trustee's Deed of Correction, dated September 20, 1977, executed by W. LaMonte Robison, Trustee, in favor of St. Mary Parish Land Company, and relating to real property situated in Carbon County, Utah, as further described on Exhibit A attached hereto.

TO HAVE AND TO HOLD by the said Dallas Mines, Inc. and assigns forever, as fully and complete as Grantor shall have title therein.

IN WITNESS WHEREOF, this DEED is executed this 22nd day of January, 1981.

COMBINED METALS REDUCTION COMPANY

L. T. Atkinson

Lawrence T. Atkinson
President

STATE OF NEW YORK)
) ss;
COUNTY OF NEW YORK)

On this 22nd day of January, 1981, personally appeared before me Lawrence T. Atkinson as President of Combined Metals Reduction Company, who acknowledged that he executed the above instrument.

Lotte S. Shiff

Notary Public

LOTTE S. SHIFF
Notary Public, State of New York
No. 31-4675822
Qualified in New York County
Commission Expires March 30, 1982

EXHIBIT A

to Deed dated January 22, 1981, between Dallas Explorations, Ltd. and Combined Metals Reduction Company, Grantor, and Dallas Mines, Inc., Grantee.

The Surprise No. 1, comprising the Northeast Quarter of Section 4, Township 14 South, Range 14 East, Salt Lake Meridian;

The Last Chance, comprising the West Half of the Southeast Quarter and the East Half of the Southwest Quarter of Section 4, Township 14 South, Range 14 East, Salt Lake Meridian;

Sunnyside No. 8, comprising the East Half of the Northwest Quarter of Section 4, Township 14 South, Range 14 East, and the Southwest Quarter of the Southeast Quarter and the Southeast Quarter of the Southwest Quarter of Section 33, Township 13 South, Range 14 East, Salt Lake Meridian;

Black Jack, comprising the East Half of the Southeast Quarter of Section 4, Township 14 South, Range 14 East, and the Northeast Quarter of the Northeast Quarter of Section 9, Township 14 South, Range 14 East, Salt Lake Meridian.

All in Carbon County, Utah.

Entry No. 39494
Indexed ✓✓
Abstracted ✓
Recdg. Fee 12.00

STATE OF UTAH } SS 818
COUNTY OF CARBON }
FILED AND RECORDED FOR
St. Mary's Land & Exp.
MAY 27 9 39 AM '93
BOOK 328 RECORDS
PAGE 818-819
ANN D. O'BRIEN
COUNTY RECORDER

AFFIDAVIT REGARDING CHANGE OF CORPORATE NAME TO ST. MARY LAND & EXPLORATION COMPANY

I, John P. Congdon, Secretary of St. Mary Land & Exploration Company (formerly "St. Mary Parish Land Company"), hereby certify under oath that the name of this Corporation has been changed from "St. Mary Parish Land Company" to "St. Mary Land & Exploration Company." This change was accomplished by the filing of Certificate of Amendment to the Company's Certificate of Incorporation with the Delaware Secretary of State on October 13, 1992. It has been further formalized in a Restated Certificate of Incorporation filed with the Delaware Secretary of State on November 17, 1992. Notice of this name change has been filed with the Secretary of State in each state in which the Company does business.

Executed this 3rd day of February, 1993 in Denver, Colorado.

John P. Congdon, Secretary
St. Mary Land & Exploration Company

STATE OF COLORADO)
CITY AND) ss.
COUNTY OF DENVER)

Subscribed and sworn to under oath before me by John P. Congdon, known to me to be the Secretary of St. Mary Land & Exploration Company, in the City and County of Denver, State of Colorado, this 3rd day of February, 1993.

My Commission Expires:
February 14, 1993

Notary Public
James C. Robertson
1776 Lincoln Street, Suite 1100
Denver, Colorado 80203

C:\JPC\Aff_NC

RE: Tar Sands
NE/4, SE/4, E/2SW/4, E/2NW/4 of Sec. 4, T14S-R14E; SW/4SE/4, SE/4SW/4 of Sec. 33, T13S-R14E
NE/4NE/4 of Sec. 9, T14S-R14E
Carbon County, Utah

State of Delaware

Office of the Secretary of State

I, DANIEL R. GRIFFITH, ACTING SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THAT THE SAID "ST. MARY PARISH LAND COMPANY", FILED A CERTIFICATE OF AMENDMENT, CHANGING ITS CORPORATE TITLE TO "ST. MARY LAND & EXPLORATION COMPANY", ON THE THIRTEENTH DAY OF OCTOBER, A.D. 1992, AT 10 O'CLOCK A.M.

GREAT SEAL OF THE STATE OF DELAWARE

LIBERTY AND INDEPENDENCE

1793 · 1847 · 1907

Daniel R. Griffith

ACTING SECRETARY OF STATE

AUTHENTICATION: *3733474

733006102

DATE: 01/06/1993

4—1007.

Salt Lake City 047409

NOV 15 1934

The United States of America,

To all to whom these presents shall come, Greeting:

WHEREAS, a Certificate of the Register of the Land Office at Salt Lake City, Utah, has been deposited in the General Land Office, whereby it appears that, pursuant to the Act of Congress of May 20, 1862, "To Secure Homesteads to Actual Settlers on the Public Domain," and the acts supplemental thereto, the claim of Emmanuel Vatsakis has been established and duly consummated, in conformity to law, for the southeast quarter of the southeast quarter of Section eight and the west half, the west half of the east half, the east half of the southeast quarter, and the southeast quarter of the northeast quarter of Section nine in Township fourteen south of Range fourteen east of the Salt Lake Meridian, Utah, containing six hundred forty acres

Entry No. 72463
Indexed ✓
Abstracted ✓
Rec. Fee $1.70

STATE OF UTAH) ss
COUNTY OF CARBON)
FILED AND RECORDED FOR
Title Insurance Agency
FEB 28 3 53 PM '55
IN BOOK 6A OF Records
PAGE 356
Drucilla J. Powell
COUNTY RECORDER

according to the Official Plat of the Survey of the said Land, on file in the GENERAL LAND OFFICE:

NOW KNOW YE, That there is, therefore, granted by the UNITED STATES unto the said claimant the tract of Land above described; TO HAVE AND TO HOLD the said tract of Land, with the appurtenances thereof, unto the said claimant and to the heirs and assigns of the said claimant forever; subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights, as may be recognized and acknowledged by the local customs, laws, and decisions of courts; and there is reserved from the lands hereby granted, a right of way thereon for ditches or canals constructed by the authority of the United States. Excepting and reserving, however, to the United States all the coal and other minerals in the lands so entered and patented, together with the right to prospect for, mine, and remove the same pursuant to the provisions and limitations of the Act of December 29, 1916 (39 Stat., 862).

IN TESTIMONY WHEREOF, I, Franklin D. Roosevelt, President of the United States of America, have caused these letters to be made Patent, and the seal of the General Land Office to be hereunto affixed.

GIVEN under my hand, at the City of Washington, the SEVENTH day of NOVEMBER in the year of our Lord one thousand nine hundred and THIRTY-FOUR and of the Independence of the United States the one hundred and FIFTY-NINTH.

By the President: Franklin D. Roosevelt

By Louise Polk Wilson, Secretary.

Ruth [illegible]
Recorder of the General Land Office.

RECORDED: Patent Number 1073126

249

Jay Lift

Ent 810969 Bk 748 Pg 534
Date: 10-JUN-2011 3:34:47PM
Fee: $249.00 Charge
Filed By: CW
VIKKI BARNETT, Recorder
CARBON COUNTY CORPORATION
For: PROFESSIONAL TITLE SERVICES

WHEN RECORDED, MAIL TO:

____

____

____

GENERAL WARRANTY DEED

UTAH REVERSE EXCHANGE, LLC, WATER CANYON HOLDINGS, LLC, and RANGE CREEK HOLDINGS, LLC, each an Alabama limited liability company, collectively the Grantors, each with an address of 6301 Monroe Street, Daphne, AL 36526, hereby convey and warrant to LEVADA EF FIVE, LLC, a Delaware limited liability company, Grantee, with an address of 712 Fifth Avenue, 45th Floor, New York, New York 10019, the following described real property which is located in Carbon County, Utah, and is more particularly described as follows:

See the attached Exhibit "A," which is incorporated herein.

Together with all of Grantors' interest in and to all appurtenant water rights.

Recorded at the request of PROFESSIONAL TITLE SERVICES

16575

Dated as of the 6th day of May, 2011.

[signature]

State of Alabama)
:ss
County of Baldwin)

The foregoing instrument was acknowledged before me this 6th day of May 2011, by Charles K. Breland the Mgr./Member of each of Utah Reverse Exchange, LLC, Water Canyon Holdings, LLC, and Range Creek Holdings, LLC, each an Alabama limited liability company.

[signature]
Notary Public
Residing at: ______________

My commission expires:

NOTARY PUBLIC STATE OF ALABAMA AT LARGE
MY COMMISSION EXPIRES: May 8, 2011
BONDED THRU NOTARY PUBLIC UNDERWRITERS

LORI K. OLOGETTI NOTARY PUBLIC ALABAMA STATE AT LARGE

{00120221.DOCX / }

EXHIBIT "A"
LEGAL DESCRIPTION

"KAISER LANDS"

Township 14 South, Range 14 East, Salt Lake Base and Meridian

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2A-1364 Section 8: SE1/4 SE1/4, EXCEPTING therefrom all coal and other minerals.

-1365 Section 9: W1/2; W1/2 E1/2; E1/2 SE1/4: SE1/4 NE1/4, EXCEPTING therefrom all coal and other minerals.

-1367-3 Section 17: NE1/4; SE1/4 NW1/4; S1/2 SE1/4; E1/2 SW1/4

1370-1 Section 20: ALL, LESS the following located West of the Whitmore Canyon Road:

DESCRIPTION OF PROPERTY WEST OF ROAD IN SECTION 20

BEGINNING at a point on the North line of the Northwest Quarter of Section 20, Township 14 South, Range 14 East, Salt Lake Base and Meridian, which point is located North 89°35'27" East 1139.63 feet from the Northwest Corner of said Section 20, said point of beginning is the center line of an existing county road, thence along the following courses and distances following the center line of the existing county road; thence South 0°06'25" West 27.92 feet; thence South 8°35'21" West 435.09 feet; thence South 11°47'33" West 339.97 feet; thence South 7°11'17" West 107.76 feet; thence South 14°07'33" East 52.92 feet; thence South 30°40'45" East 51.62 feet; thence South 39°41'04" East 116.94 feet; thence South 42°24'14" East 118.54 feet; thence South 57°09'51" East 73.91 feet; thence South 64°12'04" East 144.94 feet; thence South 57°52'21" East 285.97 feet; thence South 63°59'34" East 314.49 feet; thence South 63°11'37" East 252.20 feet; thence South 58°33'48" East 109.37 feet; thence South 54°24'42" East 285.18 feet; thence South 55°35'18" East 105.21 feet; thence South 44°25'04" East 66.93 feet; thence South 32°01'37" East 56.07 feet; thence South 16°11'20" East 182.96 feet; thence South 14°37'10" East 1444.71 feet; thence South 14°38'13" East 730.51 feet; thence South 2°53'48" East 138.25 feet; thence South 7°06'01" West 101.71 feet; thence South 9°14'35" West 106.36 feet; thence South 11°14'33" West 189.66 feet; thence South 12°49'57" West 149.55 feet; thence South 9°02'55" East 51.27 feet; thence South 18°55'16" East 53.99 feet; thence South 31°22'46" East 117.78 feet; thence South 41°33'26" East 178.99 feet to the South line of said Section 20; thence North 88°14'57" West 623.15 feet to the South Quarter Corner of said Section 20; thence North 89°04'21" West 2645.18 feet to the Southwest Corner of said Section 20; thence North 0°40'17" West 2639.28 feet to the West Quarter Corner of said Section 20; thence North 01°40'16" West 2639.28 feet to the Northwest Corner of said Section 20; thence North 89°35'27" East 1139.63 feet along the Section line to the point of beginning.

2A-1371 Section 21: E1/2, EXCEPTING therefrom all coal.
West 1/2.

{00120221.DOCX / }

257

Ent 810970 Bk 748 Pg 548
Date: 10-JUN-2011 3:37:27PM
Fee: $257.00 Charge
Filed By: CW
VIKKI BARNETT, Recorder
CARBON COUNTY CORPORATION
For: PROFESSIONAL TITLE SERVICES

After recording return to:

____

____

____

16535
Recorded at the request of PROFESSIONAL TITLE SERVICES

SPECIAL WARRANTY DEED

(Minerals)

LEVADA EF FIVE, LLC, a Delaware limited liability company ("**Grantor**"), hereby CONVEYS AND WARRANTS against all claiming by, through, or under Grantor, but not otherwise, to Osprey Utah, LLC, a Utah limited liability company, whose address is 111 E BROADWAY, 11TH FL Salt Lake City UT 84111 ("**Grantee**"), for the sum of TEN DOLLARS ($10.00) and other good and valuable consideration, an undivided one-third (1/3) interest in all oil, gas and other minerals owned by Grantor in or under and that may be produced from the real property described in Exhibit A hereto, excepting Exhibits G-1 and G2 hereto, located in Carbon County, Utah (the "**Property**").

Subject to Grantor's obligation to account to Grantee for Grantee's share of all bonus, rentals, royalties and other net revenues from or attributable to the mineral interest in the Property conveyed to Grantee herein (the "**Grantee's Mineral Interest**"), Grantor hereby **RESERVES AND RETAINS** the exclusive right to develop the Grantee's Mineral Interest without the consent of, and without interference from, Grantee and the right to participate, make and enter into all forms of leases, licenses or other agreements with third parties involving the Grantee's Minerals without the consent of, and without interference from, Grantee. Grantor hereby reserves and retains the right to conduct oil, gas and other mineral exploration and production operations on the Property, and hereby reserves and retains the exclusive right to enter into leases, joint operating agreements, farmin or farmout agreements, or other such agreements with third parties for the purposes of exploring for and producing oil, gas and other minerals from Grantee's Mineral Interest, without the consent of, and without interference from, Grantee.

The respective rights of the Grantor and Grantee in the Property are subject to the terms and conditions of that certain Amended and Restated Agreement between Grantor and Grantee dated __________________, 2011 (the "**Agreement**"), a redacted copy of which may be obtained from Grantor.

This deed and all rights, reservations and covenants in connection herewith shall be considered covenants running with the land and shall inure to and be binding upon the parties hereto, their heirs, personal representatives, successors and assigns.

To have and to hold unto Grantee and Grantee's heirs, successors and assigns forever.

DATED this ___ day of June, 2011

GRANTOR:

LEVADA EF FIVE, LLC, a Delaware limited liability company

By: [signature]
Name: ADRIAN ZAJAC
Title: MANAGING MEMBER of Argo Utah LLC

GRANTEE:

OSPREY UTAH, LLC
a Utah limited liability company

By: ____________________
Name: ____________________
Title: ____________________

STATE OF New York)
: ss.
COUNTY OF New York)

On this 8th day of June, 2011, before me, the undersigned Notary Public in and for said County and State, personally appeared Adrian Zajac Managing Member of LEVADA EF FIVE, LLC, a Delaware limited liability company known to me to be a person or persons whose names are subscribed to the foregoing instrument, acknowledged that the same was executed and delivered as their free and voluntary act for the purposes therein set forth. In witness whereof I hereunto set my hand and official seal as of the date hereinabove stated

My commission Expires

EVAN F. JAFFE
Notary Public, State of New York
No. 01JA6196006
Commission Expires 11/03/2012

NOTARY PUBLIC

STATE OF ____________)
: ss.
COUNTY OF)

On this ______ day of __________________, 2011, before me, the undersigned Notary Public in and for said County and State, personally appeared ___________, ___________ of Osprey Utah, LLC, known to me to be a person or persons whose names are subscribed to the foregoing instrument, acknowledged that the same was executed and delivered as their free and voluntary act for the purposes therein set forth. In witness whereof I hereunto set my hand and official seal as of the date hereinabove stated

My commission Expires

____
NOTARY PUBLIC

DATED this 9th day of June 2011

GRANTOR:

LEVADA EF FIVE, LLC
a Delaware limited liability company

By: ____________________
Name: ____________________
Title: ____________________

GRANTEE:

OSPREY UTAH, LLC
a Utah limited liability company

By: ____________________
Name: ____________________
Title: ____________________

STATE OF ____________)
: ss.
COUNTY OF)

On this ______ day of __________________, 2011, before me, the undersigned Notary Public in and for said County and State, personally appeared ____________, ____________ of LEVADA EF FIVE, LLC, a Delaware limited liability company known to me to be a person or persons whose names are subscribed to the foregoing instrument, acknowledged that the same was executed and delivered as their free and voluntary act for the purposes therein set forth. In witness whereof I hereunto set my hand and official seal as of the date hereinabove stated

My commission Expires

NOTARY PUBLIC

STATE OF ALABAMA)
: ss.
COUNTY OF BALDWIN)

On this 9th day of JUNE, 2011, before me, the undersigned Notary Public in and for said County and State, personally appeared CHARLES Kenneth Breland JR of Osprey Utah, LLC, known to me to be a person or persons whose names are subscribed to the foregoing instrument, acknowledged that the same was executed and delivered as their free and voluntary act for the purposes therein set forth. In witness whereof I hereunto set my hand and official seal as of the date hereinabove stated

My commission Expires

NOTARY PUBLIC STATE OF ALABAMA AT LARGE
MY COMMISSION EXPIRES: AUGUST 26, 2011
BONDED THRU WESTERN SURETY COMPANY

NOTARY PUBLIC

MATTHEW WARGO NOTARY PUBLIC ALABAMA STATE AT LARGE

Exhibit A
(Legal Description of Property)

Township 14 South, Range 14 East, Salt Lake Base and Meridian

----

Section 8: SE1/4 SE1/4, EXCEPTING therefrom all coal and other minerals.

Section 9: W1/2; W1/2 E1/2; E1/2 SE1/4: SE1/4 NE1/4, EXCEPTING therefrom all coal and other minerals.

Section 17: NE1/4; SE1/4 NW1/4; S1/2 SE1/4; E1/2 SW1/4

Section 20: ALL, LESS the following located West of the Whitmore Canyon Road:

DESCRIPTION OF PROPERTY WEST OF ROAD IN SECTION 20

BEGINNING at a point on the North line of the Northwest Quarter of Section 20, Township 14 South, Range 14 East, Salt Lake Base and Meridian, which point is located North 89°35'27" East 1139.63 feet from the Northwest Corner of said Section 20, said point of beginning is the center line of an existing county road, thence along the following courses and distances following the center line of the existing county road; thence South 0°06'25" West 27.92 feet; thence South 8°35'21" West 435.09 feet; thence South 11°47'33" West 339.97 feet; thence South 7°11'17" West 107.76 feet; thence South 14°07'33" East 52.92 feet; thence South 30°40'45" East 51.62 feet; thence South 39°41'04" East 116.94 feet; thence South 42°24'14" East 118.54 feet; thence South 57°09'51" East 73.91 feet; thence South 64°12'04" East 144.94 feet; thence South 57°52'21" East 285.97 feet; thence South 63°59'34" East 314.49 feet; thence South 63°11'37" East 252.20 feet; thence South 58°33'48" East 109.37 feet; thence South 54°24'42" East 285.18 feet; thence South 55°35'18" East 105.21 feet; thence South 44°25'04" East 66.93 feet; thence South 32°01'37" East 56.07 feet; thence South 16°11'20" East 182.96 feet; thence South 14°37'10" East 1444.71 feet; thence South 14°38'13" East 730.51 feet; thence South 2°53'48" East 138.25 feet; thence South 7°06'01" West 101.71 feet; thence South 9°14'35" West 106.36 feet; thence South 11°14'33" West 189.66 feet; thence South 12°49'57" West 149.55 feet; thence South 9°02'55" East 51.27 feet; thence South 18°55'16" East 53.99 feet; thence South 31°22'46" East 117.78 feet; thence South 41°33'26" East 178.99 feet to the South line of said Section 20; thence North 88°14'57" West 623.15 feet to the South Quarter Corner of said Section 20; thence North 89°04'21" West 2645.18 feet to the Southwest Corner of said Section 20; thence North 0°40'17" West 2639.28 feet to the West Quarter Corner of said Section 20; thence North 01°40'16" West 2639.28 feet to the Northwest Corner of said Section 20; thence North 89°35'27" East 1139.63 feet along the Section line to the point of beginning.

Section 21: El/2, EXCEPTING therefrom all coal.
West 1/2.

Section 22: ALL, EXCEPTING therefrom all coal.

Section 23: W1/2; SE1/4; SW1/4 NE1/4, EXCEPTING therefrom all Coal.

?

259

TAX List

After recording return to:

____

____

____

Ent 810971 Bk 748 Pg 566
Date: 10-JUN-2011 3:40:21PM
Fee: $259.00 Charge
Filed By: CW
VIKKI BARNETT, Recorder
CARBON COUNTY CORPORATION
For: PROFESSIONAL TITLE SERVICES

SPECIAL WARRANTY DEED

(Rents, Royalties and Profits)

LEVADA EF FIVE, LLC, a Delaware limited liability company, Grantee, with an address of 712 Fifth Avenue, 45th Floor, New York, New York 10019 ("**Grantor**"), hereby CONVEYS AND WARRANTS against all claiming by, through, or under Grantor, but not otherwise, to Osprey Utah, LLC, a Utah limited liability company, whose address is 111 E BROADWAY, 11TH FL Salt Lake City UT 84111 ("**Grantee**"), for the sum of TEN DOLLARS ($10.00) and other good and valuable consideration, a one-third (1/3) interest in Grantor's rents, royalties, profits and revenue, as more particularly described and defined below (the "**Revenue Interest**"), from the real property described in Exhibit A hereto, excepting Exhibits G-1 and G2 hereto, located in Carbon County, Utah (the "**Property**"). Income from the Property, to which the Revenue Interest shall apply, may be generated from the following interests in the Property: (a) surface rights or interests incident to the enjoyment of the surface estate, including but not limited to grazing and agricultural rights, timber rights, surface leases, rights-of-way, and hunting rights (the "**Surface Rights**");.

> The Revenue Interest is hereby defined as a one-third (1/3) interest in all of Grantor's interest in rents, profits or other revenue generated from the Property by Grantor, including revenue generated from Surface Rights, whether such rents, profits or revenue are generated from Grantor's development of the property (whether singly or jointly with third parties), and including any revenue generated from leases, licenses or other agreements between the Grantor and third parties involving the use or development of the Property, and including any bonus, rental or royalty payments received by Grantor as consideration for such leases, licenses or other agreements, and one third (1/3) of all such revenues generated by Grantor will be paid by and through Grantor to Grantee, with the exceptions noted below. The Grantor hereby **RESERVES AND RETAINS** all other rights in and to the Property, including the rights of possession, occupancy, development, use and control of the Property, which rights include the exclusive right to develop and use the Property without the consent of, and without interference from, Grantee and the right to participate, make and enter into all forms of deeds, leases, licenses or other agreements with third parties involving the Property without the consent of, and without interference from, Grantee. Grantor hereby reserves and retains the right to conduct oil, gas and other mineral exploration and production operations on the Property, and hereby reserves and retains the exclusive right to enter into leases, joint operating agreements, farmin or farmout agreements, or

12575
Recorded at the request of PROFESSIONAL TITLE SERVICES

other such agreements with third parties for the purposes of exploring for and producing oil, gas and other minerals, without the consent of, and without interference from, Grantee.

Upon any sale of the Property, the Revenue Interest with respect to the Surface Rights herein conveyed by Grantor to Grantee shall be extinguished and revert to the Grantor. All of Grantee's right, title and interest in and to any income or revenue from the exercise of Surface Rights shall be immediately extinguished upon execution and recording of a deed from Grantor, conveying all or any portion of the Property to a purchaser. Upon executing and recording any deed conveying all or any portion of the Property, the Grantee's rights in any income from Surface Rights shall terminate and revert to Grantor (and shall pass with the deed to such purchaser) with respect to that portion of the Property conveyed. Thereafter, such purchaser of Grantor, and the purchaser's successors and assigns, shall have full rights to use and enjoyment of any Surface Rights, free of any claim of Grantee to any Revenue Interest. Grantee, upon Grantor's request, agrees to cooperate in executing and delivering to the Grantor a release and quit-claim of Grantee's rights in the Revenue Interest in the Surface Rights.

The respective rights of the Grantor and Grantee in the Property are subject to the terms and conditions of that certain Amended and Restated Agreement between Grantor and Grantee dated April ___, 2011 (the "**Agreement**"), a redacted copy of which may be obtained from Grantor.

This deed and all rights, reservations and covenants in connection herewith shall be considered covenants running with the land and shall inure to and be binding upon the parties hereto, their heirs, personal representatives, successors and assigns.

DATED this ___ day of June 2011

GRANTOR:

LEVADA EF FIVE, LLC
a Delaware limited liability company

By: ______________________
Name: ADRIAN ZAJAC
Title: MANAGING MEMBER of Argo Utah LLC

GRANTEE:

OSPREY UTAH, LLC
a Utah limited liability company

By: ______________________
Name: ______________________
Title: ______________________

STATE OF New York)
: ss.
COUNTY OF New York

On this 8 th day of June, 2011, before me, the undersigned Notary Public in and for said County and State, personally appeared Adrian Zajac Managing Member of LEVADA EF FIVE, LLC, a Delaware limited liability company known to me to be a person or persons whose names are subscribed to the foregoing instrument, acknowledged that the same was executed and delivered as their free and voluntary act for the purposes therein set forth. In witness whereof I hereunto set my hand and official seal as of the date hereinabove stated

My commission Expires

EVAN F. JAFFE
Notary Public, State of New York
No. 01JA6196006
Commission Expires 11/03/2012

NOTARY PUBLIC

STATE OF ____________)
: ss.
COUNTY OF)

On this ______ day of __________________, 2011, before me, the undersigned Notary Public in and for said County and State, personally appeared ___________, ____________ of Osprey Utah, LLC, known to me to be a person or persons whose names are subscribed to the foregoing instrument, acknowledged that the same was executed and delivered as their free and voluntary act for the purposes therein set forth. In witness whereof I hereunto set my hand and official seal as of the date hereinabove stated

My commission Expires

NOTARY PUBLIC

DATED this 9th day of June, 2011

GRANTOR:

LEVADA EF FIVE, LLC, a Delaware limited liability company

By: ________________
Name: ________________
Title: ________________

GRANTEE:

OSPREY UTAH, LLC
a Utah limited liability company

By: [signature]
Name: Charles K. Dinkelacker
Title: President

CKD

STATE OF ____________)
: ss.
COUNTY OF)

On this ______ day of __________________, 2011, before me, the undersigned Notary Public in and for said County and State, personally appeared __________, __________ of LEVADA EF FIVE, LLC, a Delaware limited liability company known to me to be a person or persons whose names are subscribed to the foregoing instrument, acknowledged that the same was executed and delivered as their free and voluntary act for the purposes therein set forth. In witness whereof I hereunto set my hand and official seal as of the date hereinabove stated

My commission Expires

____
NOTARY PUBLIC

STATE OF ALABAMA)
: ss.
COUNTY OF BALDWIN)

On this 9th day of June, 2011, before me, the undersigned Notary Public in and for said County and State, personally appeared CHARLES Kenneth Breland JR of Osprey Utah, LLC, known to me to be a person or persons whose names are subscribed to the foregoing instrument, acknowledged that the same was executed and delivered as their free and voluntary act for the purposes therein set forth. In witness whereof I hereunto set my hand and official seal as of the date hereinabove stated

My commission Expires

NOTARY PUBLIC STATE OF ALABAMA AT LARGE
MY COMMISSION EXPIRES: AUGUST 26, 2011
BONDED THRU WESTERN SURETY COMPANY

MATTHEW WARGO NOTARY PUBLIC ALABAMA STATE AT LARGE

Mark Wargo
NOTARY PUBLIC

Exhibit A
(legal description of property)

"KAISER LANDS"

Township 14 South, Range 14 East, Salt Lake Base and Meridian

---

Section 8: SE1/4 SE1/4, EXCEPTING therefrom all coal and other minerals.

Section 9: W1/2; W1/2 E1/2; E1/2 SE1/4: SE1/4 NE1/4, EXCEPTING therefrom all coal and other minerals.

Section 17: NE1/4; SE1/4 NW1/4; S1/2 SE1/4; E1/2 SW1/4

Section 20: ALL, LESS the following located West of the Whitmore Canyon Road:

DESCRIPTION OF PROPERTY WEST OF ROAD IN SECTION 20
BEGINNING at a point on the North line of the Northwest Quarter of Section 20, Township 14 South, Range 14 East, Salt Lake Base and Meridian, which point is located North 89°35'27" East 1139.63 feet from the Northwest Corner of said Section 20, said point of beginning is the center line of an existing county road, thence along the following courses and distances following the center line of the existing county road; thence South 0°06'25" West 27.92 feet; thence South 8°35'21" West 435.09 feet; thence South 11°47'33" West 339.97 feet; thence South 7°11'17" West 107.76 feet; thence South 14°07'33" East 52.92 feet; thence South 30°40'45" East 51.62 feet; thence South 39°41'04" East 116.94 feet; thence South 42°24'14" East 118.54 feet; thence South 57°09'51" East 73.91 feet; thence South 64°12'04" East 144.94 feet; thence South 57°52'21" East 285.97 feet; thence South 63°59'34" East 314.49 feet; thence South 63°11'37" East 252.20 feet; thence South 58°33'48" East 109.37 feet; thence South 54°24'42" East 285.18 feet; thence South 55°35'18" East 105.21 feet; thence South 44°25'04" East 66.93 feet; thence South 32°01'37" East 56.07 feet; thence South 16°11'20" East 182.96 feet; thence South 14°37'10" East 1444.71 feet; thence South 14°38'13" East 730.51 feet; thence South 2°53'48" East 138.25 feet; thence South 7°06'01" West 101.71 feet; thence South 9°14'35" West 106.36 feet; thence South 11°14'33" West 189.66 feet; thence South 12°49'57" West 149.55 feet; thence South 9°02'55" East 51.27 feet; thence South 18°55'16" East 53.99 feet; thence South 31°22'46" East 117.78 feet; thence South 41°33'26" East 178.99 feet to the South line of said Section 20; thence North 88°14'57" West 623.15 feet to the South Quarter Corner of said Section 20; thence North 89°04'21" West 2645.18 feet to the Southwest Corner of said Section 20; thence North 0°40'17" West 2639.28 feet to the West Quarter Corner of said Section 20; thence North 01°40'16" West 2639.28 feet to the Northwest Corner of said Section 20; thence North 89°35'27" East 1139.63 feet along the Section line to the point of beginning.

Section 21: El/2, EXCEPTING therefrom all coal.
West 1/2.

URS

March 3, 2014

Sarah Lindsey
Utah Division of Wildlife Resources
1594 W. North Temple, Suite 2110
Salt Lake City, UT 84116

Re: Request for Information
Green River Resources Corp. Notice of Intention to Commence Large Mining Operations

Dear Ms. Lindsey:

URS Corporation, on behalf of Green River Resources Corp., is following up on baseline surveys that were previously performed as part of the permit application for mining activity in the Bruin Point area located in Township 14 South, Range 14 East, Sections 2, 3, and 10, Salt Lake Base and Meridian. The proposed site is approximately 1,800 acres in Carbon County, Utah at the boundary between the Wasatch and Uinta Mountains and the Colorado Plateau Ecoregions. Vegetation on the site consists of mixed conifer forests (mostly Engelmann spruce and sub alpine fir), open grass and shrub lands and occasional aspen stands. A location map and a site map with property boundaries are enclosed for your review.

In order to assist with our review of the site, URS Corporation is requesting additional information regarding rare animal and plant species located within the project site.

I look forward to your response so that we may continue to move forward with this project. If you have any questions, please do not hesitate to contact me at (801) 904-4110.

Thank you,

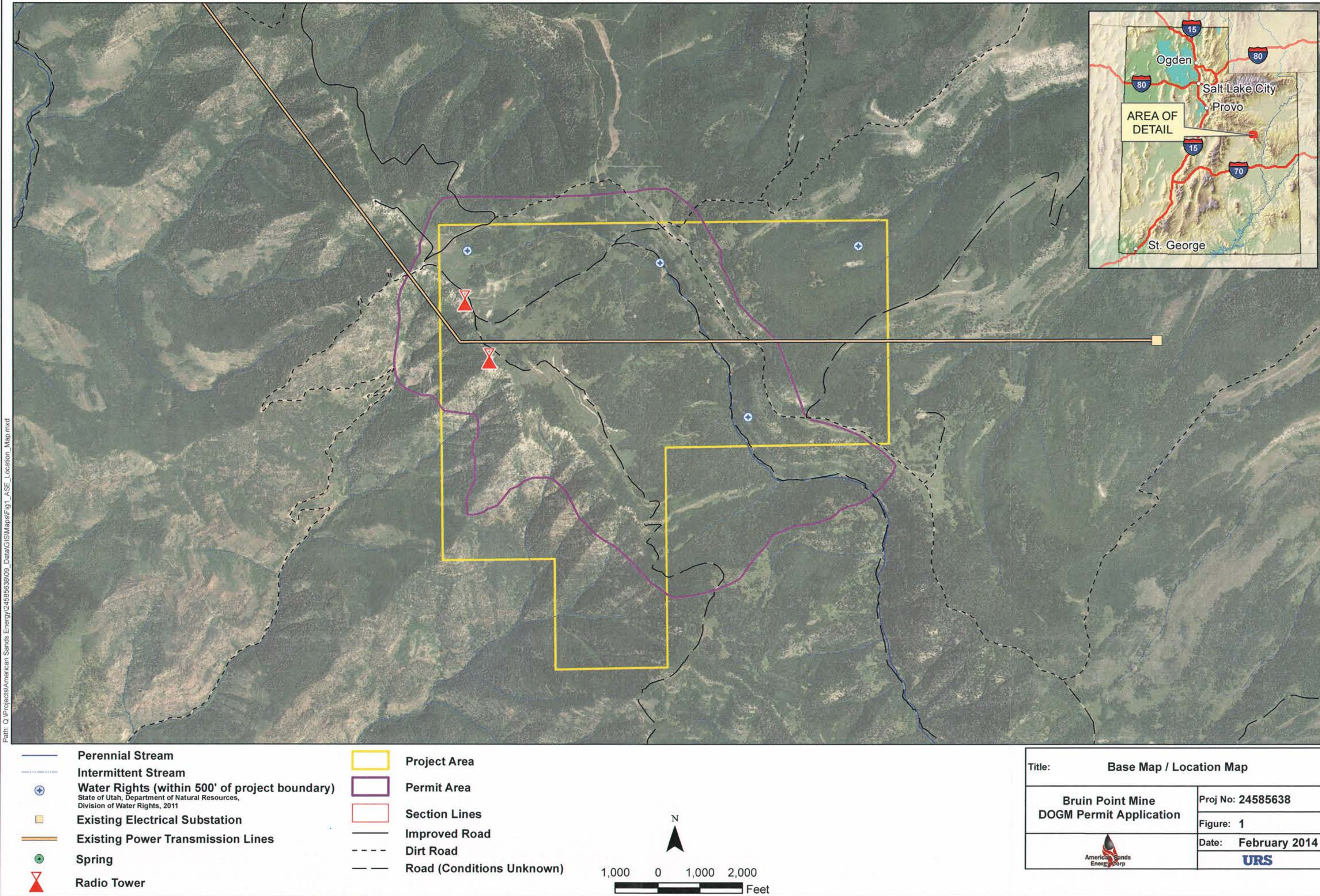
URS Corporation

Amber Fortner

Amber Fortner
Project Manager

Enclosure

URS Corporation
756 East Winchester Street
Suite 400
Salt Lake City, Utah 84107
Tel: 801.904.4000
Fax: 801.904.4100
www.urscorp.com



Title:	Base Map / Location Map
Bruin Point Mine DOGM Permit Application	Proj No: 24585638
	Figure: 1
American Sands Energy Corp	Date: February 2014
	URS

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

March 11, 2014

Amber Fortner
URS Corportation
756 E. Winchester Street, Suite 400
Salt Lake City, Utah 84107

Subject: Species of Concern Near Sections 2, 3 and 10 of Township 14 South, Range 14 East, SLB&M

Dear Amber Fortner:

I am writing in response to your letter dated March 3, 2014 regarding information on species of special concern proximal to the proposed Green River Resources Corporation's mining operations located in Sections 2, 3 and 10 of Township 14 South, Range 14 East, SLB&M in Carbon County, Utah.

The Utah Division of Wildlife Resources (UDWR) does not have records of occurrence for any threatened, endangered, or sensitive species within the project area noted above. However, within a two-mile radius there are recent records of occurrence for northern goshawk, a species 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 habitat manager for the southeastern region, Daniel Eddington, at (435) 613-3709 if you have any questions.

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

Sincerely,

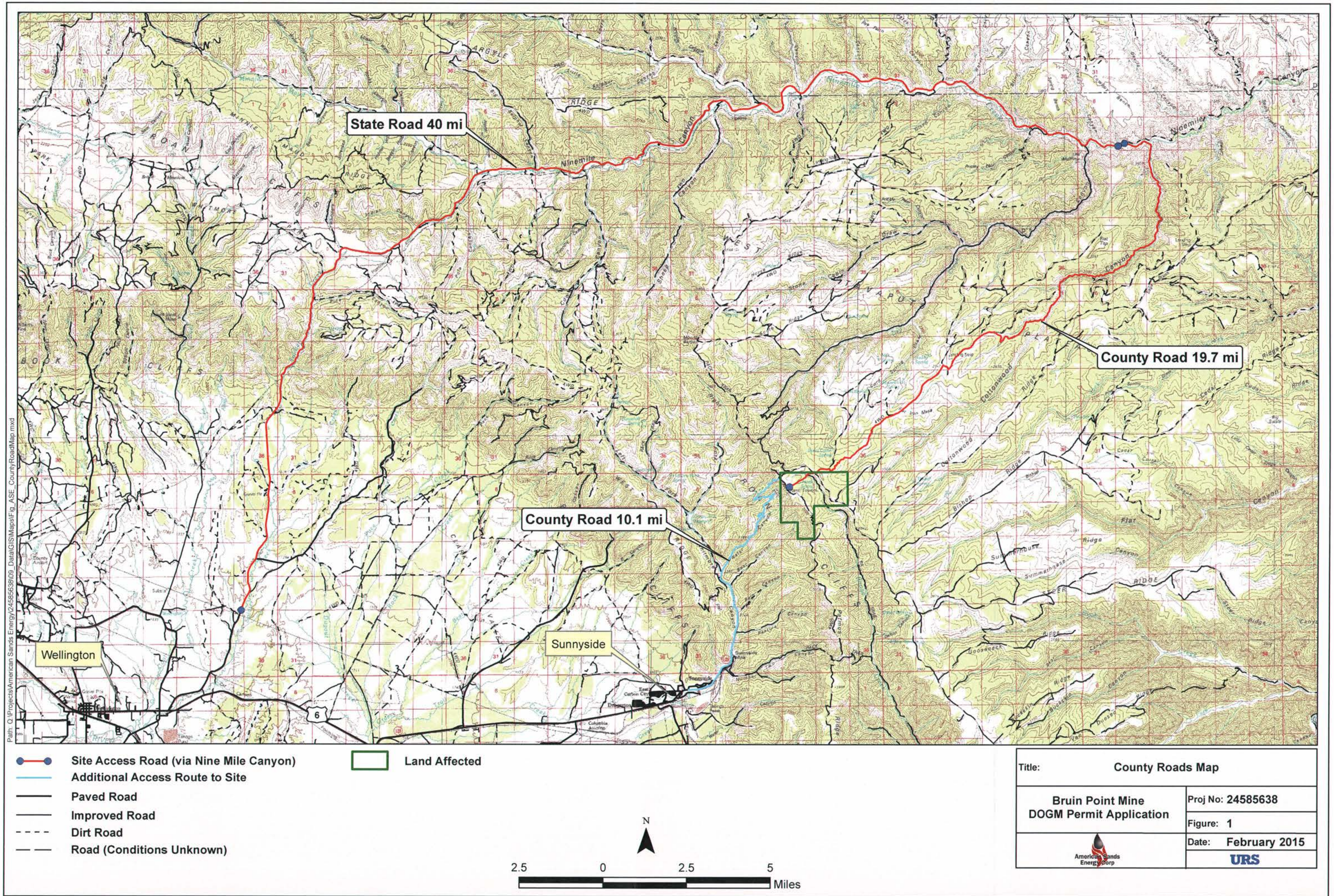
Sarah Lindsey

Sarah Lindsey
Information Manager
Utah Natural Heritage Program

cc: Daniel Eddington

Carbon County Conditional Use permit and road maintenance agreement

(will be filed prior to commencement of project.)



Title:	County Roads Map
Bruin Point Mine DOGM Permit Application	Proj No: 24585638
	Figure: 1
American Sands Energy Corp	Date: February 2015
	URS

APPENDIX E

Groundwater Discharge Permit
Air Approval
SWPPP
SPCC Plan
General Construction Permit
Wetlands Inventory Approved JD Letter

(All permits will be filed prior to construction of the mine site.)

STORMWATER POLLUTION AND PREVENTION PLAN (SWPPP)

American Sands Energy Corp

BRUIN POINT MINE
CARBON COUNTY, UTAH

August, 2014

PREPARED FOR:
Green River Resources, Inc.
201 South Main Street, Suite 1800
Salt Lake City, Utah 84111

PREPARED BY:
URS
756 East Winchester Street, Suite 400
Salt Lake City, UT 84107
URS Job No. 24585638

TABLE OF CONTENTS

List of Tables

List of Figures

List of Drawings

List of Appendices

1.0 OVERVIEW

1.1 PURPOSE

This Stormwater Pollution and Prevention Plan (SWPPP) details stormwater pollution prevention practices associated with the proposed Bruin Point Mine to be located approximately six miles northeast of Sunnyside, Carbon County, Utah (Figure 1). The stormwater controls outlined in this plan will be implemented during construction, operation, and reclamation of the proposed facility, approximately 15 years. Note that since this project is currently in its conceptual design and permitting phases, the stormwater controls presented herein will be modified and expanded accordingly as the project design is finalized.

1.2 SWPPP ORGANIZATION

This SWPPP has been developed to meet the requirements of the Utah Pollutant Discharge Elimination System (UPDES) Storm Water General Permit for Construction Activities (Permit No. UTR30000). A copy of this permit is found in Appendix A.

Table 1: SWPPP Requirements According to UPDES Storm Water General Permit for Construction Activities (Permit No. UTR30000)

Permit Part	Description	Section in SWPPP
3.5.1	**Site Description**	
3.5.1.a	Describe the nature of the construction activity.	2.2
3.5.1.b	Describe the proposed sequence of major activities.	2.3
3.5.1.c	Estimates of the total area of the site and the total area of the site that is expected to be disturbed by excavation, grading, or other activities, including areas for construction support.	2.5
3.5.1.d	An estimate of the runoff coefficient of the site after construction activities are completed and existing data describing the soil	2.4
3.5.1.e	Site Map	Figure 2
3.5.1.e.1	Drainage patterns and approximate slopes anticipated after major grading activities.	Figure 3
3.5.1.e.2	Construction boundaries and a description of existing vegetation prior to grading activities,	2.4 Figure 2
3.5.1.e.3	Areas of soil disturbance, and areas of no disturbance.	Figure 2, and Sec 2.5
3.5.1.e.4	The location of major structures and nonstructural controls identified in the SWPPP.	Figure 3
3.5.1.e.5	Locations of areas used for construction support.	Figure 2
3.5.1.e.6	The location of areas where stabilization practices are expected to occur.	Figure 3
3.5.1.e.7	The location of surface waters (including wetlands).	Figure 1 and Sec 2.4.3
3.5.1.e.8	Conceptual Surface Water Control Plan	Figure 3
3.5.1.f	A description of any discharge associated with industrial activity other than construction at the site (including storm water discharges from dedicated portable asphalt plants and dedicated portable concrete plants), whether or not those discharges are covered by the Permit; and the location of that activity.	Not applicable
3.5.1.g	The name of the receiving water(s), and aerial extent of wetland acreage at the site.	Figure 1 and Sec 2.4.3
3.5.1.g	A copy of the UPDES Storm Water General Permit for Construction Activities.	Appendix A

Table 1. SWPPP Requirements According to UPDES Storm Water General Permit for Construction Activities (Permit No. UTR30000) (cont'd)

Permit Part	Description	Section in SWPPP
3.5.2	**Controls**	
3.5.2.a	Erosion and Sediment Controls	3.0
3.5.2.a.1	A description of installation, maintenance, and design of controls, and management of storage areas and litter, debris, and construction chemicals.	Sections 3.0 and 4.0
3.5.2.a.2	A description of existing interim and permanent stabilization practices, including site-specific scheduling of the implementation of the practices.	Sections 2.3 and 3.0
3.5.2.a.3	A description of structural practices that divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable.	3.1
3.5.2.b	A description of measures that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed.	Not applicable
3.5.2.c	A description of other controls such as waste disposal, off-site tracking, septic, waste, and sanitary sewer disposal, exposure to construction materials, and support areas.	4.0
3.5.2.d	A description of any other laws and requirements, such as local storm water control requirements, threatened or endangered species and historic properties, and variance of permit requirements.	Not applicable
3.5.3	**Maintenance**	
3.5.3	A description of procedures to ensure the timely maintenance of the erosion and sediment control measures shall be identified in the SWPPP.	3.2
3.5.4	**Inspections**	
3.5.4.a, b, c	A description of inspection frequency requirements.	3.2.1
3.5.4.d	A description of qualified personnel requirements.	3.2.2
3.5.4.e	A description of inspection areas.	3.2.3
3.5.4.f	A description of inspection requirements at construction sites involving utility line installation, pipeline construction, and other long, narrow, linear construction.	Not applicable
3.5.4.g	A description of inspection reporting requirements.	Appendix D
3.5.4.h	A description of inspection record keeping requirements.	3.2.1
3.5.5	**Non-Storm water discharges**	
3.5.5	A description of sources of sources non-storm water listed in Part 1.5 that are combined with storm water discharges associated with industrial activity.	Not Applicable

1.3 PLAN LOCATION

During construction, a copy of the SWPPP will be kept on site for the duration of this project. A record copy will also be kept with the responsible individual identified below. The SWPPP shall include a copy of the Permit, the Notice of Intent (NOI) (Appendix A), and any amendments to this Plan (Appendix B).

1.4 CONTACT INFORMATION

The individual responsible for implementing, maintaining, and revising the SWPPP is identified below.

William C. Gibbs
Green River Resources, Inc.
201 South Main Street, Suite 1800
Salt Lake City, Utah 84111

1.5 SWPPP REVISIONS

Any modifications to the design, construction, operation, or maintenance described in this SWPPP shall be recorded in an amendment to this SWPPP. Amendments shall be documented in Appendix B of this Plan.

2.0 SITE BACKGROUND AND DESCRIPTION OF CONSTRUCTION ACTIVITIES

2.1 SITE DESCRIPTION

The Bruin Point Mine site is located approximately six miles northeast of Sunnyside, Utah. Refer to Figure 1 for a location map and Figure 2 for a site map. Proposed surface facilities at the site will cover 160 acres in area. Currently, the project area is largely undeveloped, and is primarily used for wildlife habitat and open space. Existing structures include two radio towers and a power transmission line.

2.2 NATURE OF CONSTRUCTION ACTIVITY

A Notice of Intention to Commence Large Mining Operations (NOI) has been submitted to the Utah Division of Oil, Gas and Mining to mine oil sands at the project site. The on-site surface facilities will consist of a mine portal and pad to provide underground access, as well as a plant site with maintenance and processing facilities, offices, and a tank farm.

2.3 PROPOSED SEQUENCE OF MAJOR ACTIVITIES

The major activities of the Bruin Point Mine construction and ongoing operations are shown in Table 2 below. The schedule of the construction activities has not been determined. Construction is expected to occur upon approval of the NOI. This SWPPP will be updated when the construction schedule is determined.

Table 2: Proposed Construction Schedule

Task	Expected Date
Implementing SWPPP BMPs	TBD
Clearing vegetation and removal/stockpiling of growth media	TBD
Leveling of plant site construction of facilities	TBD
Grading and surfacing of access roads	TBD
Constructing roadway from portal to processing plant	TBD
Developing portal to underground workings	TBD
Commencing underground mining operations	TBD
Processing ore	TBD
Site reclamation (post-mining)	TBD

This SWPPP will be implemented for the life of the proposed mine, including the following major phases of its life cycle:

- Site preparation and construction
- Mine operation
- Site Reclamation

Adverse stormwater impacts will be controlled through the incorporation of Best Management Practices (BMP's) to contain site runoff. All BMP erosion controls will be inspected regularly and maintained in operable condition for the life of the mine. The sequence of BMP installation and development is described below. A description of each BMP is provided in Sections 3 and 4, construction details are provided in Drawings 1 and 2.

Site Preparation and Construction

1. Construct haul road drainage controls such as ditches, berms, culverts, slope drains, water bars, check dams, and sediments traps/retention basins.
2. Install silt fencing, wattles, or earthen berms along the downslope perimeter of temporary disturbance areas.
3. Construct berms around topsoil storage pile areas and other site regions.
4. Install silt fence at the toe of the tailings storage area.
5. Install other erosion control features as needed to control stormwater drainage across the site.

Mine Operation

1. Maintain BMP's described above.
2. Modify BMP's appropriately to account for changes in mine operations.

Site Reclamation

1. Demolition of on-site facilities.
2. Regrade disturbed areas to a maximum two horizontal to one vertical (2H:1V) slope, blend them with surrounding topography, surface roughen to encourage vegetative growth and minimize runoff.
3. Deep-rip and regrade on-site roads to relieve compaction and to match site topography.
4. Place growth media on regraded disturbed areas.
5. Perform site revegetation.
6. Monitor stabilized areas and perform additional revegetation as needed until final stabilization is reached.
7. Remove erosion control features.

2.4 SITE FEATURES

The site features relevant for this SWPPP are described below. There are no known wetland areas within the area of the site.

2.4.1 Site Topography or Storm Water Drainage Patterns

The site is located near Bruin Point, within the Book Cliffs and Roan Cliffs in the Colorado Plateau Physiographic Province. The topography of the project area is mountainous, with the project area falling between the elevations of 8,200 feet above mean sea level (amsl) and 10,150 ft amsl. The site spans the headwaters of four hydrologic units (Dry Creek, Cottonwood Canyon, Grassy Trail Creek and Range Creek Canyon), but the majority of the proposed disturbance will occur within the headwaters of the Grassy Trail Creek watershed. No underground mining will take place around Range Creek and an adequate buffer will be maintained to prevent any unforeseen subsidence to the Range Creek watershed. The Grassy Trail Creek watershed covers approximately 15,592 acres and is characterized by 40% to 60% slopes in the upper parts of the watershed with much flatter slopes at the bottom of the watershed. It is a tributary to the Price River and eventually drains to Green River. Annual precipitation in the project area is approximately 12.5 inches based on site data. There are no perennial streams within the project area.

Site topography and stormwater drainage will not significantly change as a result of proposed mining activities and their subsequent reclamation. Grading performed at the site will be done in a manner to make the surface loose but not erodible and also to maximize infiltration of stormwater and to minimize runoff.

Recommended Rational Method Runoff Coefficients (C) for use in hydrologic calculations are summarized below:

- Undisturbed areas: 0.13
- Disturbed areas, exposed soil: 0.1
- Disturbed areas, gravel roads: 0.5
- Pavement and structures: 0.9
- Recently reclaimed areas: 0.2

The site topography pre- and post-construction is illustrated in Figure 3.

2.4.2 Vegetation and Ground Cover

Site vegetation consists of a mixed conifer/aspen forest community interspersed with sagebrush/grass/forb communities. At the higher locations on the site, Limber Pines occur as single trees or in small clumps within the conifer/aspen community. On the east side of the site, aspen and mountain snowberry occupy the south facing slopes and mixed conifers and current occupy the north facing slopes. As part of reclamation, disturbed areas will be revegetated with the seed mix shown in Appendix C.

2.4.3 Surface Waters

There are no perennial streams within the project area. There is one intermittent and stream (Range Creek) that will be protected from adverse storm water impacts through the implementation of the BMP's described in this document.

2.5 AREA OF SITE DISTURBANCE

The total area of site disturbance is approximately 160 acres as shown in Figure 2.

2.6 POTENTIAL POLLUTION SOURCES

There are no potential sources of pollution to stormwater runoff due to the containment of the 100-yr design storm event.

3.0 EROSION AND SEDIMENT CONTROL BMPS

Erosion and sediment control BMPs will be conducted as described in the following sections in order to control offsite impacts from construction, mining, and reclamation activities. In general, storm water will be routed in ditches, culverts, and other conveyances to retention basins. The locations, extents, and sizes of these BMP's will be determined using appropriate hydrologic, structural, and geotechnical design criteria once the mine site layout has been determined.

3.1 BMP DETAILS

The proposed BMPs to be used across the site include:

1. Sediment traps
2. Slope drains
3. Berms
4. Silt fencing
5. Pipe inlet barriers
6. Check dams
7. Surface roughening and revegetation

Details for each BMP are provided on Drawings 1 and 2. Placement of BMPs will be determined when more specific development plans have been established for the project, but a conceptual design of BMP placement is shown in Figure 3.

3.1.1 Sediment Traps

Runoff from the project area will be conveyed to temporary sediment traps that will allow for settling and evaporation. Sediment trap sizes and locations will be determined Drawing 1 shows the typical cross section of the sediment trap. Retention basins will also serve as sediment traps at the lowest hydraulic point.

3.1.2 Slope Drains and Berms

Runoff from steeper slopes will be directed to slope drains using berms and ditches. The slope drains will convey runoff to retention basins. A sediment trap or other erosion control device will be constructed at the bottom of all slope drains to contain sediments. Drawing 1 shows the construction details for slope drains and diversion berms. The berms will provide containment of storm water and also serve to divert surface water away from the project areas.

3.1.3 Silt Fence

Silt fences will be installed along the downstream perimeter of temporary disturbance areas in order to provide an additional barrier for soil. Drawing 2 shows the construction details for the silt fence.

3.1.4 Pipe Inlet Barriers

Water flowing into culverts will be slowed by pipe inlet barriers to detain sediment, control clogging, and reduce the chance for eroding the pipe bedding. Drawing 2 shows a typical plan view of a pipe inlet barrier.

3.1.5 Check Dams

Check dams will be used to reduce flow velocities and detain sediments within ditches. Check dams will either be constructed from stones or fiber rolls. In general, stone check dams will be installed at every 2-

foot drop in elevation and fiber roll dams will be installed at every 1-foot drop in elevation along the length of all ditches. Drawing 2 shows the construction details for stone check dams.

3.1.6 Surface Roughening and Revegetation

Following site grading conducted during mine reclamation; stockpiled topsoil will be spread over the ground surface. The entire site will be pocked (extreme surface roughening) with depressions measuring approximately 3 feet wide by 3 feet long by 2 feet deep suing a backhoe bucket or similar equipment. The roughened surface will contain microclimates where moisture and topsoil will collect and encourage revegetation. The site will be revegetated with the native species seed mix shown in Appendix C. Surface roughening and revegetation shall be applied as soon as practicable as a temporary erosion protection measure in exposed soil areas where activities have permanently or temporarily ceased.

3.2 BMP INSPECTION

3.2.1 Frequency Requirements

The UPDES Storm Water General Permit for Construction Activities outlines different requirements for inspections of erosion and sediment control measures identified in this SWPPP. The following schedules are outlined in the Permit:

1. Active Construction
   a. At least once every seven days, or
   b. At least once every 14 calendar days and within 24 hours of any precipitation and/or snow melt event which exceeds 0.5 inches.

This SWPPP requires that the site be inspected on a weekly basis. If the scheduled inspection cannot be conducted due to severe weather or other dangerous conditions, an inspection form shall be completed to document the conditions delaying the inspection. The inspection shall be performed as soon as conditions allow. A site inspection form is provided in Appendix D. Completed inspection forms shall be stored in Appendix E of the on-site copy of the SWPPP. A record of inspection shall be retained for at least three years from the date that permit coverage expires or is terminated.

3.2.2 Qualified Personnel

Only qualified personnel shall perform inspections of the erosion and sediment control measures identified in this SWPPP. As defined in Part 3.5.4.d of the Permit (Appendix A), qualified personnel is defined as "a person knowledgeable in the principles and practice of erosion and sediment controls who possesses the skills to assess conditions at the construction site that could impact storm water quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of storm water discharges from the construction activity".

3.2.3 Maintenance Procedures

The BMPs shall be maintained continuously in an effective operating condition until they are removed. BMPs shall be inspected at least weekly. Specific instructions for maintenance and repairs for each BMP are provided below.

3.2.3.1 Sediment Traps

Sediment shall be removed and the structure restored to its original dimensions when the sediment accumulation reaches 50 percent of the capacity of the trap. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode. Erosion of embankments must be repaired as necessary.

3.2.3.2 Slope Drains

Slope drain pipes should be inspected regularly to ensure that erosion is not occurring around the pipe fixtures and the pipe remains secured to the ground. Any instances of erosion at the pipe inlet or outlet or along the length of the pipe will be repaired. If a sediment trap is present at the base of the drain, it will be maintained as stated above.

3.2.3.3 Berms

Berms will be inspected for settlement, erosion, cracking, or other damage. Damaged berms will be promptly repaired so that they extend to their design elevations/heights.

3.2.3.4 Silt Fence

Silt Fence shall be inspected after each rainfall event and maintained when bulges occur or when sediment accumulation reaches 50 percent of fabric height. Removed sediment from behind the silt fence shall be deposited in a suitable area and in such a manner that it will not erode.

3.2.3.5 Pipe Inlet Barriers

Barriers will be maintained in proper functioning order throughout construction. Sediment shall be removed when sediment accumulation reaches 50 percent of the barrier capacity. Removed sediment from the barrier shall be deposited in a suitable area and in such a manner that it will not erode. Upon completion of the project, the stone barriers can be removed by spreading the stone along the cut ditch.

3.2.3.6 Check Dams

Sediment shall be removed from check dams as it accumulates. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode. Upon completion of the project, rock check dams can be spread out to line ditches and fiber check dams can be broken apart and spread over seeded areas.

3.3 BMP DESIGN

The BMPs will be designed to safely contain the peak flow and volume produced by a 100-year, 24-hour storm event. Stormwater that is tributary to the site will be diverted from crossing the site.

4.0 OPERATIONAL CONTROLS

4.1 HOUSEKEEPING BMPS

Any chemicals or fertilizers stored on site will be used stored in compliance with the Spill Prevention, Control and Countermeasure (SPCC) plan. The weekly maintenance of BMPs will ensure that litter, debris, and sediment do not leave the construction site. If litter and construction debris exposed to stormwater have the potential of becoming a pollutant source, it shall be picked up prior to any storm event.

4.2 SANITARY FACILITIES

Sanitary facilities will be installed within the area of disturbance during construction activities. These facilities will be operated and maintained in accordance with all applicable state and local waste disposal, sanitary sewer, or septic system regulations.

4.3 PETROLEUM PRODUCT BULK STORAGE

Petroleum bulk storage at the construction site will be in compliance with the SPCC plan.

4.4 CONCRETE OR ASPHALT BATCH PLANTS

There will not be a temporary concrete/asphalt batch plant at the construction site.

5.0 CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Joseph Daniel Hales
Name

Water Resources Engineer
Title

Signature

09/04/2014
Date

PROFESSIONAL ENGINEER
09/04/2014
7454956
J. DANIEL HALES
STATE OF UTAH

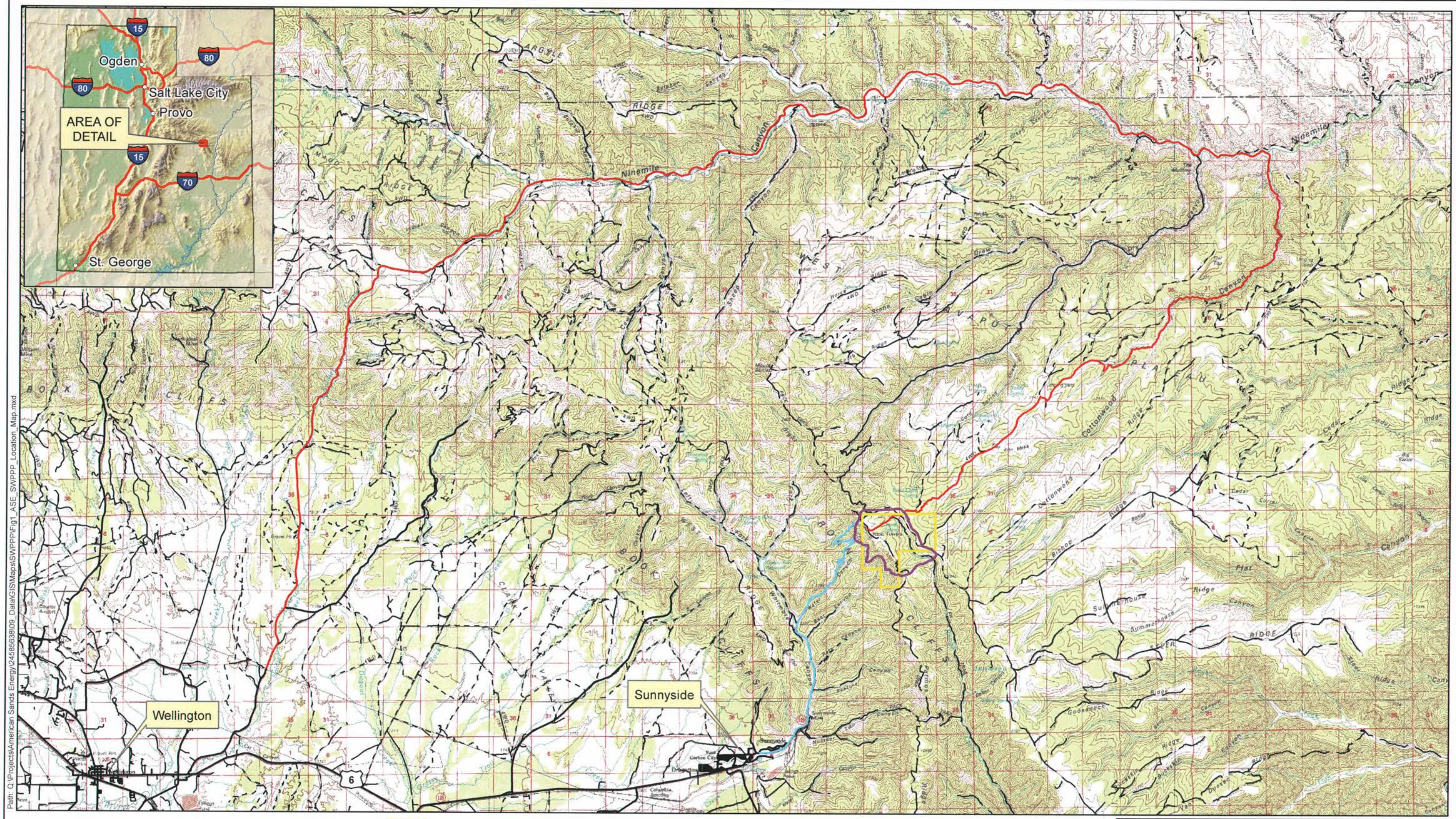
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name

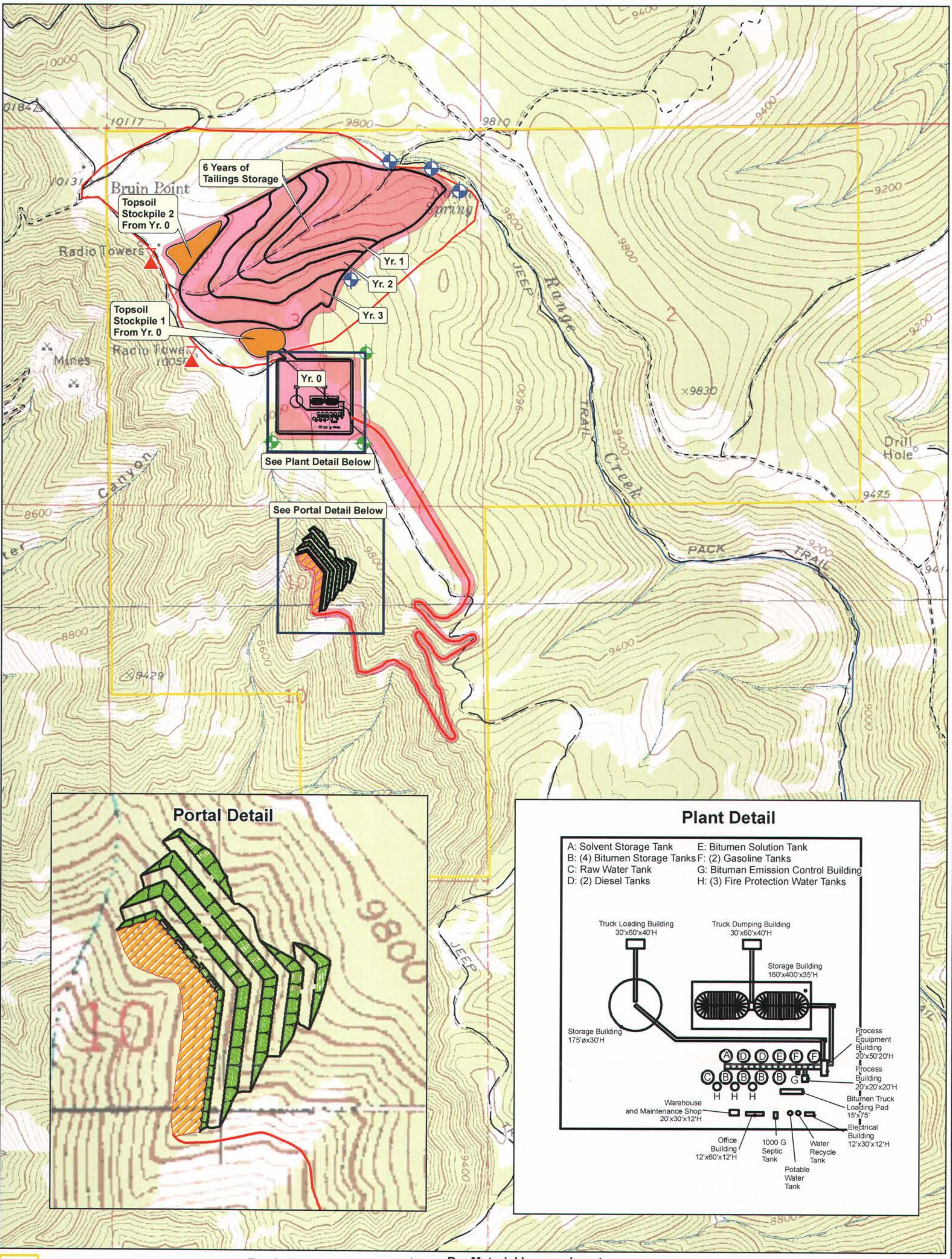
Title

Signature

Date



Title:	Location Map
Bruin Point Mine SWPPP	Proj No: 24585638
	Figure: 1
American Sands Energy Corp	Date: March 2015
	URS

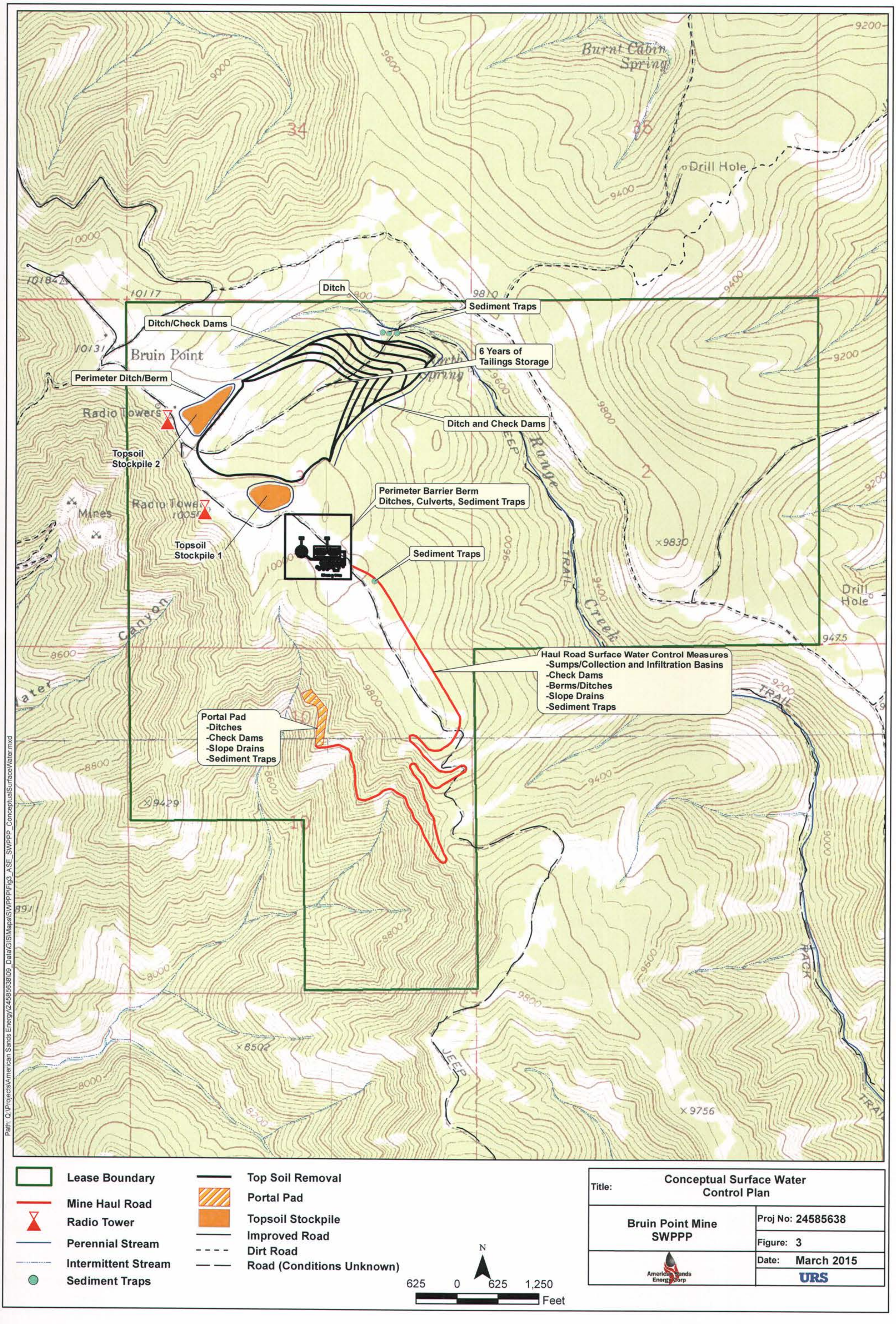


- Lease Boundary
- Mine Haul Road
- Radio Tower
- Perennial Stream
- Intermittent Stream
- Top Soil Removal (yr.#: years in which topsoil is removed)
- Portal Pad
- Topsoil Stockpile
- Improved Road
- Dirt Road
- Road (Conditions Unknown)
- Dry Material Impoundment Monitoring Well
- Process Area Monitoring Well
- Affected Area

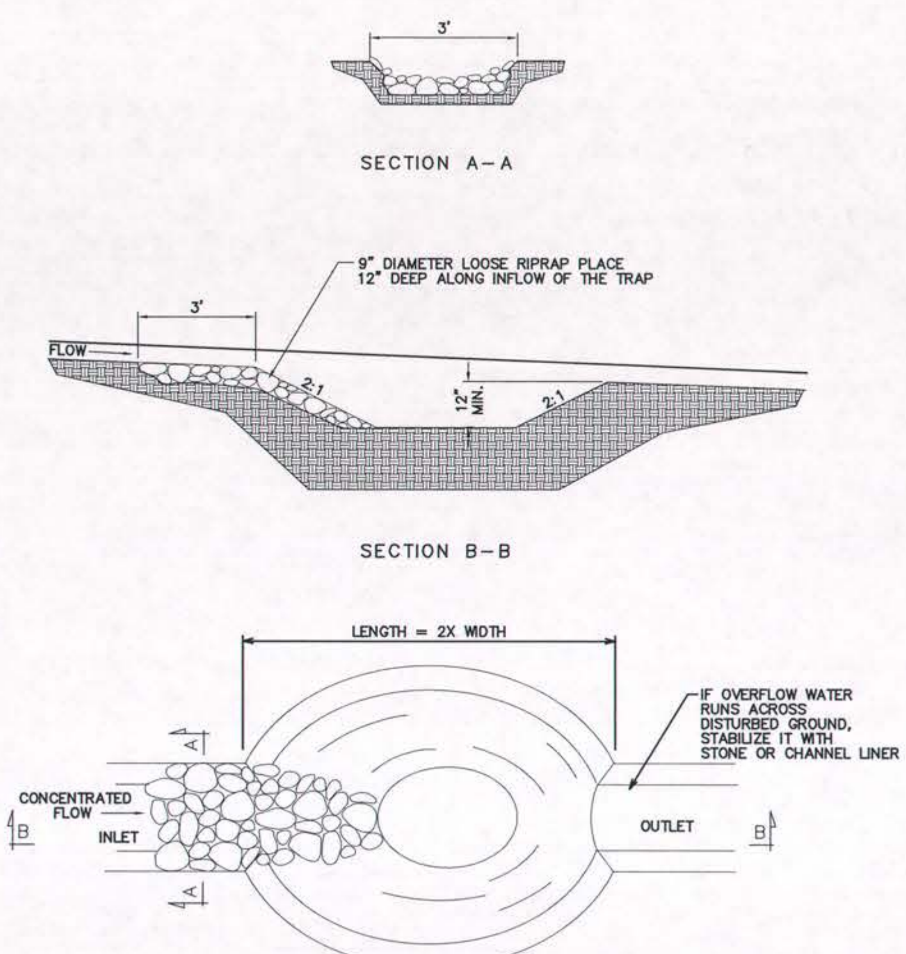
N

625 0 625 1,250 Feet

Title:	Mine Plan Map	
General Construction Permit American Sands Permit Application	Proj No: 24585638	
	Figure: 2	
American Sands Energy Corp	Date: March 2015	
	URS	


Ditch
Sediment Traps
Ditch/Check Dams
6 Years of Tailings Storage
Perimeter Ditch/Berm
Bruin Point
Radio Towers
Ditch and Check Dams
Topsoil Stockpile 2
Perimeter Barrier Berm Ditches, Culverts, Sediment Traps
Radio Tower
Topsoil Stockpile 1
Sediment Traps
Haul Road Surface Water Control Measures
-Sumps/Collection and Infiltration Basins
-Check Dams
-Berms/Ditches
-Slope Drains
-Sediment Traps
Portal Pad
-Ditches
-Check Dams
-Slope Drains
-Sediment Traps
Burnt Cabin Spring
Drill Hole
Mines
Canyon
Creek
Range
JEEP
TRAIL
Lease Boundary
Mine Haul Road
Radio Tower
Perennial Stream
Intermittent Stream
Sediment Traps
Top Soil Removal
Portal Pad
Topsoil Stockpile
Improved Road
Dirt Road
Road (Conditions Unknown)
N
625 0 625 1,250
Feet
Title: Conceptual Surface Water Control Plan
Bruin Point Mine SWPPP
Proj No: 24585638
Figure: 3
Date: March 2015
American Sands Energy Corp
URS

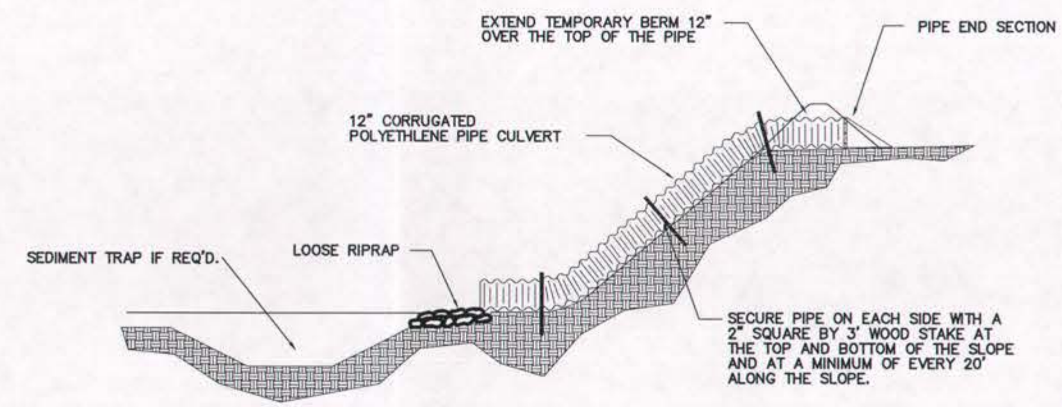
SEDIMENT TRAP



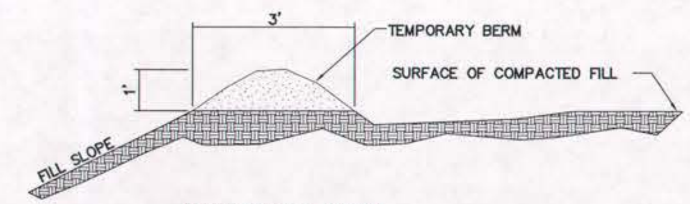
NOTES FOR SEDIMENT TRAPS:

1. PLACE SEDIMENT TRAPS AT LOCATIONS SHOWN ON THE PLANS OR AS DIRECTED BY THE OPERATOR.
2. IDENTIFY THE STORAGE CAPACITY OF EACH SEDIMENT TRAP IN THE PROJECT PLAN SET.
3. CONSTRUCT TRAP LENGTH TWICE AS LONG AS THE WIDTH.
4. MAINTAIN A PROPERLY FUNCTIONING SEDIMENT TRAP THROUGHOUT CONSTRUCTION OR UNTIL DISTURBED AREAS CONTRIBUTING TO THE BASIN HAVE BEEN PAVED OR SEEDED AND MULCHED.
5. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA APPROVED BY THE OPERATOR. STABLE AREA MAY BE LOCATED UP GRADIENT WITHIN THE DRAINAGE AREA FOR THE BASIN BEING CLEARED OUT AS TO MINIMIZE NET LOSS OF SOILS WITHIN THAT DRAINAGE AREA.
6. 9" RIPRAP LAYER WILL BE TWO TIMES THE 9" RIPRAP FOR LOWER FLOWS, AND INCREASE IN THICKNESS AS FLOW INCREASES.

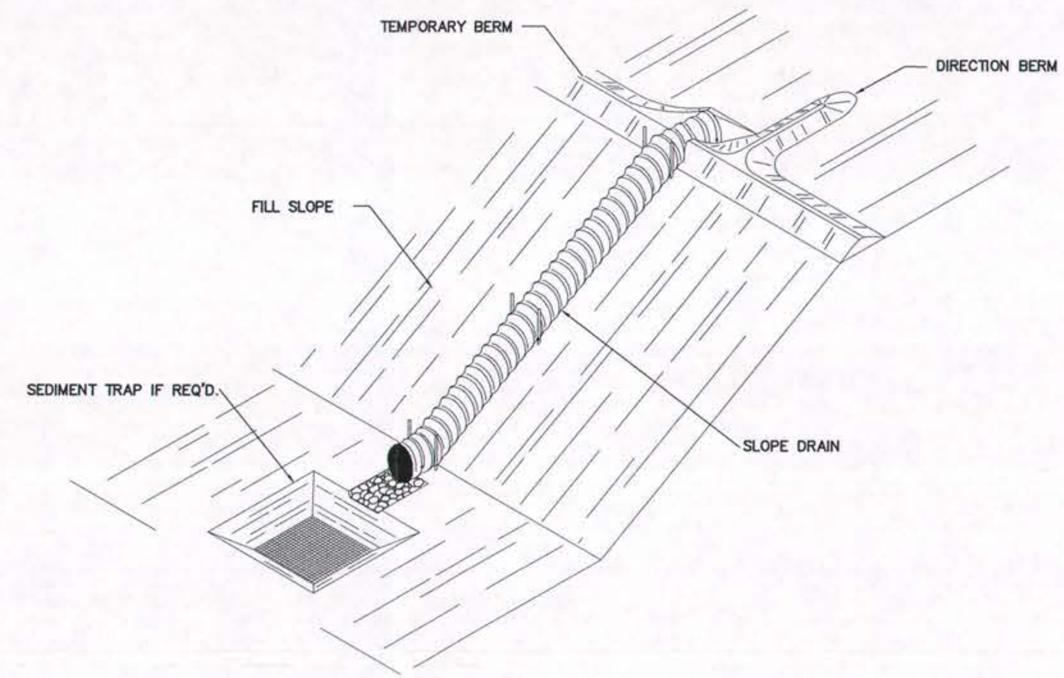
SLOPE DRAIN AND TEMPORARY BERM



SLOPE DRAIN SECTION



TEMPORARY BERM



NOTES FOR TEMPORARY BERM:

1. COMPACT THE RIDGE OF EXISTING SOIL TO PROVIDE A NON-ERODIBLE BERM THAT DIVERTS STORM RUNOFF FROM RECENTLY CONSTRUCTED SLOPES. REPAIR ANY EROSION OF THE BERM IMMEDIATELY.
2. TEMPORARY BERMS ARE TYPICALLY USED IN CONJUNCTION WITH SLOPE DRAINS.

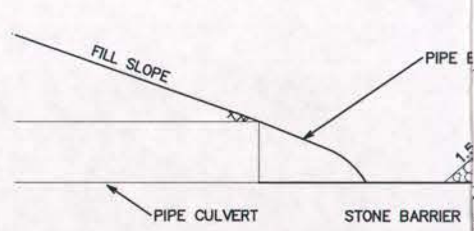
NOTES FOR SLOPE DRAIN:

1. COMPACT THE SOIL SURFACE AND BERMS AROUND THE ENTRANCE TO THE PIPE END SECTION TO PREVENT WATER FROM UNDERMINING THE PIPE AND ERODING THE SLOPE. REPAIR ANY EROSION AROUND THE INLET, OUTLET OR SLOPE IMMEDIATELY.
2. SECURE THE PIPE TO THE GROUND EVERY 20' TO PREVENT PIPE MOVEMENT AND SUBSEQUENT FAILURES DURING STORM EVENTS.
3. USE WATER-TIGHT FITTINGS AT ALL SLOPE DRAIN CONNECTIONS.
4. EXTEND THE SLOPE DRAIN AS REQUIRED TO COINCIDE WITH THE HEIGHT OF THE EMBANKMENT.
5. EXTEND THE DRAIN A MINIMUM OF 3' BEYOND THE TOE OF THE SLOPE AND PROVIDE OUTLET PROTECTION.
6. 50 PERCENT OF THE RIPRAP TO BE BETWEEN 6" AND 8" WITH A MAXIMUM SIZE OF 12" AND A MINIMUM SIZE OF 4".
7. IF A SEDIMENT TRAP CANNOT BE CONSTRUCTED AT THE PIPE OUTLET PROVIDE A SEDIMENT TRAPPING DEVICE BEFORE THE PIPE INLET.
8. MAINTAIN SLOPE DRAINS UNTIL SLOPES HAVE BEEN PERMANENTLY STABILIZED. REMOVE SLOPE DRAINS AS DIRECTED BY THE OPERATOR.

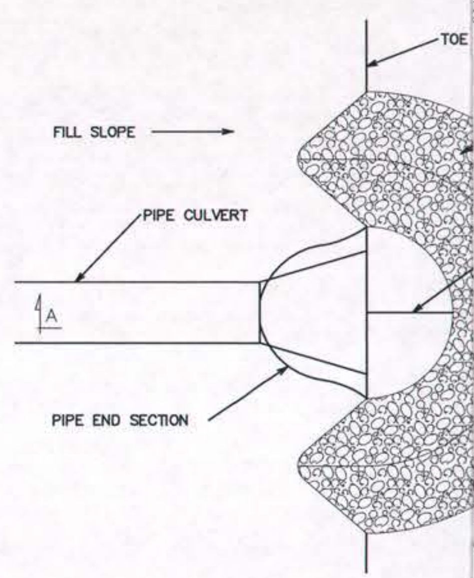
*PLACEMENT OF BMPs WILL BE DETERMINED AT TIME OF CONSTRUCTION

Title: Typical Erosion Control Details (BMPS) Sheet 1 of 2	
Bruin Point Mine SWPPP	Proj No: 24585638
	Figure: 1
American Sands Energy Corp	Date: MAY 2014
	URS

PIPE INLET BARRIER



SECTION A–A



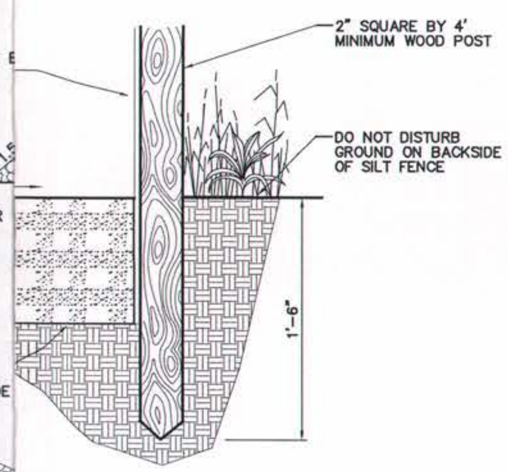
PLAN VIEW

NOTES FOR PIPE INLET BARRIER:

1. PLACE PIPE INLET BARRIERS AT LOCATIONS SHOW AS DIRECTED BY THE OPERATOR.
2. MAINTAIN A PROPERLY FUNCTIONING SEDIMENT B CONSTRUCTION.
3. REMOVE SEDIMENT AS IT ACCUMULATES AND PLA APPROVED BY THE OPERATOR.
4. WHEN SURROUNDING AREAS HAVE BEEN SEEDED THE STONE BARRIER BY SPREADING THE STONE
5. AN 18" MINIMUM DIAMETER FIBER ROLL MAY BE FOR THE STONE BARRIER.

NOTES FOR CHECK DAMS:

1. PLACE A CHECK DAM AT EVERY TWO–FOOT DROP ALONG THE CUT DITCH.
2. A 9" TO 12" DIAMETER FIBER ROLL CAN BE USE THE 18" ROLL PROVIDED A ROLL IS INSTALLED A FOOT DROP IN ELEVATION ALONG THE CUT DITCH
3. PLACE CHECK DAMS PERPENDICULAR TO THE FLO
4. DO NOT PLACE CHECK DAMS ACROSS NATURAL S
5. DO NOT USE STONE CHECK DAMS WITHIN CLEAR
6. CONSTRUCT CHECK DAMS SO THAT WATER DOES AROUND THE ENDS OF THE DAM.
7. REMOVE SEDIMENT AS IT ACCUMULATES AND PLA AREA AS DIRECTED BY THE OPERATOR.
8. AFTER SURROUNDING AREAS HAVE BEEN SEEDED SPREAD ROCK FROM CHECK DAMS TO LINE THE APART FIBER ROLLS AND SPREAD THE STRAW O



SECTION

THE SILT FENCE 5' BEYOND THE

INTS ALONG THE SILT FENCE, ALIGN TOUR AS MUCH AS POSSIBLE. WHERE CUMULATE AT A LOW POINT, PROVIDE AND INSTALL A SEDIMENT TRAP.

NCH, USE MACHINERY THAT WILL

FLOWING AROUND THE ENDS OF THE SILT THE FENCE UP SLOPE.

ACROSS POTENTIAL CONCENTRATED FLOWS IAGE CHANNELS, CUT DITCHES).

G THE FENCE AS MUCH AS POSSIBLE. , BEFORE POUNDING IN THE END POSTS, AND TWIST 180 DEGREES.

CTIONING SILT FENCE THROUGHOUT OJECT OR UNTIL DISTURBED AREAS HAVE

OSITS SEDIMENT BEHIND THE FENCE. D PLACE IT IN A STABLE AREA APPROVED

SEEDED AND MULCHED, REMOVE SILT PROTECTING A WETLAND OR WATER BODY.

S SPECIFIED BY THE MANUFACTURER.

INED ON AN ONGOING BASIS.

*PLACEMENT OF BMPs WILL BE DETERMINED AT TIME OF CONSTRUCTION

Typical Erosion Control Details (BMPS) Sheet 2 of 2		
Bruin Point Mine SWPPP	Proj No:	24585638
	Figure:	2
American Sands Energy Corp	Date:	MAY 2014
		URS

Appendix A

Utah Pollutant Discharge Elimination System (UPDES) Storm Water General Permit for Construction Activities (Permit No. UTR30000)

Notice of Intent (NOI) (To be submitted when approved)

STATE OF UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER QUALITY

Authorization to Discharge Under the
Utah Pollutant Discharge Elimination System

Storm Water General Permit for
Construction Activities
Permit No. UTR300000

This Permit is issued in compliance with the provisions of the Utah Water Quality Act, Title 19, Chapter 5, Utah Code Annotated 2004, as amended (the "Act") and the federal Water Pollution Control Act (33 U.S.C. §§ 1251 *et. seq.*, as amended to date), and the rules and Regulations made pursuant to those statutes.

This Permit authorizes storm water discharges to waters of the State of Utah resulting from construction activities, including construction support activities, anywhere within the State of Utah as provided in Parts 1.4 and 1.5 of this Permit. This authorization is conditioned upon a discharger meeting the eligibility requirements in Part 1.2.2 of this Permit, including preparation of a Storm Water Pollution Prevention Plan <u>prior</u> to filing a Notice of Intent ("NOI") to discharge under this General Permit. A discharger is not covered by this Permit if the discharger submits an NOI but has not met these conditions.

This authorization is subject to the authority of the Utah Water Quality Board or the Executive Secretary of the Utah Water Quality Board to reopen this Permit (*see* Part 5.15 of this Permit), or to require a discharger to obtain an individual permit or use an alternative general permit (*see* Part 2.3 of this Permit). The issuance of a discharge permit authorization under this general Permit does not relieve Permittees of other duties and responsibilities under the Act or rules made under that Act. Significant terms used in this Permit are defined in Part 6 of this Permit.

This Permit shall become effective on July 1, 2008.

This Permit and the authorization to discharge shall expire at midnight, June 30, 2013, except as described in Part 2.4 of this Permit.

Signed this 26th day of June, 2008.

Walter L. Baker, P.E.
Executive Secretary,
Utah Water Quality Board

TABLE OF CONTENTS

PART 1: PERMIT SCOPE AND COVERAGE

1.1 Persons required to obtain authorization for discharge. No person may conduct construction activities that disturb an area greater than or equal to one acre without authorization for storm water discharge from the Executive Secretary. (*See* Utah Admin. Code Sections R317-8-3.9(6)(d)(10) and R317-8-3.9(6)(e)(1).) In addition, no person may conduct construction activities that disturb an area smaller than one acre if the disturbance is part of a larger common plan of development or sale that will ultimately disturb an area greater than or equal to one acre. *Id. See* Part 6.5 of this Permit for a definition of "construction activities."

1.2 Permit Area and Eligibility.

1.2.1. Construction activities located within the State of Utah, except for Indian Country (*see* Part 6.16 of this Permit for a definition of "Indian Country") may be eligible to be covered under this Permit.

1.2.2. Eligibility for authorization to discharge under this Permit is conditioned upon:

a. Preparation of a Storm Water Pollution Prevention Plan ("SWPPP") (see Part 3 of this permit) prior to submission of a Notice of Intent ("NOI");
b. Submission of a complete and a ccurate Notice of Intent to be covered by this Permit (see Part 1.8 of this Permit); and
c. Payment of applicable fees.

1.3 Authorization to Discharge. This Permit authorizes discharges of storm water from construction activities that disturb an area greater than or equal to one acre, and from construction activities that disturb an area smaller than one acre if the disturbance is part of a larger common plan of development or sale that will ultimately disturb an area greater than or equal to one acre. This authorization is subject to all of the terms and conditions of this Permit, including the requirement that the discharger must submit a Notice of Intent ("NOI"), and the prohibitions on discharges specified in Part 1.6.

1.4 Allowable Storm Water Discharges. Subject to compliance with the terms and conditions of this Permit, a Permittee is authorized to discharge pollutants in:

1.4.1. Storm water associated with construction activity as that term is defined in Part 6.5 of this Permit (but see Part 1.4.3 of this Permit for limitations on discharges from construction support activities);

1.4.2. Storm water discharges designated by the Executive Secretary as needing a storm water permit under R317-8-3.9(6)(e)(2);

1.4.3. Discharges from construction support activities as that term is defined in Part 6.6 of this Permit, provided:

a. The support activity is directly related to the construction site required to have UPDES permit coverage for discharges of storm water associated with construction activity;
b. The support activity is not a commercial operation serving multiple unrelated construction projects by different owners/operators, and does not operate beyond the completion of the construction activity at the last construction project it supports; and
c. Appropriate controls and measures are identified in a Storm Water Pollution

Prevention Plan (SWPPP) covering the discharges from the support activity areas; and

1.4.4. Discharges composed of allowable discharges listed in Part 1.4 and 1.5 of this Permit commingled with a discharge authorized by a different UPDES permit and/or a discharge that does not require UPDES permit authorization.

1.5. Allowable Non-storm Water Discharges. A Permittee is authorized to make the following non-storm water discharges, provided the non-storm water component of the discharge is in compliance with Part 3.5.5 of this Permit:

1.5.1. Discharges from fire-fighting activities;
1.5.2. Fire hydrant flushings;
1.5.3. Waters used to wash vehicles where detergents are not used;
1.5.4. Water used to control dust in accordance with Part 3.5.2(c)(2);
1.5.5. Potable water including uncontaminated water line flushings;
1.5.6. Routine external building wash down that does not use detergents;
1.5.7. Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used;
1.5.8. Uncontaminated air conditioning or compressor condensate;
1.5.9. Uncontaminated ground water or spring water;
1.5.10. Foundation or footing drains where flows are not contaminated with process materials such as solvents;
1.5.11. Landscape and other irrigation drainage.

1.6 Discharges not allowed under this Permit. Notwithstanding any other language in this Permit, the following storm water discharges are not authorized by this Permit:

1.6.1. Discharges from Construction Activities within Indian Country. This Permit does not cover discharges within Indian Country as that term is defined in Part 6.16 of this Permit;[1]
1.6.2. Post Construction Discharges. Storm water discharges that originate from the site after construction activities have been completed and the site has undergone final stabilization;
1.6.3. Discharges Mixed with Non-storm Water. Discharges that are mixed with sources of non-storm water other than discharges which are identified in Part 1.5 of this Permit and in compliance with Part 3.5.5 (non-storm water discharges) of this Permit;
1.6.4. Discharges Covered by Another Permit. Storm water discharges associated with construction activity for which an individual permit has been issued, or for which the owner/operator is required to or may obtain coverage under an individual permit or an alternative general permit (*see* Part 2.3 of this Permit), including a general

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[1] The State of Utah, *Division of Water Quality*, does not have permit authority for Indian Country. Storm water permits for Indian Country within the State must be acquired through EPA Region VIII, except for facilities on the Navajo Reservation or on the Goshute Reservation which must acquire storm water permits through EPA Region IX.

permit issued for areas regulated by a qualified municipal Separate Storm Sewer System Program;

1.6.5. Discharges Threatening Water Quality. Storm water discharges from construction activities that cause or have the reasonable potential to cause a violation of a water quality standard. *See* Part 2.2 of this Permit;

1.6.6. Discharges from commercial construction support and related activities. Storm water discharges from construction support activities unless they are included within the definition in Part 6.6 of this permit;

1.6.7. Spills. This Permit does not authorize the discharge of hazardous substances or oil resulting from an on-site spill; and

1.6.8. Discharges that result from violations of this Permit.

1.7 Authorization to Discharge Date.

1.7.1. This permit is effective as of July 1, 2008 and is effective for five years, expiring at 11:59 p.m. on June 30, 2013.

1.7.2. Unless notified by the Executive Secretary to the contrary, a discharger is authorized for coverage under this Permit and may begin construction activities immediately after preparing a SWPPP for the construction activities (*see* Part 1.2.2(a) of this Permit), and after submitting an NOI and permit fee (*see* Part 1.2.2(b) and (c) of this Permit). The date of submission of the NOI or a permit fee shall be the date of its receipt by the Executive Secretary, or the date the NOI or permit fee are submitted electronically using the website for the Utah Division of Water Quality. Any NOIs mailed to the Executive Secretary shall be mailed to the address specified in Part 5.11 of this Permit.

1.7.3. The Executive Secretary may, with written notice (including electronic notice) delay authorization to verify an applicant's eligibility or resolve other concerns. In these instances, a discharger is not authorized for coverage under this permit until it receives notice from the Executive Secretary.

1.8 Notice of Intent

1.8.1. A person who wishes to submit an NOI must use the NOI form provided by the Executive Secretary (or a copy thereof), or submit an NOI electronically (see (https://secure.utah.gov/stormwater/)).

1.8.2. All questions in an NOI form provided by the Executive Secretary or answered in the course of submitting an NOI electronically must be answered completely and accurately.

1.8.3. The NOI, whether on the form provided by the Executive Secretary or submitted electronically, must include a certification statement, and must be signed and dated by an authorized representative as specified in Part 5.16 of this Permit.

1.9 Coverage before June 30, 2010. Permittee's that previously received authorization to discharge under the October 1, 2002 General Permit (2002 General Permit) and still have active coverage shall without submission of an NOI continue coverage under UTR200000 until June 30, 2010 at which time, or before if desired, the Permittee shall, by submission of an NOI (either on-line www.waterquality.utah.gov/updes/stormwatercon.htm or by paper submission) obtain coverage under this Permit (UTR300000).

1.10 Late Notifications. Persons are not prohibited from submitting NOIs after initiating clearing, grading, excavation activities, or other construction activities. When a late NOI is submitted, authorization for discharges occurs consistent with Subpart 2.1. The Agency reserves the right to take enforcement action for any un-permitted discharges that occur between the commencement of construction and discharge authorization.

PART 2. SPECIAL CONDITIONS, MANAGEMENT PRACTICES, RESPONSIBILITIES, AND OTHER NON-NUMERIC LIMITATIONS

2.1 Releases in excess of Reportable Quantities. The discharge of hazardous substances or oil in the storm water discharge(s) from a site shall be prevented or minimized in accordance with the applicable SWPPP for the site. This Permit does not relieve the Permittee of the reporting requirements of 40 CFR part 117, 40 CFR 110, and 40 CFR part 302. Where a release containing a hazardous substance in an amount equal to or in excess of a reportable quantity established under either 40 CFR 117, 40 CFR 110, or 40 CFR 302, occurs during a 24 hour period:

2.1.1. The Permittee is required to notify the National Response Center (NRC) (800-424-8802) in accordance with the requirements of 40 CFR 117, 40 CFR 110, and 40 CFR 302 and the Division of Water Quality (DWQ) (801-538-6146) or the 24 hour DWQ answering service at 801-536-4123 as soon as he or she has knowledge of the discharge;

2.1.2. The Permittee shall submit within 14 calendar days of knowledge of the release a written description of: the release (including the type and estimate of the amount of material released), the date that such release occurred, the circumstances leading to the release, the measures taken and/or planned to be taken to cleanup the release, and steps to be taken to minimize the chance of future occurrences to the Executive Secretary; and

2.1.3. The SWPPP required under Part 3 of this Permit must be modified within 14 calendar days of knowledge of the release to provide a description of the release, the circumstances leading to the release, and the date of the release. In addition, the SWPPP must be reviewed to identify measures to prevent the reoccurrence of such releases and to respond to such releases, and the SWPPP must be modified where appropriate.

2.2 Discharge Compliance with Water Quality Standards and TMDL requirements. Storm water discharges from construction activities that cause or have the reasonable potential to cause a violation of a water quality standard or a violation of Total Maximum Daily Load ("TMDL") requirements are not authorized by this Permit. If there is a TMDL requirement for the receiving water, that requirement, rather than a water quality standard, will govern. If a discharge that would otherwise be covered by this Permit causes a violation or if there is a reasonable potential a discharge will cause a violation, the Permitteee will take all necessary actions to ensure future discharges do not cause or contribute to the violation of a water quality standard or a TMDL requirement, and shall document these actions in the SWPPP.

If the Executive Secretary determines that construction activities have caused or have the reasonable potential to cause a violation of a water quality standard or a TMDL requirement, the discharger will be notified by the Executive Secretary of additional requirements for treatment or handling of the discharge to ensure future discharges do not cause or contribute to the violation. The Permittee will document these requirements in the SWPPP. The Executive Secretary may authorize continued coverage under this Permit after appropriate controls and implementation procedures, designed to bring the discharges into compliance with water quality standards or TMDL requirements, have been included in the SWPPP.

Alternatively, the Executive Secretary may notify the Permittee that an individual permit application is necessary (see Part 2.3 of this Permit).

If violations remain or re-occur, then coverage under this Permit may be terminated by the Executive Secretary and an alternative permit may be issued or denied. Compliance with this requirement does not preclude any enforcement activity as provided by the Water Quality Act for the underlying violation.

2.3 Requiring an Individual Permit or an Alternative General Permit.

2.3.1. The Executive Secretary may require any person authorized by this Permit to apply for and/or obtain either an individual UPDES permit or an alternative UPDES general permit. Any interested person may petition the Executive Secretary to take action under this paragraph. Where the Executive Secretary requires a discharger authorized to discharge under this Permit to apply for an individual UPDES permit, the Executive Secretary shall notify the discharger in writing that a permit application is required. This notification shall include a brief statement of the reasons for this decision, an application form or reference to the application requirements, a statement setting a deadline for the discharger to file the application, and a statement that on the effective date of issuance or denial of the individual UPDES permit or the alternative general permit as it applies to the individual Permittee, coverage under this general Permit shall automatically terminate. Applications shall be submitted to the address of the Division of Water Quality shown in Part 5.11 of this Permit. The Executive Secretary may grant additional time to submit the application upon request of the applicant. If a discharger fails to submit in a timely manner an individual UPDES permit application as required by the Executive Secretary under this paragraph, then the applicability of this Permit to the individual UPDES permittee is automatically terminated at the end of the day specified for application submittal.

2.3.2. Any discharger authorized by this Permit may request to be excluded from the coverage of this Permit by applying for an individual permit. In such cases, the discharger shall submit an individual application in accordance with the requirements of Utah Administrative Code ("UAC") R317-8-3.9(2)(b)2 with reasons supporting the request, to the Executive Secretary at the address for the Division of Water Quality in Part 5.11 of this Permit. The request may be granted by issuance of any individual permit or an alternative general permit if the reasons cited by the Permittee are adequate to support the request.

2.3.3. When an individual UPDES permit is issued to a discharger who would otherwise be subject to this Permit, or the discharger is authorized to discharge under an alternative UPDES general permit, the applicability of this Permit to the individual UPDES permittee is automatically terminated on the effective date of the individual permit or the date of authorization for coverage under the alternative general permit, whichever the case may be. When an individual UPDES permit is denied to a discharger otherwise subject to this Permit or the discharger is denied for coverage under an alternative UPDES general permit, the applicability of this Permit to the individual UPDES permittee is automatically terminated on the date of such denial, unless otherwise specified by the Executive Secretary.

2.4 Continuation of the Expired General Permit. This Permit expires on June 30, 2013. However, an expired general permit shall continue in force and effect after the expiration date until a new general permit is issued. If a discharger was eligible for and permitted under this Permit, and this Permit expires, the discharger will remain covered by this Permit until the earliest of:

2.4.1. One hundred twenty days after re-issuance or replacement of this Permit;

2.4.2. The discharger submits a Notice of Termination in compliance with this Permit;

2.4.3. The discharger is issued an individual permit for the project's discharges; or

2.4.4. 180 days after the Executive Secretary makes a formal decision not to reissue or replace this Permit, at which time the discharger must seek coverage under an alternative general permit or an individual permit.

PART 3. STORM WATER POLLUTION PREVENTION PLANS

3.1. SWPPP required. A Storm Water Pollution Prevention Plan ("SWPPP") shall be developed for each construction project covered by this Permit prior to submission of an NOI. A SWPPP shall be prepared in accordance with good engineering practices. It is recommended that the plan be signed by a Professional Engineer (P.E.) registered in the State. The SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges from the construction site, shall describe and ensure the implementation of practices which will be used to reduce the pollutants in storm water discharges associated with construction activity at the construction site and to assure compliance with the terms and conditions of this Permit, and shall otherwise meet the requirements of this Permit. As a condition of this Permit, Permittees must implement the SWPPP as written or modified from commencement of construction until final stabilization is complete and an NOT has been submitted. (This provision is not intended to address the potential liability of a Permittee or other current or former operator or owner in the event of a discharge of pollution from the property of an individual homeowner.)

3.2. SWPPP Location, Availability, Revision, and Signature.

3.2.1. SWPPP Location. A copy of the SWPPP, including a copy of the Permit, the NOI, and any amendments to the SWPPP, shall be retained on-site at the site which generates the storm water discharge in accordance with this Part 3.2 and with Part 5.10 of this Permit. If the site is inactive or does not have an onsite location adequate to store the copy of the SWPPP, reasonable local access to a copy of the SWPPP during normal working hours (e.g., at a local library or government building), must be provided and the location of the SWPPP, along with a contact phone number, shall be posted on site at a publicly-accessible location. For linear construction projects, such as pipelines, the posted notice shall be located at a publicly accessible location near the active part of the construction project.

3.2.2. SWPPP Availability. The Permittee shall make the copy of the SWPPP that is kept on-site or kept locally available for review upon request to the Executive Secretary; EPA; other local agencies approving sediment and erosion plans, grading plans, or storm water management plans; local government officials; or to the operators of a municipal separate storm sewer receiving discharges from the site. The Permittee need not provide a free copy of the SWPPP to these entities upon request, but if it chooses not to do so, it shall keep two copies of the SWPPP, in its entirety, and shall allow these entities to borrow one to make a copy at their own expense.

3.2.3. Original SWPPP. If requested by the Executive Secretary, the original SWPPP, including any previous versions requested, shall be provided to the Executive Secretary within five working days of the request. The original provided shall be signed in accordance with Part 5.16 of this Permit.

3.2.4. SWPPP Availability to the Public. The Permittee shall also make a copy of the SWPPP available to the public to review at reasonable times during regular business hours. Advance notice by the public of the desire to view the SWPPP may be required, not to exceed two working days. The Permittee need not provide a free copy of the SWPPP to members of the public, but if it chooses not to do so, it shall keep two copies of the SWPPP, in its entirety, and shall allow members of the public to borrow one to make a copy at their own expense.

3.2.5. Compelled Revisions. The Executive Secretary, or an authorized representative of the Executive Secretary, may notify the Permittee (co-Permittees) at any time that the SWPPP does not meet one or more of the minimum requirements of this Part 3. Such notification shall identify those provisions of the Permit which are not being met by the SWPPP, and identify which provisions of the SWPPP require modifications in order to meet the minimum requirements of this Part 3. Within 7 days of such notification from the Executive Secretary, (or as otherwise provided by the Executive Secretary), or authorized representative, the Permittee shall make the required changes to the SWPPP and shall submit to the Executive Secretary a written certification that the changes have been made. The Executive Secretary may take appropriate enforcement action for the period of time the Permittee was operating under a SWPPP that did not meet the minimum requirements of the Permit.

3.2.6. All SWPPPs must be signed and certified in accordance with Part 5.16 of this Permit.

3.3. Keeping SWPPPs Current.

3.3.1. The Permittee shall amend the SWPPP whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on the discharge of pollutants to the waters of the State and which has not otherwise been addressed in the SWPPP.

3.3.2. The Permittee shall amend the SWPPP whenever inspections or investigations by site operators, local, state, or federal officials indicate the SWPPP is proving ineffective in eliminating or significantly minimizing pollutants from sources identified under Part 3.5.1 of this Permit, or is otherwise not achieving the general objectives of controlling pollutants in storm water discharges associated with construction activity.

3.3.3. The Permittee shall amend the SWPPP whenever a new owner/operator becomes responsible for implementing all or part of the SWPPP, as further described in Part 3.4 and Part 4.3 of this Permit.

3.3.4. The following records of activities shall be maintained as part of the SWPPP:

a. Dates when major grading activities occur;
b. Dates when construction activities temporarily or permanently cease on a portion of or all of the site; and
c. Dates when stabilization measures are initiated.

3.3.5. Once an area has been finally stabilized, the Permittee may identify this area in the SWPPP and no further SWPPP or inspection requirements shall apply to that area.

3.4. More than one Permittee. A SWPPP may identify more than one Permittee and may specify the responsibilities of each Permittee by task, area, and/or timing. Permittees may coordinate and prepare more than one SWPPP to accomplish this. However, in the event there is a requirement under the SWPPP for which responsibility is ambiguous or is not included in the SWPPP(s), each Permittee shall be responsible for implementation of that requirement. Each Permittee is also responsible for assuring that its activities do not render another Permittee's controls ineffective.

3.5. Contents of SWPPP. The SWPPP shall include the following items:

3.5.1. Site Description. Each SWPPP shall provide a description of pollutant sources and other information as indicated:

a. A description of the nature of the construction activity;
b. A description of the intended sequence of major activities which disturb soils for major portions of the site (e.g. grubbing, excavation, grading, utilities, and infrastructure installation);
c. Estimates of the total area of the site and the total area of the site that is expected to be disturbed by excavation, grading, or other activities, including areas for construction support;
d. An estimate of the runoff coefficient of the site after construction activities are completed and existing data describing the soil or the quality of any discharge from the site;
e. A general location map (e.g. portion of a city or county map or similar scale) and a site map indicating:
    1) drainage patterns and approximate slopes anticipated after major grading activities;
    2) construction boundaries and a description of existing vegetation prior to grading activities;
    3) areas of soil disturbance, and areas of no disturbance;
    4) the location of major structures and nonstructural controls identified in the SWPPP;
    5) Locations of areas used for construction support;
    6) the location of areas where stabilization practices are expected to occur;
    7) the location of surface waters (including wetlands); and
    8) locations where storm water is discharged or will discharge to a surface water;
f. A description of any discharge associated with industrial activity other than construction at the site (including storm water discharges from dedicated portable asphalt plants and dedicated portable concrete plants), whether or not those discharges are covered by the Permit; and the location of that activity;
g. The name of the receiving water(s), and aerial extent of wetland acreage at the site; and
h. A copy of this Permit.

3.5.2. Controls. The SWPPP shall employ best management practices to control pollutants in storm water discharges. Each plan shall include a description of appropriate controls and measures that will be implemented during construction activity and while the site is unstabilized. The plan must clearly describe for each major activity identified in Part 3.5.1(b) appropriate control measures and the timing during the construction process that the measures will be implemented. The description and implementation of controls shall address the following minimum components:

a. Erosion and Sediment Controls.
    1) Short and Long Term Goals and Criteria:
        A) The construction-phase erosion and sediment controls should be designed to retain sediment on site to the maximum extent

practicable.

B) All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately, incorrectly, or is ineffective the Permittee must replace or modify the control for site situations.

C) If sediments escape the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize the possibility of offsite impacts such as fugitive sediments washing into storm sewers by the next rain or posing a safety hazard to users of public streets.

D) Sediment must be removed from sediment traps or sedimentation ponds when design capacity has been reduced by 50%.

E) Litter, construction debris, and construction chemicals exposed to storm water shall be picked up prior to anticipated storm events (e.g. forecasted by local weather reports), or otherwise prevented from becoming a pollutant source for storm water discharges (e.g. screening outfalls, picked up daily, etc.).

F) Offsite material storage areas (also including overburden and stockpiles of dirt, etc.) used solely by the Permitted project are considered a part of the project and, unless a Permittee submits a separate NOI for such areas or they are subject to a separate UPDES permit, they shall be addressed in the SWPPP.

2) <u>Stabilization Practices</u>. A description of existing interim and permanent stabilization practices, including site-specific scheduling of the implementation of the practices. SWPPPs should ensure that existing vegetation is preserved where attainable and that disturbed portions of the site are stabilized. Stabilization practices may include: temporary seeding, permanent seeding, mulching, geo-textiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. Use of impervious surfaces for stabilization should be avoided. Except as provided in paragraphs (A) and (B) below (Parts 3.5.2(a)(2)(A) and (B)), stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.

A) Where the initiation of stabilization measures by the 14th day after construction activity temporarily or permanently ceases is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practicable.

B) Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of the site.

3) <u>Structural Practices</u>. The permittee shall provide a description of

structural practices that divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable. Such practices may include silt fences, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins. Placement of structural practices in floodplains should be avoided to the degree attainable. The installation of these devices may be subject to Section 404 of the federal Clean Water Act ("CWA").

A) <u>10 Acre Sediment Basin Requirement</u>. Where attainable, for common drainage locations that serve areas with 10 or more acres disturbed at one time, the Permittee shall provide a temporary (or permanent) sediment basin that provides storage for a 10 year, 24 hour storm event, a calculated volume of runoff for disturbed acres drained, or equivalent control measures, until final stabilization of the site. Where calculations are not performed, a sediment basin providing 3,600 cubic feet of storage per acre drained (a 1 inch storm event), or equivalent control measures, shall be provided where attainable until final stabilization of the site. The required sizing of the sediment basin does not include flows from offsite areas and flows from onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area and the sediment basin. In determining whether installing a sediment basin is attainable, factors such as site soils, slope, and available area on site shall be considered. For drainage locations which serve 10 or more disturbed acres at one time and where a temporary sediment basin or equivalent controls is not attainable, smaller sediment basins and/or sediment traps (with comparable storage) must be used; or

(i) at a minimum, equivalent controls in silt fences, vegetative buffer strips, sod, mulch, geo-textiles, stepped check dams, pipe slope drains or other sediment or erosion controls are required for all erodible areas, down slope boundaries of the construction area and side slope boundaries deemed appropriate as dictated by individual site conditions; or

(ii) it can be shown that site meteorological conditions do not warrant equivalent storage during the time period the 10-acres are destabilized (little or no chance of precipitation for the period of surface destabilization).

B) <u>Less Than 10 Acre BMP Requirement</u>. For drainage locations serving less than 10 acres, sediment basins and/or sediment traps should be used. At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries (and those side slope boundaries deemed appropriate as dictated by individual site conditions) of the construction area unless a sediment basin providing storage for

3,600 cubic feet of storage per acre drained is provided.

b. Storm Water Management. Description of measures that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed. Structural measures should be placed on upland soils to the degree attainable. The installation of these devices may be subject to Section 404 of the CWA. This Permit only addresses the installation of storm water management measures, and not the ultimate operation and maintenance of such structures after the construction activities have been completed and the site has undergone final stabilization. Permittees are only responsible for the installation and maintenance of storm water management measures prior to final stabilization of the site, and are not responsible for maintenance after storm water discharges associated with construction activity have been eliminated from the site. However, post-construction storm water BMPs that discharge pollutants from point sources once construction is completed, may in themselves, need authorization under a separate UPDES permit and are likely regulated under local municipal requirements.
   1) Such measures may include:
      A) storm water detention structures (including wet ponds);
      B) storm water retention structures;
      C) flow-attenuation by use of open vegetated swales and natural depressions;
      D) infiltration of runoff onsite; and
      E) sequential systems (which combine several practices).
   2) The SWPPP shall include an explanation of the technical basis used to select the practices to control pollution where flows exceed predevelopment levels.
   3) Storm water velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel for the purpose of providing a non-erosive flow velocity from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected. The objective is to minimize significant changes in the hydrological regime of the receiving water.

c. Other Controls.
   1) Waste Disposal. No solid materials, including building materials, shall be discharged to waters of the State, except as authorized by a federal CWA Section 404 permits.
   2) Off-site Tracking. Off-site vehicle tracking of sediments and the generation of dust shall be minimized.
   3) Septic, Waste, and Sanitary Sewer Disposal. The SWPPP shall ensure and demonstrate compliance with applicable State and/or local waste disposal, sanitary sewer or septic system regulations.
   4) Exposure to Construction Materials. The SWPPP shall include a narrative description of practices to reduce pollutants from construction related materials which are stored onsite including an inventory of construction materials (including waste materials), storage practices to minimize exposure of the materials to storm water, and spill prevention and

response.

5) Support Areas. A description of pollutant sources from areas other than construction (including storm water discharges from dedicated portable asphalt plants and dedicated portable concrete plants), and a description of controls and measures that will be implemented at those sites.

d. Other Laws and Requirements.

1) Local Storm Water Control Requirements. This Permit does not relieve the Permittee from compliance with other laws effecting erosion and sediment control or requirements for the permanent storm water system. Where applicable, compliance efforts to these requirements should be reflected in the SWPPP.

2) Threatened or Endangered Species & Historic Properties. This Permit does not relieve the Permittee from compliance with Federal or State laws pertaining to threatened or endangered species or historic properties. Where applicable compliance efforts to these laws should be reflected in the SWPPP.

3) Variance of Permit Requirements. Dischargers seeking alternative permit requirements shall submit an individual UPDES permit application in accordance with applicable law to the address indicated in Part 5.11 of this Permit, along with a description of why requirements in this Permit should not be applicable as a condition of a UPDES permit.

3.5.3. Maintenance. All vegetation, erosion and sediment control measures and other protective measures identified in the SWPPP shall be maintained in effective operating condition. A description of procedures to ensure the timely maintenance of these measures shall be identified in the SWPPP. Maintenance needs identified in inspections or by other means shall be accomplished before the next anticipated storm event, or as necessary to maintain the continued effectiveness of storm water controls. If maintenance prior to the next anticipated storm event is impracticable, maintenance must be scheduled and accomplished as soon as practicable.

3.5.4. Inspections.

a. Inspections must be conducted in accordance with one of the two schedules listed below. The Permittee shall specify in its SWPPP which schedule it will be following.

1) At least once every 7 calendar days; or

2) At least once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater.

b. Inspection frequency may be reduced to at least once every month if:

1) The entire site is temporarily stabilized; or

2) Runoff is unlikely due to winter conditions (e.g., site is covered with snow, ice, or the ground is frozen).

c. The inspection requirement is waived until one month before thawing conditions are expected to result in a discharge if all of the following requirements are met:

1) The project is located in an area where frozen conditions are anticipated to continue for extended periods of time (i.e., more than one month);

2) Land disturbance activities have been suspended; and
3) The beginning and ending dates of the waiver period are documented in the SWPPP.

d. Inspections must be conducted by qualified personnel (provided by the operator or cooperatively by multiple operators). "Qualified personnel" means a person knowledgeable in the principles and practice of erosion and sediment controls who possesses the skills to assess conditions at the construction site that could impact storm water quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of storm water discharges from the construction activity.

e. Inspections must include all areas of the site disturbed by construction activity and areas used for storage of materials that are exposed to precipitation. Inspectors must look for evidence of, or the potential for, pollutants entering the storm water conveyance system. Sedimentation and erosion control measures identified in the SWPPP must be observed to ensure proper operation. Discharge locations must be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to waters of the United States, where accessible. Where discharge locations are inaccessible, nearby downstream locations must be inspected to the extent that such inspections are practicable. Locations where vehicles enter or exit the site must be inspected for evidence of off-site sediment tracking.

f. Inspections at construction sites involving utility line installation, pipeline construction, and other long, narrow, linear construction may be more limited if the areas described in Part 3.5.4(e) of this Permit are not reasonably accessible or could cause additional disturbance of soils and increase the potential for erosion. In these circumstances, controls must be inspected at the same frequency as other construction projects, but personnel may instead inspect controls along the construction site for 0.25 mile above and below each access point where a roadway, undisturbed right-of-way, or other similar feature intersects the construction site and allows access to the areas described above. In the absence of evidence to the contrary, the conditions of the controls along each inspected 0.25 mile segment may be considered as representative of the condition of controls along that reach extending from the end of the 0.25 mile segment to either the end of the next 0.25 mile inspected segment, or to the end of the project, whichever occurs first.

g. For each inspection required above, the inspector must complete an inspection report. At a minimum, the inspection report must include:
1) The inspection date;
2) Names, titles, and qualifications of personnel making the inspection;
3) Weather information for the period since the last inspection (or since commencement of construction activity if the first inspection) including a best estimate of the beginning of each storm event, duration of each storm event, approximate amount of rainfall for each storm event (in inches), and whether any discharges occurred;
4) Weather information and a description of any discharges occurring at the time of the inspection;
5) Location(s) of discharges of sediment or other pollutants from the site;

6) Location(s) of BMPs that need to be maintained;
7) Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
8) Location(s) where additional BMPs are needed that did not exist at the time of inspection; and
9) Corrective action required including any changes to the SWPPP necessary and implementation dates.

h. A record of each inspection and of any actions taken in accordance with this Part 3 must be retained as part of the SWPPP for at least three years from the date that permit coverage expires or is terminated. The inspection reports must identify any incidents of non-compliance with the permit conditions. Where a report does not identify any incidents of non-compliance, the report must contain a certification that the construction project or site is in compliance with the SWPPP and this permit. The report must be signed in accordance with Part 5.16 of this Permit.

3.5.5. Non-Storm Water Discharges. Except for flows from fire fighting activities, sources of non-storm water listed in Part 1.5 of this Permit that are combined with storm water discharges associated with industrial activity must be identified in the SWPPP. The SWPPP shall identify and ensure the implementation of appropriate pollution prevention measures for the non-storm water component(s) of the discharge.

PART 4 . TERMINATION/CHANGES IN OWNER/OPERATOR FOR SITE

4.1. Termination of Coverage: Permittees may or shall (as specified) terminate coverage under this Permit under the following conditions:

4.1.1. Completion of construction activities and site stabilization: Permittees shall terminate coverage under this Permit by submitting a Notice of Termination ("NOT") within thirty days after completion of all construction activities, completion of final stabilization of all areas of the site as defined in Part 6.15. The NOT shall be submitted on the form specified by the Executive Secretary.

4.1.2. Partial completion of construction activities and site stabilization: A Permittee who, as specified in Part 3.4 of this Permit, is identified in the SWPPP as responsible for a specific area may terminate coverage under this Permit by submitting an NOT within thirty days after completion, for that area, of all construction activities, completion of final stabilization of all areas for which the Permittee was responsible and that were disturbed. The NOT shall be submitted on the form specified by the Executive Secretary, and the Permittee shall indicate on the form that it is a partial NOT.

4.1.3. New responsible owner/operator: A Permittee may terminate its coverage under this Permit by submitting an NOT if another party (or parties) assumes responsibility for all remaining SWPPP requirements. Termination of the Permittee's responsibilities under the SWPPP will not be final until the other party (or parties) submits an NOI. If the new responsible owner/operator fails to submit an NOI, the Permittee may complete termination by demonstrating to the Executive Secretary that it has entered into contracts that obligate the new owner/operator to undertake all remaining responsibilities under the SWPPP.

4.2. Conditions for Submitting an NOT: A Permittee may not submit an NOT unless it meets the requirements specified in Part 4.1. Appropriate enforcement actions may be taken if an NOT is submitted without these requirements having been met, and the Permittee may also continue to be responsible for any Permit violations.

4.3. Updating the SWPPP: If an NOT is submitted under Part 4.1.2 or 4.1.3, the SWPPP shall be updated by the remaining Permittee(s) to meet the requirements of Part 3.4 of the Permit.

PART 5. STANDARD PERMIT CONDITIONS

5.1. Duty to Comply.

5.1.1. The Permittee must comply with all conditions of this Permit. Any Permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for Permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

5.1.2. Penalties for Violations of Permit Conditions.

a. Violations. The Act provides that any person who violates the Act, Utah wastewater rules, or conditions of a permit issued under the Act is subject to a fine of $10,000 per day.

b. Willful or Gross Negligence. The Act provides that any person who discharges a pollutant to waters of the State as a result of criminal negligence or who intentionally discharges is criminally liable and is subject to imprisonment and a fine of up to $50,000 per day. Utah Code Ann. § 19-5-115.

c. False Statements. The Act provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act, the rules, or this Permit, or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act shall upon conviction , be punished by a fine of not more than $10,000 or by imprisonment for 6 months, or by both. Utah Code Ann. § 19-5-115(4).

5.2. Dut y to Reapply. If a Permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, it must apply for and obtain a new permit except as provided in Part 2.4 of this Permit.

5.3. Need to halt or reduce activity not a defense. It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Permit.

5.4. Duty to Mitigate. The Permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this Permit which has a reasonable likelihood of adversely affecting human health or the environment.

5.5. Duty to Provide Information. The Permittee shall furnish to the Executive Secretary or an authorized representative, within a reasonable time, any information which is requested to determine compliance with this Permit. The Permittee must also furnish to the Executive Secretary or an authorized representative copies of records to be kept by this Permit.

5.6. Other Information. When the Permittee becomes aware that he or she failed to submit any relevant facts or submitted incorrect information in the Notice of Intent or in any other report to the Executive Secretary, he or she shall promptly submit such facts or information.

5.7. Oil and Hazardous Substance Liability. Nothing in this Permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties to which the Permittee is or may be subject under the "Act".

5.8. Property Rights. The issuance of this Permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

5.9. Severability. The provisions of this Permit are severable, and if any provision of this Permit, or the application of any provision of this Permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Permit shall not be affected thereby.

5.10. Record Retention.

5.10.1. The Permittee shall retain copies of SWPPPs and all reports required by this Permit, and records of all data used to complete the Notice of Intent to be covered by this Permit, for a period of at least three years from the date that the site is finally stabilized. This period may be extended by request of the Executive Secretary at any time.

5.10.2. After final stabilization of the construction site is complete, the SWPPP is no longer required to be maintained on site, but may be maintained by the Permittee(s) at its primary headquarters. Access to the SWPPP will continue as described in Part 3.2, however.

5.11. Addresses. All written correspondence under this permit shall be directed to the Division of Water Quality at the following address:

Department of Environmental Quality
Division of Water Quality
288 North 1460 West
PO Box 144870
Salt Lake City, Utah 84114-4870

5.12. State Laws.

5.12.1. Nothing in this Permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Utah Code Ann. § 19-5-117.

5.12.2. No condition of this Permit shall release the Permittee from any responsibility or requirements under other environmental statutes or regulations.

5.13. Proper Operation and Maintenance. The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this Permit and with the requirements of SWPPPs. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a Permittee only when necessary to achieve compliance with the conditions of the Permit.

5.14. Inspection and Entry. The Permittee shall allow, upon presentation of credentials, the Executive Secretary or an authorized representative:

5.14.1. To enter upon the Permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this Permit;

5.14.2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this Permit;

5.14.3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and

5.14.4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by law, any substances or parameters at any location.

5.15 Reopener Clause.

5.15.1. Reopener Due to Water Quality Impacts. If there is evidence indicating that the storm water discharges authorized by this Permit cause, have the reasonable potential to cause or contribute to, a violation of a water quality standard, the discharger may be required to obtain an individual permit or an alternative general permit in accordance with Part 2.3 of this Permit or the Permit may be modified to include different limitations and/or requirements.

5.15.2. Reopener Guidelines. Permit modification or revocation will be conducted according to UAC R317-8-5.6 and UAC R317-8-6.2.

5.15.3. Permit Actions. This Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Permittee for a Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Permit condition.

5.16. Signatory Requirements.

5.16.1. All Notices of Intent, SWPPPs, reports, certifications or information submitted to the Executive Secretary, or that this Permit requires be maintained by the Permittee, shall be signed as follows:

a. All Notices of Intent shall be signed as follows:

1) For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or the manager of one or more manufacturing, production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25,000,000 (in second-quarter 1980 dollars) if authority to sign

documents has been assigned or delegated to the manager in accordance with corporate procedures;

2) For a partnership of sole proprietorship: by a general partner or the proprietor, respectively; or

3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes (1) the chief executive officer of the agency, or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g. Regional Administrators of EPA).

b. All reports required by the Permit and other information requested by the Executive Secretary or by an authorized representative of the Executive Secretary shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1) The authorization is made in writing by a person described above and submitted to the Executive Secretary; and

2) The authorization specifies either an individual or a position having responsibility for overall operation of the regulated site, facility or activity, such as the position of manager, operator, superintendent, or position of equivalent responsibility or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position).

c. Certification. Any person signing documents under this Part 5.16 shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

5.16.2. If a document is to be signed electronically, the Division's rules regarding electronic transactions govern.

PART 6. DEFINITIONS

As used in this Permit:

6.1. "Act" means the "Utah Water Quality Act"

6.2. "Best Management Practices" ("BMPs") means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

6.3. "Common plan of development or sale" means one plan for development or sale, separate parts of which are related by any announcement, piece of documentation (including a sign, public notice or hearing, sales pitch, advertisement, drawing, plat, blueprint, contract, permit application, zoning request, computer design, etc.), physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.), or continuing obligation (including contracts) that identify the scope of the project. A plan may still be a common plan of development or sale even if it is taking place in separate stages or phases, is planned in combination with other construction activities, or is implemented by different owners or operators.

6.4. "Commencement of Construction" means the initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.

6.5. "Construction activity" means soil disturbing activities such as clearing, grading, and excavating of land. The term also includes construction support activities.

6.6. "Construction support activities" means construction material and equipment storage and maintenance, concrete or asphalt batch plants, except as provided in Part 1.4.3 of this Permit.

6.7. "Control Measure" refers to any Best Management Practice or other method used to prevent or reduce the discharge of pollutants to waters of the State.

6.8. "CWA" means Clean Water Act or the Federal Water Pollution Control Act.

6.9. "Dedicated portable asphalt plant" means a portable asphalt plant that is located on or contiguous to a construction site and that provides asphalt only to the construction site that the plant is located on or adjacent to.

6.10. "Dedicated portable concrete plant" means a portable concrete plant that is located on or contiguous to a construction site and that provides concrete only to the construction site that the plant is located on or adjacent to.

6.11. "Discharge," when used without qualification, means the discharge of a pollutant.

6.12. "EPA" means the United States Environmental Protection Agency.

6.13. "Eligible" means qualified for authorization to discharge storm water under this general permit.

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

6.15. "Final Stabilization" means that all soil disturbing activities at the site have been completed, and that a uniform (e.g. evenly distributed, without large bare areas) perennial vegetative cover with a density of 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geo-textiles) have been employed. In some parts of the country, background native vegetation will cover less than 100% of the ground (e.g. arid areas). Establishing at least 70% of the natural cover of native vegetation meets the vegetative cover criteria for final stabilization. For example, if the native vegetation covers 50% of the ground, 70% of 50% would require 35% total cover for final stabilization. For individual lots in residential construction, final stabilization means that either the homebuilder has completed final stabilization as specified above, or the homebuilder has established temporary stabilization including perimeter controls for an individual lot prior to occupation of the home by the homeowner and has obligated the homeowner, by contract, to complete the requirements for final stabilization within two years.

6.16. "Indian Country" is defined as in 40 CFR §122.2 to mean:
1. All land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation;
2. All dependent Indian communities within the borders of the United States whether within the originally or subsequently acquired territory thereof, and whether within or without the limits of a state; and
3. All Indian allotments, the Indian titles to which have not been extinguished, including rights-of-ways running through the same.

6.17. "Municipal Separate Storm Sewer System" refers to all separate storm sewers that are owned or operated by the United States, a State, city, town, county, district, association, or other public body having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer districts, flood control districts or drainage districts, or similar entity that discharges to waters of the State.

6.18. "NOI" means notice of intent to be covered by this Permit.

6.19. "NOT" means notice of termination.

6.20. "Point Source" means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

6.21. "Runoff coefficient" means the fraction of total rainfall that will appear at conveyance as runoff.

6.22. "Site" means the land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity.

6.23. "Storm water" means storm water runoff, snow melt runoff, and surface runoff and drainage.

6.24. "Storm water discharge associated with industrial activity" is defined in the Utah Administrative Code (UAC) R317-8-3.9(6)(c) & (d) and incorporated here by reference. Most relevant to this Permit is UAC R317-8-3.9(6)(d)10, which relates to construction activity including clearing, grading and excavation activities.

6.25. SWPPP means Storm Water Pollution Prevention Plan, referring to the plan required in Part 3 of this Permit.

6.26. "Total Maximum Daily Load" or "TMDL" means the sum of the individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background. If a receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure.

6.27. 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 throw, or border upon this state or any portion thereof, except that 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 (UAC R317-1-1.31).

Attachment C:
Bruin Point Mine Reclamation Seed Mix

Common Name	Scientific Name	Pounds PLS/acre
Grasses		
Sandberg Bluegrass	*Poa secunda*	0.4
Idaho Fescue	*Festuca idahoensis*	0.8
Sheep Fescue	*Festuca ovina*	0.5
Mountain Brome	*Bromus marginatus*	3.9
Forbs		
Gooseberry-leaved Globemallow	*Sphaeralcea grossulariifolia var. grossulariifolia*	0.4
Oregon Daisy	*Erigeron speciosus Var. mollis*	0.1
Richardson Geranium	*Geranium richardsonii*	3.4
Western Sweetroot	*Osmorhiza occidentalis*	5.9
Blue Mountain Penstemon	*Penstemon rydbergii*	0.2
Shrubs		
Big Sagebrush	*Artemisia tridentata Var. vaseyana*	0.1
Utah Serviceberry	*Amelanchier utahensis*	0.4
Red Elderberry	*Sambucus racemosa*	1.1
TOTAL		**17**

Notes:
PLS = Pure Live Seed

The planting rate indicated (pounds PLS/acre) is for broadcast seeding.

Bruin Point Mine
Stormwater Construction Site Inspection Report

General Information			
Date of Inspection		**Start/End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Describe present phase of construction			
Type of Inspection: ❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? ❑Yes ❑No **If yes, provide:** Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):			
Weather at time of this inspection? ❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds ❑ Other: Temperature:			
Have any discharges occurred since the last inspection? ❑Yes ❑No **If yes, describe:**			
Are there any discharges at the time of inspection? ❑Yes ❑No **If yes, describe:**			

Site-specific BMPs

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
1	Sediment Traps	❑Yes ❑No	❑Yes ❑No	
2	Slope Drains and Temporary Berms	❑Yes ❑No	❑Yes ❑No	
3	Silt Fencing	❑Yes ❑No	❑Yes ❑No	
4	Pipe Inlet Barriers	❑Yes ❑No	❑Yes ❑No	
5	Check Dams	❑Yes ❑No	❑Yes ❑No	

Overall Site Issues

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
2	Is the silt fence adequately installed and maintained?	❑Yes ❑No	❑Yes ❑No	
3	Are sediment trap and temporary ditch free of excessive accumulated sediment (i.e., less than 50 percent of capacity)?	❑Yes ❑No	❑Yes ❑No	
4	Are sediment trap and temporary ditch draining properly and free of damage from erosion?	❑Yes ❑No	❑Yes ❑No	
5	Is the construction exit preventing sediment from being tracked into the street?	❑Yes ❑No	❑Yes ❑No	
6	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	
7	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	
8	Are materials that are potential stormwater contaminants stored inside or under cover?	❑Yes ❑No	❑Yes ❑No	

Non-Compliance

Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and title: ____

Signature:______________________________________ **Date:**______________

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

January 14, 2015

Regulatory Division (SPK-2014-00574-UO)

Green River Resources, Inc.
Attn: Mr. William Gibbs
201 South Main, Suite 1800
Salt Lake City, Utah 84111

Dear Mr. Gibbs:

We are responding to your December 18, 2014 request for an approved jurisdictional determination for the Bruin Point Mine site. The approximately 207-acre site is located in the Roan Cliffs area within Sections 3 and 10, Township 14 South, Range 14 East, Salt Lake Meridian, near Latitude 39.6316°, Longitude -110.3252°, approximately 6 miles northeast of Sunnyside, Carbon County, Utah (enclosures 1-2).

Based on available information, we concur with the findings of the December 18, 2014 "Inventory of Waters of the U.S. Proposed Bruin Point Mine" delineation report, prepared by URS Corporation (enclosure 3). The wetland delineation report concludes the survey area contains no jurisdictional wetlands or waters of the U.S.

This determination is valid for five years from the date of this letter, unless new information warrants revision of the determination before the expiration date. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 Code of Federal Regulations (CFR) Part 331.

A combined Notification of Appeal Process and Request for Appeal form is enclosed (enclosure 4). If you request to appeal this determination you must submit a completed Request for Appeal form to the South Pacific Division Office at the following address: Administrative Appeal Review Officer, Army Corps of Engineers, South Pacific Division, CESPD-PDO, 1455 Market Street, 2052B, San Francisco, California 94103-1399, Telephone: 415-503-6574, FAX: 415-503-6646.

In order for a Request for Appeal to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR Part 331.5, and that it has been received by the Division Office within 60 days of the Notification of Appeal Process. Should you decide to submit a Request for Appeal form, it must be received at the above address by 60 days from the date of this letter. It is not necessary to submit a Request for Appeal form to the Division Office if you do not object to the determination in this letter.

You should provide a copy of this letter and notice to all other affected parties, including any individual who has an identifiable and substantial legal interest in the property.

This determination has been conducted to identify the limits of Corps of Engineers' Clean Water Act jurisdiction for the particular site identified in this request. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are U.S. Department of Agriculture (USDA) program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

We appreciate your feedback. At your earliest convenience, please tell us how we are doing by completing the Customer Survey from the link on our District program website at *www.spk.usace.army.mil/Missions/Regulatory.aspx*.

Please refer to identification number SPK-2014-00574-UO in any correspondence concerning this project. If you have any questions, please contact Timm Kennedy at the Utah Regulatory Office, 533 West 2600 South, Suite 150, Bountiful, Utah 84010, email *Timm.A.Kennedy@usace.army.mil*, or telephone at 801-295-8380, extension 12.

Sincerely,

John Urbanic
Senior Project Manager, UT/NV Branch
Regulatory Division

Enclosures

cc (w/o encls):

Ms. Harriet Natter, URS Corporation (harriet.natter@urs.com)

U.S. Department of Labor
Occupational Safety and Health Administration

MATERIAL SAFETY DATA SHEET

SECTION I: - PRODUCTION INFORMATION

Product Name/Identifier:	UOR-1776
Product Number:	TS-101
Product Use:	Hydrocarbon Extraction Solvent
SUPPLIER:	UNIVERSAL OIL RECOVERY LLC 26027 S. Nottingham Dr. Sun Lakes, Arizona, 85248
EMERGENCY PHONE NUMBER:	(480) 239-7700
DATE PREPARED:	February 02, 2012, Revised Sept 22 2014

Read this MSDS prior to use or disposal of the product. Share this information with employees, customers, and other users of this product.

SECTION II: - CHEMICAL COMPOSITION

This product is a blend of various chemical components that are based upon and composed of non-carcinogenic chemical compounds.

None of these components or compounds are identified on the CalEPA List of Lists, Dated November 1991, or in the National Toxicology Program Annual Report on Carcinogens, Twelfth Edition 2011.

This chemical compound and its various applications are considered Trade Secrets and may be the subject of patents or patent applications. Upon the granting of the patent(s) related to the compound, the identity of the components may be released. Based upon the foregoing, at this time the identity of the components are considered to be protected as proprietary under the Uniform Trade Secrets Act.

Use maximum protection when handling the product, as detailed below.

SECTION III: - HAZARDS IDENTIFICATION

UOR-1776 is non-flammable and does not have a flash point, but its vapors can form a mixture that could be flammable at >4.0%-9.0% volume concentration with air.

INHALATION	May irritate nose, throat, and respiratory systems, with symptoms of headache, nausea, dizziness, coughing or shortness of breath. Prolonged overexposure may adversely affect the liver, kidney and respiratory, reproductive and central nervous systems.
EYES	May cause irritation with symptoms of redness, tearing, stinging
SKIN	Through cuts, punctures and abrasions; may cause irritation with symptoms of rash, burning, itching or swelling
INGESTION	Through accidental drinking or swallowing; may cause irritation of mouth and intestinal tract, with symptoms of nausea, vomiting or headaches. Aspiration into the lungs after ingestion could result in lung damage.

SECTION IV: - FIRST AID MEASURES

INHALATION	Immediately remove person to fresh air. If breathing stops, provide CPR rescue breathing. If breathing is difficult, administer oxygen by qualified personnel. Obtain medical attention immediately.
EYES	For direct eye contact, flush eyes with large quantities of running water for at least 15 minutes and obtain medical attention: 1) for external areas, treat as a burn due to the fact that the epidermal layer may blister from rapid de-oiling; 2) for direct eye contact, treat as an eye abrasion.
SKIN	Remove contaminated clothing and wash skin with mild soap and running water. If irritation persists, obtain medical attention. Wash clothing before re-use. For dry skin, apply hand lotion. Drying of exposed skin can be mitigated with a high oil / high lanolin / vitamin E lotion treatment.
INGESTION	If swallowed, DO NOT induce vomiting. Obtain medical attention immediately.

SECTION V: - FIRE-FIGHTING MEASURES

FLASH POINT:	None, per ASTM Methods
FLAMMABLE LIMITS:	4.0%-9.0% by volume in air
METHOD USED:	OSHA 29 CFR 1910.106 criteria
AUTO-IGNITION TEMPERATURE	>480° C
EXTINGUISHING MEDIA:	Water may not be effective Use carbon dioxide, dry chemical powder, alcohol foam or polymer foam
SPECIAL FIRE FIGHTING PROCEDURES	Wear NIOSH/MSHA-approved self-contained breathing apparatus and protective fire-retardant clothing to prevent eye and skin contact. Water may be used to cool containers and equipment exposed to heat or flame. Dike area to prevent runoff.
UNUSUAL FIRE AND EXPLOSION HAZARDS:	Vapor may form a flammable mixture in a concentration of 4.0%-9.0% by volume in air. Carbon monoxide, carbon dioxide, and other oxides may be generated as products of combustion. Containers exposed to intense heat or flame may explode due to increased internal pressures.

SECTION VI: - ACCIDENTAL RELEASE MEASURES

Cordon off spill site and warn all people in vicinity. For large spills, evacuate and ventilate the effected site. If the product has contaminated the ground water, inform the appropriate authority. Wear self-contained breathing apparatus and recommended personal protective equipment. Contain spillage or leakage with dams or absorbent material to prevent migration into sewer, waterway or confined spaces. Dam and absorb spillages with earth, sand, or other non-combustible absorbent material (sawdust or vermiculite) and sweep into sealable containers for disposal in accordance with local, state, and federal disposal regulations.

SECTION VII: - HANDLING AND STORAGE

HANDLING	Avoid inhalation, skin and eye contact by wearing protective clothing, including safety glasses and non-rubber gloves. Use full face plastic shield to avoid injury from accidental splashing. Always wash hands and face thoroughly before eating, drinking, and smoking. Do not eat in the vicinity of operations.
STORAGE	Store in dry, ventilated, cool area in clearly labeled closed containers away from ignition sources and other incompatible chemicals

SECTION VIII: - EXPOSURE CONTROLS AND PERSONAL PROTECTION

EXPOSURE CONTROLS	Do not use in confined spaces without use of ambient or mechanical exhaust ventilation.
EXPOSURE LIMITS	OSHA Permissible Exposure Limit not established. A workplace exposure guideline of 99 ppm 8 hour time weighted average (TWA) is recommended based on information for compounds contained in the product.
EYE PROTECTION	Use safety goggles or full face shield.
RESPIRATORY PROTECTION	Use NIOSH-approved vapor respirators with carbon filters or self-contained breathing apparatus with full face shield, due to possible exposure to other reactive agents, if ventilation is insufficient or depending on concentration of product in air.
GLOVES AND CLOTHING	Wear cover-all uniforms and use non-rubber gloves that are resistant to the product (Teflon or polyethylene gloves)
OTHER PROTECTIONS	On-site safety-shower and eye-wash station

SECTION IX: - PHYSICAL AND CHEMICAL PROPERTIES

CHEMICAL FAMILY:	Trade-Secret Chemical Blend
APPEARANCE:	Clear, colorless or yellow liquid; mild odor
BOILING POINT (Degrees F):	<175° F
VAPOR PRESSURE: (mm Hg):	~110-114 mm fig at 20° C
VAPOR DENSITY (Air=1):	~4.2-44
SOLUBILITY IN WATER:	~0.22-0.27 g/100ml at 20° C
SPECIFIC GRAVITY ($H_20 = 1$)	1.30-1.33 at 20° C
MELTING/FREEZING POINT:	Less than at -74° F
FLASH POINT:	None
AUTO IGNITION TEMPERATURE:	>450° C

SECTION X: - REACTIVITY AND STABILITY DATA

STABILITY:	Stable under recommended storage and handling
CONDITIONS TO AVOID:	Avoid all sources of ignition, oxidation and sunlight
INCOMPATIBILITY:	May react with strong oxidizing agents, alkalis, bases, reactive metals and natural rubber.
HAZARDOUS DECOMPOSITION OR BY-PRODUCTS:	Carbon monoxide, carbon dioxide

SECTION XI: - TOXICOLOGICAL INFORMATION

Exposure may cause eye, nose and respiratory irritation.

LD50 Oral – Rat	>4000 mg/kg
LC50 Inhalation – Rat	>235,000 mg per m^3/one-half hour
Ames Test	Negative (no harmful results)
Eyes	Irritates
Skin	Irritates
Ingestion	Irritates mucous membranes
Inhalation	Irritates respiratory system
NTP / IARC / OSHA Listing	None (not on list of carcinogens)
Pre-existing Disorders	Pre-existing skin, lung, liver and kidney disorders may be aggravated by exposure

Component data showed no known teratogen, mutagen or other reproductive effects or genetic impairment.

SECTION XII: - ECOLOGICAL INFORMATION

The product is heavier than, and is immiscible in water. It should not be used or disposed of in any manner where it can enter or be mixed with ground or surface water.

SECTION XIII: - WASTE DISPOSAL

The product is heavier than, and is immiscible in water. It should not be used or disposed of in any manner where it can enter or be mixed with ground or surface water. All materials containing the product as well as the product itself, should be sealed in containers for disposal in accordance with all applicable local, state and federal regulations.

SECTION XIV – TRANSPORTATION INFORMATION

Shipping Information:

Not regulated as dangerous goods according to TDG Regulations or DOT Hazard Class. Not regulated as hazardous material according to 49 CFR Hazardous Materials Regulations.

Not regulated as dangerous goods according to ICAO Technical Instructions or IATA Regulations.

SECTION XV – REGULATORY INFORMATION

See Section XIV. This product's components are listed in and comply with TSCA requirements.

SECTION XVI – OTHER INFORMATION

The information presented herein is based on data from the component chemical suppliers, which is considered to be accurate to the best knowledge of Universal Oil Recovery LLC, as of the date of this Material Safety Data Sheet. Universal Oil Recovery disclaims all expressed or implied warranties or representations of any kind, including but not limited to the completeness of the foregoing data and safety information or applicability of the product for a specific use. Universal Oil Recovery LLC assumes no responsibility or liability for any damage or injury resulting from reliance on this information or from the use or misuse of this product or from any failure to adhere to recommended practices detailed herein. The user is responsible for determining if the product is suitable for the user's intended use, and assumes all risk and liability for such use and for ultimate disposal of the product, in compliance with all applicable federal, state and local regulations.

END OF MSDS

Solvent Properties

Avg. Liq. Density [lbmole/ft3]	0.606532
Cost Based on Flow [Cost/s]	0
Cp/(Cp - R)	1.060829
Cp/Cv	1.425443
Cp/Cv (Ent. Method)	1.317154
Cv [Btu/lbmole-F]	24.29583
Cv (Ent. Method) [Btu/lbmole-F]	26.29331
Cv (Semi-Ideal) [Btu/lbmole-F]	32.64648
Heat Capacity [Btu/lbmole-F]	34.63233
Heat of Vap. [Btu/lbmole]	13046.29
Kinematic Viscosity [cSt]	0.365614
Liq. Mass Density (Std. Cond) [lb/ft3]	68.01687
Liq. Vol. Flow (Std. Cond) [barrel/day]	0.992885
Liq. Vol. Flow - Sum(Std. Cond) [barrel/day]	0.992885
Liquid Fraction	1
Mass Cv [Btu/lb-F]	0.218207
Mass Cv (Ent. Method) [Btu/lb-F]	0.236147
Mass Cv (Semi-Ideal) [Btu/lb-F]	0.293207
Mass Density [lb/ft3]	67.96754
Mass Enthalpy [Btu/lb]	-566.892
Mass Entropy [Btu/lb-F]	0.194906
Mass Heat Capacity [Btu/lb-F]	0.311042
Mass Heat of Vap. [Btu/lb]	117.1722
Molar Density [lbmole/ft3]	0.610435
Molar Volume [ft3/lbmole]	1.638178
Molecular Weight	111.3429
Partial Pressure of CO2 [psia]	0
Partial Pressure of H2S [psia]	0
Phase Fraction [Act. Vol. Basis]	0
Phase Fraction [Mass Basis]	0
Phase Fraction [Molar Basis]	0
Phase Fraction [Vol. Basis]	0
Reid VP at 37.8 C [psia]	4.827108
Specific Heat [Btu/lbmole-F]	34.63233
Std. Gas Flow [MMSCFD]	1.29E-03
Std. Ideal Liq. Mass Density [lb/ft3]	67.53296
Surface Tension [dyne/cm]	25.48794
Thermal Conductivity [Btu/hr-ft-F]	6.63E-02
True VP at 37.8 C [psia]	4.827478
Viscosity [cP]	0.398057
Viscosity Index	-16.2888
Watson K	7.858378
Z Factor	3.97E-03

Analytical Results
Green River Resources, Inc.
American Sands Energy Corporation

January 2012 Analytical Results

In January 2012, Green River Resources, Inc. (GRR) batch collected three samples of processed ore. The samples were processed using American Sands Energy Corp. (ASEC's) proprietary solvent in a manner designed to emulate, as accurately as possible, the process that the company plans to use on a production scale at the mine site. The processed samples replicate, to the extent possible, the sand tailings that will be generated by the production facility when the site is in operation.

For each of the samples, three sample containers were filled and sent to American West Analytical Laboratories (AWAL) in Salt Lake City, Utah for analysis. The three processed ore samples are identified as: 1A+BC, 2A+BC, and 3A+BC, where "A," "B," and "C" represent the three sample containers.

Each sample was analyzed for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) using U.S. Environmental Protection Agency (EPA) Method 1312, the Synthetic Precipitation Leaching Procedure (SPLP), which simulates rainfall and snowmelt that might infiltrate a stockpile of the sample material and the resulting leachate that might seep out of the stockpile. The purpose of this SPLP procedure is to estimate the maximum level of contaminants with the potential to leach from the stockpile into soil, and potentially groundwater, underneath. The SPLP extract was also analyzed for general water quality parameters, including nitrate/nitrate as nitrogen (N), chloride, total dissolved solids (TDS), and total organic carbon (TOC), as well as oil and grease (O&G) and total recoverable petroleum hydrocarbons (TRPH). O&G and TRPH are of interest since they are the nearest proxies for bitumen (the compound for which the ore is processed).

The results of the SPLP analyses are shown in **Table 1**. The general water quality parameters, O&G, and TRPH analyses are also included in **Table 1**. Samples with compound concentrations in excess of Utah Groundwater Quality Standards (GWQS) are bolded. The GWQS, as codified in Utah Administrative Code (UAC) R317-6-2.1 (UDEQ, 2014), are listed in **Table 2. Table 3** demonstrates the Utah Initial Screening Levels for groundwater, which constitute the action levels for excavating leaking underground storage tanks (UDEQ, 2005). Though the initial screening levels are not applicable to tailings or stockpiles, they are included to provide a standard for comparison, particularly for TPH-DRO and TPH-GRO.

Laboratory analytical results indicate the pH of the leaching solution under the SPLP analysis ranges from 9.35-9.42. These values are above the Utah GWQS pH limits of 6.5-8.5. The benzene concentration in Sample 3A+BC, 0.00516 milligrams per liter (mg/L), was the only other compound above Utah GWQS. The majority of compounds were non-detect. The full laboratory analytical reports from AWAL are attached.

The full laboratory analytical reports from AWAL are included with this report.

September 2012 Analytical Results

In September 2012, GRR batch collected three samples of processed ore and one sample of raw tar sands from the Sunnyside, Utah ore body. The samples were processed similarly to the January 2012 samples. The processed samples replicate, to the extent possible, the sand tailings that will be generated by the production facility when the site is in operation.

For each of the samples, two sample containers were filled and sent to AWAL in Salt Lake City, Utah for analysis. The three processed ore samples are identified as: U-001A/B, U-002A/B, and U-003A/B and the raw tar sands sample as: U-004A/B, where "A" and "B" designate the two sample containers.

Each sample was analyzed for VOC and SVOC using U.S. EPA Method 1312 (SPLP). The SPLP extract was also analyzed for general water quality parameters, including chloride, total dissolved solids (TDS), and total organic carbon (TOC). In addition, the raw tar sands sample (U-004B) was analyzed for O&G and TRPH.

The results of the SPLP analyses are shown in **Table 4**. The general water quality parameters, O&G, and TRPH analyses are also shown in **Table 4**. Samples with compound concentrations in excess of Utah Groundwater Quality Standards (GWQS) are bolded.

Laboratory analytical results indicate the pH of the leaching solution from the SPLP analysis ranges from 3.6-6.27. These values are below the Utah GWQS pH limits of 6.5-8.5. A leaching solution of pH 4.2 is used under SPLP analysis to simulate the pH of acid rain. The SPLP procedure instructs that for mine waste, an acidic extraction fluid (of pH 4.2) should be used. There were no other analytes in violation of the Utah GWQS.

Sample U-004B, the raw tar sands sample, contained 34,900 mg/kg O&G and 13,400 mg/kg TRPH. However, in the SPLP analyses, O&G and TRPH were below the detection limit (3 mg/L). The results indicate the low mobility of these components in the environment.

The full laboratory analytical reports from AWAL are included with this report.

The laboratory analytical results from January 2012 and September 2012 help demonstrate that the stockpiles of raw tar sand and processed ore produced by the ASEC process pose a *de minimis* risk to the general environment, specifically groundwater, from seepage of precipitation through the stockpile.

References

Utah Department of Environmental Quality (UDEQ), 2005. Initial Screening Levels. Utah Administrative Code R311-205. November 2005. <http://www.deq.utah.gov/ProgramsServices/programs/tanks/lust/docs/2006/08Aug/cleanupLevels.pdf>

Utah Department of Environmental Quality (UDEQ), 2014. Utah Ground Water Protection Program. Ground Water Quality Standards – Table 1 of R317-6-2.1. June 2014.

Tables:

Table 1 – January 2012 Analytical Data
Table 2 – Utah Groundwater Quality Standards
Table 3 – Utah Initial Screening Levels
Table 4 – September 2012 Analytical Data

Table 1
January 2012 Analytical Data

Analytical Result SPLP Metals Method 1312				
Compound	**Units**	**Sample ID**		
		1A,B+C	**2A,B+C**	**3A,B+C**
Antimony	mg/L	< 0.00100	< 0.00100	< 0.00100
Arsenic	mg/L	0.00106	0.00146	0.00135
Barium	mg/L	0.012	0.0124	0.0142
Beryllium	mg/L	< 0.000600	< 0.000600	< 0.000600
Boron	mg/L	< 0.500	< 0.500	< 0.500
Cadmium	mg/L	< 0.000180	< 0.000180	< 0.000180
Calcium	mg/L	1.27	1.31	1.86
Chromium	mg/L	< 0.0100	< 0.0100	< 0.0100
Copper	mg/L	0.00161	0.0013	0.00134
Iron	mg/L	0.782	1.2	1.1
Lead	mg/L	0.00071	0.000846	0.000676
Lithium	mg/L	< 0.100 ~	< 0.100 ~	< 0.100 ~
Magnesium	mg/L	< 1.00	< 1.00	< 1.00
Manganese	mg/L	0.216	0.243	0.366
Mercury	mg/L	< 0.0100 *	< 0.0100 *	< 0.0100 *
Molybdenum	mg/L	< 0.0200	< 0.0200	< 0.0200
Nickel	mg/L	0.00336	0.00364	0.00449
Pottassium	mg/L	< 1.00	< 1.00	< 1.00
Selenium	mg/L	< 0.000800	0.00105	< 0.000800
Silver	mg/L	< 0.000400	< 0.000400	< 0.000400
Sodium	mg/L	1.07	< 1.00	< 1.00
Strontium	mg/L	< 0.0500	< 0.0500	< 0.0500
Thallium	mg/L	< 0.000400	0.000692	< 0.000400
Tin	mg/L	< 0.500	< 0.500	< 0.500
Vanadium	mg/L	< 0.0500	< 0.0500	< 0.0500
Zinc	mg/L	0.0245	0.021	0.0156
Alkalinity (as $CaCO_3$)	mg/L	14.6	13.7	10.9
Chloride	mg/L	< 0.100	< 0.100	< 0.100
Fluoride	mg/L	< 0.100	< 0.100	< 0.100
Nitrate/Nitrite (as N)	mg/L	0.0419	0.0407	0.0422
Oil & Grease	mg/L	3.07	4.39	3.69
pH	s.u.	**9.42**	**9.42**	**9.35**
Sulfate	mg/L	2.63	2.68	3.13
Total Dissolved Solids	mg/L	< 20.0	< 20.0	< 20.0
Total Organic Carbon	mg/L	3.96	4.58	4.51

Notes:

Bold indicates an exceedance of DWQ water quality standards.

< - Value is less than reporting limit.

* - The reporting limits were raised due to sample matrix interferences.

~ - Result was not performed in accordance with National Environmental Laboratory Accreditation Program (NELAP) requirements.

µmhos/cm - micromhos per centimeter

mg/L - milligram per liter

N - Nitrogen

SPLP - Synthetic Precipitation Leaching Procedure

s.u. - standard unit

$CaCO_3$ - Calcium Carbonate

Table 1
January 2012 Analytical Data

Analytical Result GC/MS Method 8270D/3510C*				
Compound	Units	Sample ID		
		1A,B+C	2A,B+C	3A,B+C
1,1 '-Biphenyl	mg/L	< 0.0100	< 0.0100	< 0.0100
1,2,4,5-Tetrachl oro benzene	mg/L	< 0.0100	< 0.0100	< 0.0100
1,2,4-Trichlorobenzene	mg/L	< 0.0100	< 0.0100	< 0.0100
1,2-Dichlorobenzene	mg/L	< 0.0100	< 0.0100	< 0.0100
1,3,5-Trinitrobenzene	mg/L	< 0.0100	< 0.0100	< 0.0100
1,4-Naphthoquinone	mg/L	< 0.0100	< 0.0100	< 0.0100
1,3-Dichlorobenzene	mg/L	< 0.0100	< 0.0100	< 0.0100
1,3-Dinitrobenzene	mg/L	< 0.0100	< 0.0100	< 0.0100
1,4-Dichlorobenzene	mg/L	< 0.0100	< 0.0100	< 0.0100
1,4-Phenylenediamine	mg/L	< 0.0100	< 0.0100	< 0.0100
1-Chloronaphthalene	mg/L	< 0.0100	< 0.0100	< 0.0100
1-Methylnaphthalene	mg/L	< 0.0100	< 0.0100	< 0.0100
1-Naphthylamine	mg/L	< 0.0100	< 0.0100	< 0.0100
2,3,4,6-Tetrachlorophenol	mg/L	< 0.0100	< 0.0100	< 0.0100
2,4,5-Trichlorophenol	mg/L	< 0.0100	< 0.0100	< 0.0100
2,4,6-Trichlorophenol	mg/L	< 0.0100	< 0.0100	< 0.0100
2,4-Dichlorophenol	mg/L	< 0.0100	< 0.0100	< 0.0100
2,4-Dimethylphenol	mg/L	< 0.0100	< 0.0100	< 0.0100
2,4-Dinitropbenol	mg/L	< 0.0100	< 0.0100	< 0.0100
2,4-Dinitrotoluene	mg/L	< 0.0100	< 0.0100	< 0.0100
2,6-Dichlorophenol	mg/L	< 0.0100	< 0.0100	< 0.0100
2,6-Dinitrotoluene	mg/L	< 0.0100	< 0.0100	< 0.0100
2-Acetylaminofluorene	mg/L	< 0.0100	< 0.0100	< 0.0100
2-Cbloronaphthalene	mg/L	< 0.0100	< 0.0100	< 0.0100
2-Chlorophenol	mg/L	< 0.0100	< 0.0100	< 0.0100
2-Methylnaphthalene	mg/L	< 0.0100	< 0.0100	< 0.0100
2-Methylphenol	mg/L	< 0.0100	< 0.0100	< 0.0100
2-Naphthylamine	mg/L	< 0.0100	< 0.0100	< 0.0100
2-Nitroaniline	mg/L	< 0.0100	< 0.0100	< 0.0100
2-Nitrophenol	mg/L	< 0.0100	< 0.0100	< 0.0100
2-Picoline	mg/L	< 0.0100	< 0.0100	< 0.0100
3&4-Methylphenol	mg/L	< 0.0100	< 0.0100	< 0.0100
3,3 '-Dichlorobenzidine	mg/L	< 0.0100	< 0.0100	< 0.0100
3,3'-Dimethylbenzidine	mg/L	< 0.0100	< 0.0100	< 0.0100
3-Methylcholanthrene	mg/L	< 0.0100	< 0.0100	< 0.0100
3-Nitroaniline	mg/L	< 0.0100	< 0.0100	< 0.0100
4,6-Dinitro-2-methylphenol	mg/L	< 0.0100	< 0.0100	< 0.0100
4-Arninobiphenyl	mg/L	< 0.0100	< 0.0100	< 0.0100
4-Bromophenyl phenyl ether	mg/L	< 0.0100	< 0.0100	< 0.0100
4-Chloro-3-methylphenol	mg/L	< 0.0100	< 0.0100	< 0.0100
4-Chloroaniline	mg/L	< 0.0100	< 0.0100	< 0.0100
4-Chlorophenyl phenyl ether	mg/L	< 0.0100	< 0.0100	< 0.0100
4-Nitroaniline	mg/L	< 0.0100	< 0.0100	< 0.0100
4-Nitrophenol	mg/L	< 0.0100	< 0.0100	< 0.0100
5-Nitro-o-toluidine	mg/L	< 0.0100	< 0.0100	< 0.0100
7,12-Dimethylbenz(a)anthracene	mg/L	< 0.0100	< 0.0100	< 0.0100
a,a-Dimethylphenethylamine	mg/L	< 0.0100	< 0.0100	< 0.0100
Acenaphthene	mg/L	< 0.0100	< 0.0100	< 0.0100
Acenaphthylene	mg/L	< 0.0100	< 0.0100	< 0.0100
Acetophenone	mg/L	< 0.0100	< 0.0100	< 0.0100
alpha-Terpineol	mg/L	< 0.0100	< 0.0100	< 0.0100
Aniline	mg/L	< 0.0100	< 0.0100	< 0.0100
Anthracene	mg/L	< 0.0100	< 0.0100	< 0.0100
Aramite	mg/L	< 0.0100	< 0.0100	< 0.0100
Azobenzene	mg/L	< 0.0100	< 0.0100	< 0.0100
Benz(a)anthracene	mg/L	< 0.0100	< 0.0100	< 0.0100
Benzidine	mg/L	< 0.0100	< 0.0100	< 0.0100
Benzo(a)pyrene	mg/L	< 0.0100	< 0.0100	< 0.0100
Benzo(b)fluoranthene	mg/L	< 0.0100	< 0.0100	< 0.0100
Benzo(g,h,i)perylene	mg/L	< 0.0100	< 0.0100	< 0.0100
Benzo(k)fluoranthene	mg/L	< 0.0100	< 0.0100	< 0.0100
Benzoic acid	mg/L	< 0.0100	< 0.0100	< 0.0100
Benzyl alcohol	mg/L	< 0.0100	< 0.0100	< 0.0100
Bis(2-chloroethoxy)methane	mg/L	< 0.0100	< 0.0100	< 0.0100
Bis(2-chloroethyl) ether	mg/L	< 0.0100	< 0.0100	< 0.0100
Bis(2-chloroisopropyl) ether	mg/L	< 0.0100	< 0.0100	< 0.0100
Bis(2-ethylhexyl) phthalate	mg/L	< 0.0100	< 0.0100	< 0.0100
bis(2-ethylhexyl)adipate	mg/L	< 0.0100	< 0.0100	< 0.0100
Butyl benzyl phthalate	mg/L	< 0.0100	< 0.0100	< 0.0100
Carbazole	mg/L	< 0.0100	< 0.0100	< 0.0100
Chlorobenzilate	mg/L	< 0.0100	< 0.0100	< 0.0100
Chrysene	mg/L	< 0.0100	< 0.0100	< 0.0100

Table 1
January 2012 Analytical Data

Analytical Result GC/MS Method 8270D/3510C*				
Compound	**Units**	**Sample ID**		
		1A,B+C	**2A,B+C**	**3A,B+C**
Di-n-butyl phthalate	mg/L	< 0.0100	< 0.0100	< 0.0100
Di-n-octyl phthalate	mg/L	< 0.0100	< 0.0100	< 0.0100
Diallate (cis or trans)	mg/L	< 0.0100	< 0.0100	< 0.0100
Dibenz(a,h)anthracene	mg/L	< 0.0100	< 0.0100	< 0.0100
Dibenzofuran	mg/L	< 0.0100	< 0.0100	< 0.0100
Diethyl phthalate	mg/L	< 0.0100	< 0.0100	< 0.0100
Dimethoate	mg/L	< 0.0100	< 0.0100	< 0.0100
Dimethyl phthalate	mg/L	< 0.0100	< 0.0100	< 0.0100
Dimethylaminoazobenzene	mg/L	< 0.0100	< 0.0100	< 0.0100
Dinoseb	mg/L	< 0.0100	< 0.0100	< 0.0100
Diphenylamine	mg/L	< 0.0100	< 0.0100	< 0.0100
Disulfoton	mg/L	< 0.0100	< 0.0100	< 0.0100
Ethyl methanesulfonate	mg/L	< 0.0100	< 0.0100	< 0.0100
Famphur	mg/L	< 0.0100	< 0.0100	< 0.0100
Fluoranthene	mg/L	< 0.0100	< 0.0100	< 0.0100
Fluorene	mg/L	< 0.0100	< 0.0100	< 0.0100
Hexachlorobenzene	mg/L	< 0.0100	< 0.0100	< 0.0100
Hexachlorobutadiene	mg/L	< 0.0100	< 0.0100	< 0.0100
Hexachlorocyclopentadiene	mg/L	< 0.0100	< 0.0100	< 0.0100
Hexachloroethane	mg/L	< 0.0100	< 0.0100	< 0.0100
Hexachlorophene	mg/L	< 0.0100	< 0.0100	< 0.0100
Hexachloropropene	mg/L	< 0.0100	< 0.0100	< 0.0100
Indene	mg/L	< 0.0100	< 0.0100	< 0.0100
Indeno(1,2,3-cd)pyrene	mg/L	< 0.0100	< 0.0100	< 0.0100
Isodrin	mg/L	< 0.0100	< 0.0100	< 0.0100
Isophorone	mg/L	< 0.0100	< 0.0100	< 0.0100
Isosafrole	mg/L	< 0.0100	< 0.0100	< 0.0100
Kepone	mg/L	< 0.0100	< 0.0100	< 0.0100
Methapyrilene	mg/L	< 0.0100	< 0.0100	< 0.0100
Methyl methanesulfonate	mg/L	< 0.0100	< 0.0100	< 0.0100
n-Decane	mg/L	< 0.0100	< 0.0100	< 0.0100
N-Nitrosodi-n-butylamine	mg/L	< 0.0100	< 0.0100	< 0.0100
N-Nitrosodiethylamine	mg/L	< 0.0100	< 0.0100	< 0.0100
N-Nitrosodimethylamine	mg/L	< 0.0100	< 0.0100	< 0.0100
N-Nitrosodiphenylamine	mg/L	< 0.0100	< 0.0100	< 0.0100
N-Nitrosodi-n-propylamine	mg/L	< 0.0100	< 0.0100	< 0.0100
N-Nitrosomethylethylamine	mg/L	< 0.0100	< 0.0100	< 0.0100
N-Nitrosomorpholine	mg/L	< 0.0100	< 0.0100	< 0.0100
N-Nitrosopiperidine	mg/L	< 0.0100	< 0.0100	< 0.0100
N-Nitrosopyrrolidine	mg/L	< 0.0100	< 0.0100	< 0.0100
n-Octadecane	mg/L	< 0.0100	< 0.0100	< 0.0100
Naphthalene	mg/L	< 0.0100	< 0.0100	< 0.0100
Nitrobenzene	mg/L	< 0.0100	< 0.0100	< 0.0100
Nitroquinoline-1-oxide	mg/L	< 0.0100	< 0.0100	< 0.0100
O,O,O-Triethyl phosphorothioate	mg/L	< 0.0100	< 0.0100	< 0.0100
a-Toluidine	mg/L	< 0.0100	< 0.0100	< 0.0100
Parathion	mg/L	< 0.0100	< 0.0100	< 0.0100
Methyl parathion	mg/L	< 0.0100	< 0.0100	< 0.0100
Pentachlorobenzene	mg/L	< 0.0100	< 0.0100	< 0.0100
Pentachloronitrobenzene	mg/L	< 0.0100	< 0.0100	< 0.0100
Pentachlorophenol	mg/L	< 0.0100	< 0.0100	< 0.0100
Phenacetin	mg/L	< 0.0100	< 0.0100	< 0.0100
Phenanthrene	mg/L	< 0.0100	< 0.0100	< 0.0100
Phenol	mg/L	< 0.0100	< 0.0100	< 0.0100
Phorate	mg/L	< 0.0100	< 0.0100	< 0.0100
Pronamide	mg/L	< 0.0100	< 0.0100	< 0.0100
Pyrene	mg/L	< 0.0100	< 0.0100	< 0.0100
Pyridine	mg/L	< 0.0100	< 0.0100	< 0.0100
Quinoline	mg/L	< 0.0100	< 0.0100	< 0.0100
Safrole	mg/L	< 0.0100	< 0.0100	< 0.0100
Tetraethyl dithiopyrophosphate	mg/L	< 0.0100	< 0.0100	< 0.0100
Thionazin	mg/L	< 0.0100	< 0.0100	< 0.0100

Notes:

< - Value is less than reporting limit.

* SVOA SPLP 1312 List by GC/MS Method 8270D/3510C

GC/MS - gas chromatography/mass spectrometry

mg/L - milligrams per Liter

SPLP - Synthetic Precipitation Leaching Procedure

Table 1
January 2012 Analytical Data

Analytical Result GC/MS Method 8260C/5030C*				
Compound	**Units**	**Sample ID**		
		1A,B+C	**2A,B+C**	**3A,B+C**
1,1,1,2-Tetrachloroethane	mg/L	< 0.00200	< 0.00200	< 0.00200
1,1,1-Trichloroethane	mg/L	< 0.00200	< 0.00200	0.00364
1,1,2,2-Tetrachloroethane	mg/L	< 0.00200	< 0.00200	< 0.00200
1,1,2-Trichloro-1,2,2-trifluoroethane	mg/L	< 0.00200	< 0.00200	< 0.00200
1,1,2-Trichloroethane	mg/L	< 0.00200	< 0.00200	< 0.00200
1,1-Dichloropropene	mg/L	< 0.00200	< 0.00200	< 0.00200
1,1-Dichloroethane	mg/L	< 0.00200	< 0.00200	< 0.00200
1,1-Dichloroethene	mg/L	< 0.00200	< 0.00200	< 0.00200
1,2,3-Trichlorobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
1,2,3-Trichloropropane	mg/L	< 0.00200	< 0.00200	< 0.00200
1,2,3-Trimethylbenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
1,2,4-Trichlorobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
1,2,4-Trimethylbenzene	mg/L	< 0.00200	< 0.00200	0.00460
1,2-Dibromo-3-chloropropane	mg/L	< 0.00500	< 0.00500	< 0.00500
1,2-Dibromoethane	mg/L	< 0.00200	< 0.00200	< 0.00200
1,2-Dichlorobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
1,2-Dichloroethane	mg/L	< 0.00200	< 0.00200	< 0.00200
1,2-Dichloropropane	mg/L	< 0.00200	< 0.00200	< 0.00200
1,3,5-Trimethylbenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
1,3-Dichlorobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
1,3-Dichloropropane	mg/L	< 0.00200	< 0.00200	< 0.00200
1,4-Dichlorobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
1,4-Dioxane	mg/L	< 0.0500	< 0.0500	< 0.0500
2,2-Dichloropropane	mg/L	< 0.00200	< 0.00200	< 0.00200
2-Butanone	mg/L	0.0722	0.0648	0.0426
2-Chloroethyl vinyl ether	mg/L	< 0.00500	< 0.00500	< 0.00500
2-Chlorotoluene	mg/L	< 0.00200	< 0.00200	< 0.00200
2-Hexanone	mg/L	< 0.00500	< 0.00500	< 0.00500
2-Nitropropane	mg/L	< 0.00500	< 0.00500	< 0.00500
4-Chlorotoluene	mg/L	< 0.00200	< 0.00200	< 0.00200
4-Isopropyltoluene	mg/L	< 0.00200	< 0.00200	< 0.00200
4-Methyl-2-pentanone	mg/L	< 0.00500	< 0.00500	< 0.00500
Acetone	mg/L	< 0.0100	< 0.0100	0.01040
Acetonitrile	mg/L	< 0.00500	< 0.00500	< 0.00500
Acrolein	mg/L	< 0.00500	< 0.00500	< 0.00500
Acrylonitrile	mg/L	< 0.0100	< 0.0100	< 0.0100
Allyl chloride	mg/L	< 0.00500	< 0.00500	< 0.00500
Benzene	mg/L	< 0.00100	< 0.00100	**0.00516**
Benzyl chloride	mg/L	< 0.00500	< 0.00500	< 0.00500
Bis(2-chloroisopropyl) ether	mg/L	< 0.00500	< 0.00500	< 0.00500
Bromobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
Bromochloromethane	mg/L	< 0.00200	< 0.00200	< 0.00200
Bromodichloromethane	mg/L	< 0.00200	< 0.00200	< 0.00200
Bromoform	mg/L	< 0.00200	< 0.00200	< 0.00200
Bromomethane	mg/L	< 0.00500	< 0.00500	< 0.00500
Butyl acetate	mg/L	< 0.00500	< 0.00500	< 0.00500
Carbon disulfide	mg/L	< 0.00200	< 0.00200	< 0.00200
Carbon tetrachloride	mg/L	< 0.00200	< 0.00200	< 0.00200
Chlorobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
Chloroethane	mg/L	< 0.00200	< 0.00200	< 0.00200
Chloroform	mg/L	< 0.00200	< 0.00200	< 0.00200
Chloromethane	mg/L	< 0.00300	< 0.00300	< 0.00300
Chloroprene	mg/L	< 0.00200	< 0.00200	< 0.00200
cis-1,2-Dichloroethene	mg/L	< 0.00200	< 0.00200	< 0.00200
cis-1,3-Dichloropropene	mg/L	< 0.00200	< 0.00200	< 0.00200
Cyclohexane	mg/L	< 0.00200	< 0.00200	< 0.00200
Cyclohexanone	mg/L	< 0.0500	< 0.0500	< 0.0500
Dibromochloromethane	mg/L	< 0.00200	< 0.00200	< 0.00200
Dibromomethane	mg/L	< 0.00200	< 0.00200	< 0.00200
Dichlorodifluoromethane	mg/L	< 0.00200	< 0.00200	< 0.00200
Ethyl acetate	mg/L	< 0.0100	< 0.0100	< 0.0100
Ethyl ether	mg/L	< 0.0100	< 0.0100	< 0.0100
Ethyl methacrylate	mg/L	< 0.00200	< 0.00200	< 0.00200
Ethylbenzene	mg/L	< 0.00200	< 0.00200	0.00761
Hexachlorobutadiene	mg/L	< 0.00200	< 0.00200	< 0.00200
Iodomethane	mg/L	< 0.00500	< 0.00500	< 0.00500
Isobutyl alcohol	mg/L	< 0.100	< 0.100	< 0.100
Isopropyl acetate	mg/L	< 0.0200	< 0.0200	< 0.0200
Isopropyl alcohol	mg/L	< 0.0250	< 0.0250	< 0.0250
Isopropylbenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
m,p-Xylene	mg/L	< 0.00200	0.00501	0.0383

Table 1
January 2012 Analytical Data

Analytical Result GC/MS Method 8260C/5030C*				
Compound	**Units**	**Sample ID**		
		1A,B+C	**2A,B+C**	**3A,B+C**
Methacrylonitrile	mg/L	< 0.00500	< 0.00500	< 0.00500
Methyl Acetate	mg/L	< 0.00500	< 0.00500	< 0.00500
Methyl methacrylate	mg/L	< 0.00500	< 0.00500	< 0.00500
Methyl tert-butyl ether	mg/L	< 0.00200	< 0.00200	< 0.00200
Methylcyclohexane	mg/L	< 0.00200	< 0.00200	< 0.00200
Methylene chloride	mg/L	< 0.00200	< 0.00200	< 0.00200
n-Amyl acetate	mg/L	< 0.00200	< 0.00200	< 0.00200
n-Butyl alcohol	mg/L	< 0.0500	< 0.0500	< 0.0500
n-Butylbenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
n-Hexane	mg/L	< 0.00200	< 0.00200	< 0.00200
n-Octane	mg/L	< 0.00200	< 0.00200	< 0.00200
n-Propylbenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
Naphthalene	mg/L	< 0.00200	< 0.00200	< 0.00200
o-Xylene	mg/L	< 0.00200	< 0.00200	0.01460
Pentachloroethane	mg/L	< 0.00500	< 0.00500	< 0.00500
Propionitrile	mg/L	< 0.0250	< 0.0250	< 0.0250
Propyl	mg/L	< 0.00200	< 0.00200	< 0.00200
sec-Butylbenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
Styrene	mg/L	< 0.00200	< 0.00200	< 0.00200
tert-Butyl alcohol	mg/L	< 0.0200	< 0.0200	< 0.0200
tert-Butylbenzene	mg/L	< 0.00200	< 0.00200	< 0.00200
Tetrachloroethene	mg/L	< 0.00200	< 0.00200	0.00312
Tetrahydrofuran	mg/L	< 0.00200	< 0.00200	< 0.00200
Toluene	mg/L	< 0.00200	< 0.00200	0.05110
trans-1,2-Dichloroethene	mg/L	< 0.00200	< 0.00200	< 0.00200
trans-1,3-Dichloropropene	mg/L	< 0.00200	< 0.00200	< 0.00200
trans-1,4-Dichloro-2-butene	mg/L	< 0.00200	< 0.00200	< 0.00200
Trichloroethene	mg/L	< 0.00200	< 0.00200	< 0.00200
Trichlorofluoromethane	mg/L	< 0.00200	< 0.00200	< 0.00200
Vinyl acetate	mg/L	< 0.0100	< 0.0100	< 0.0100
Vinyl chloride	mg/L	< 0.00100	< 0.00100	< 0.00100
Xylenes, Total	mg/L	< 0.00200	0.00663	0.0528
TPH (DRO)	mg/L	0.0308	0.0363	0.0429
TPH (GRO)	mg/L	< 0.0200	0.0223	0.134

Notes:

Bold indicates an exceedance of DWQ water quality standards.

< - Value is less than reporting limit.

* VOCs SPLP 1312 List by GC/MS Method 8260C/5030C

GC/MS - gas chromatography/mass spectrometry

mg/L - milligrams per Liter

SPLP - Synthetic Precipitation Leaching Procedure

TPH-DRO - total petroleum hydrocarbons, diesel range organics

TPH-GRO - total petroleum hydrocarbons, gasoline range organics

VOCs -volatile organic compounds

Table 2
Utah Groundwater Quality Standards

Parameter	GWQS	Unit	Alternate Name
Physical Characteristics			
pH	6.5 - 8.5	s.u.	
Inorganic Chemicals			
Fluoride	4	mg/l	
Total Nitrate + Nitrite (both as N)	10	mg/l	
Metals			
Antimony	0.006	mg/l	
Arsenic	0.05	mg/l	
Barium	2	mg/l	
Beryllium	0.004	mg/l	
Cadmium	0.005	mg/l	
Chromium (total)	0.1	mg/l	
Copper	1.3	mg/l	
Lead	0.015	mg/l	
Mercury (inorganic)	0.002	mg/l	
Selenium	0.05	mg/l	
Silver	0.1	mg/l	
Thallium	0.002	mg/l	
Zinc	5	mg/l	
Organic Chemicals			
Dinoseb	0.007	mg/l	
Pentachlorophenol	0.001	mg/l	
Volatile Organic Chemicals			
Benzene	0.005	mg/l	
Benzo(a)pyrene (PAH)	0.0002	mg/l	
Carbon tetrachloride	0.005	mg/l	
Dichloroethane (1,2 -)	0.005	mg/l	1,2 Dichloroethane
Dichloroethylene (1,1 -)	0.007	mg/l	1,1-Dichloroethene
Dichloromethane	0.005	mg/l	methylene chloride
Di (2-ethylhexyl) adipate	0.4	mg/l	bis(2-ethylhexyl)adipate
Di (2-ethylhexyl) phthalate (PAE)	0.006	mg/l	Bis(2-ethylhexyl) phthalate
Dichlorobenzene (para -)	0.075	mg/l	1,4-Dichlorobenzene
Dichlorobenzene (o -)	0.6	mg/l	1,2-Dichlorobenzene
Dichloroethylene (cis - 1,2)	0.07	mg/l	cis-1,2-Dichloroethene
Dichloroethylene (trans - 1,2)	0.1	mg/l	trans-1,2-Dichloroethene
Dichloropropane (1,2 -)	0.005	mg/l	1,2-Dichloropropane
Ethylbenzene	0.7	mg/l	
Hexachlorobenzene	0.001	mg/l	
Hexachlorocyclopentadiene	0.05	mg/l	
Monochlorobenzene	0.1	mg/l	Chlorobenzene
Styrene	0.1	mg/l	
Tetrachloroethylene	0.005	mg/l	Tetrachloroethene
Toluene	1	mg/l	
Trichlorobenzene (1,2,4-)	0.07	mg/l	1,2,4-Trichlorobenzene
Trichloroethane (1,1,1-)	0.2	mg/l	1,1,1-Trichloroethane
Trichloroethane (1,1,2-)	0.005	mg/l	1,1,2-Trichloroethane
Trichloroethylene	0.005	mg/l	Trichloroethene
Vinyl chloride	0.002	mg/l	
Xylenes (Total)	10	mg/l	

Notes:

GWQS - Groundwater Quality Standard

mg/L - milligram per liter

s.u. - standard units

Utah Department of Environmental Quality, Division of Water Quality (DWQ), 2014. Utah Ground Water Quality Standards – Table 1 of R317-6-2.1. Last Updated June 17, 2014. http://www.waterquality.utah.gov/GroundWater/gwstandards.htm

Table 3
Utah Initial Screening Levels

Compounds	Groundwater (mg/L)
Benzene	0.005
Toluene	1
Ethylbenzene	0.7
Xylenes	10
Naphthalene	0.7
Methyl t-butyl ether (MTBE)	0.2
Total Petroleum Hydrocarbons (TPH) as gasoline	1
Total Petroleum Hydrocarbons (TPH) as diesel	1
Oil and Grease or (TRPH)	10

Notes:
mg/L - milligram per liter
TRPH - Total Recoverable Petroleum Hydrocarbons

Table 4
September 2012 Analytical Data

Analytical Result SPLP Metals Method 1312					
Compound	Units	Sample ID			
		U-001A	U-002A	U-003A	U-004A
Antimony	mg/L	<0.00200	<0.00200	<0.00200	<0.00200
Arsenic	mg/L	<0.00200	<0.00200	<0.00200	<0.00200
Barium	mg/L	0.0413	0.0401	0.0353	0.0266
Beryllium	mg/L	<0.00200	<0.00200	<0.00200	<0.00200
Boron	mg/L	<0.500	<0.500	<0.500	<0.500
Cadmium	mg/L	<0.000500	<0.000500	<0.000500	0.000924
Calcium	mg/L	2.81	2.62	2.24	5.42
Chromium	mg/L	<0.0100	<0.0100	<0.0100	<0.0100
Copper	mg/L	<0.00200	0.00302	0.00252	0.0176
Iron	mg/L	1.17	1.18	1.17	0.3
Lead	mg/L	<0.0100	<0.0100	<0.0100	<0.0100
Lithium	mg/L	<0.100 ~	<0.100 ~	<0.100 ~	<0.100 ~
Magnesium	mg/L	<1.00	<1.00	<1.00	<1.00
Manganese	mg/L	0.684	0.614	0.457	0.0669
Mercury	mg/L	<0.00100	<0.00100	<0.00100	<0.00100
Molybdenum	mg/L	<0.0200	<0.0200	<0.0200	<0.0200
Nickel	mg/L	0.0277	0.0283	0.0243	0.0309
Potassium	mg/L	<1.00	<1.00	<1.00	<1.00
Selenium	mg/L	<0.00200	<0.00200	<0.00200	<0.00200
Silver	mg/L	<0.00200	<0.00200	<0.00200	<0.00200
Sodium	mg/L	<1.00	1.24	1.5	1.48
Strontium	mg/L	<0.0500	<0.0500	<0.0500	<0.0500
Thallium	mg/L	<0.00200	<0.00200	<0.00200	<0.00200
Tin	mg/L	<0.500	<0.500	<0.500	<0.500
Vanadium	mg/L	<0.0500	<0.0500	<0.0500	<0.0500
Zinc	mg/L	<0.100	<0.100	<0.100	0.306
Alkalinity (as $CaCO_3$)	mg/L	<10.0	<10.0	<10.0	<10.0
Chloride	mg/L	<5.00	<5.00	<5.00	<5.00
Oil & Grease	mg/L	<3.00	<3.00	<3.00	<3.00
pH	s.u.	**6.27**	**5.89**	**4.51**	**3.6**
Sulfate	mg/L	11.2	9.03	7.95	22.1
Total Dissolved Solids	mg/L	14.0 #	14.0	20.0	46.0
Total Organic Carbon	mg/L	6.69 B	7.14 B	6.9 B	2.83 B
Total Recoverable Hydrocarbons	mg/L	<3.00	<3.00	<3.00	<3.00

Notes:

Bold indicates an exceedance of DWQ water quality standards.

< - Value is less than reporting limit.

~ - Result was not performed in accordance with National Environmental Laboratory Accreditation Program (NELAP) requirements

High relative percent difference (RPD) due to low analyte concentration. In this range high RPDs are expected.

µmhos/cm - micromhos per centimeter

B - This analyte was also detected in the SPLP method blank above the practical quantification limit (PQL) at 1.0056 mg/L. The batch method blank was below the PQL.

mg/L - milligram per liter

SPLP - Synthetic Precipitation Leaching Procedure

s.u. - standard unit

$CaCO_3$ - Calcium Carbonate

Analytical Result SPLP Metals Method 1312		
Compound	Units	Sample ID
		U-004B
Oil & Grease	mg/L	**34,900** [3]H
Total Recoverable Hydrocarbons	mg/L	**13,400** H

Notes:

Bold indicates an exceedance of DWQ water quality standards.

[3] - Matrix spike recoveries and/or high RPDs indicate suspected sample non-homogeneity. The method is in control as indicated by the LCS.

H - Analysis requested by the client after the holding time expired.

mg/L - milligram per liter

SPLP - Synthetic Precipitation Leaching Procedure

Analytical Result					
Compound	Units	Sample ID			
		U-001B	U-002B	U-003B	U-004B
[1]Conductivity	µmhos/cm	169	179	223	332
pH	s.u.	**4.90** H	**4.74** H	**4.70** H	**4.24** H
[1]Sodium Absorption Ratio	SAR	0.0861	0.0947	0.104	0.222

Notes:

Bold indicates an exceedance of DWQ water quality standards.

[1] Analysis performed on a 1:1 DI water extract for soils.

µmhos/cm - micromhos per centimeter

H - Sample was received outside of the holding time.

SAR - Sodium Absorption Ratio

s.u. - standard unit

Table 4
September 2012 Analytical Data

Analytical Result GC/FID Method 8015D/3510C					
Compound	Units	Sample ID			
		U-001A	U-002A	U-003A	U-004A
Diesel Range Organics (DRO)	mg/L	0.676	0.755	0.832	1.4

Notes:
mg/L - milligrams per Liter
GC/FID - gas chromatography/flame ionization detector

Analytical Result GC/MS Method 8260C/5030C*					
Compound	Units	Sample ID			
		U-001A	U-002A	U-003A	U-004A
1,1,1,2-Tetrachloroethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,1,1-Trichloroethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,1,2,2-Tetrachloroethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,1,2-Trichloro-1,2,2-trifluoroethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,1,2-Trichloroethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,1-Dichloropropene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,1-Dichloroethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,1-Dichloroethene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,2,3-Trichlorobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,2,3-Trichloropropane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,2,3-Trimethylbenzene	mg/L	< 0.00200	< 0.00200	0.00281	< 0.00200
1,2,4-Trichlorobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,2,4-Trimethylbenzene	mg/L	< 0.00200	0.0175	0.00425	< 0.00200
1,2-Dibromo-3-chloropropane	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
1,2-Dibromoethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,2-Dichlorobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,2-Dichloroethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,2-Dichloropropane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,3,5-Trimethylbenzene	mg/L	< 0.00200	0.011	0.00245	< 0.00200
1,3-Dichlorobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,3-Dichloropropane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,4-Dichlorobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
1,4-Dioxane	mg/L	< 0.0500	< 0.0500	< 0.0500	< 0.0500
2,2-Dichloropropane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
2-Butanone	mg/L	0.0101	1.0101	0.0118	< 0.0100
2-Chloroethyl vinyl ether	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
2-Chlorotoluene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
2-Hexanone	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
2-Nitropropane	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
4-Chlorotoluene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
4-Isopropyltoluene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
4-Methyl-2-pentanone	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
Acetone	mg/L	< 0.0100	< 0.0100	< 0.0100	< 0.0100
Acetonitrile	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
Acrolein	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
Acrylonitrile	mg/L	< 0.0100	< 0.0100	< 0.0100	< 0.0100
Allyl chloride	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
Benzene	mg/L	< 0.00100	< 0.00100	< 0.00100	< 0.00100
Benzyl chloride	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
Bis(2-chloroisopropyl) ether	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
Bromobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Bromochloromethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Bromodichloromethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Bromoform	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Bromomethane	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
Butyl acetate	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
Carbon disulfide	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Carbon tetrachloride	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Chlorobenzene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Chloroethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Chloroform	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Chloromethane	mg/L	< 0.00300	< 0.00300	< 0.00300	< 0.00300
Chloroprene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
cis-1,2-Dichloroethene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
cis-1,3-Dichloropropene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Cyclohexane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Cyclohexanone	mg/L	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Dibromochloromethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Dibromomethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Dichlorodifluoromethane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Ethyl acetate	mg/L	< 0.0100	< 0.0100	< 0.0100	< 0.0100
Ethyl ether	mg/L	< 0.0100	< 0.0100	< 0.0100	< 0.0100
Ethyl methacrylate	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Ethylbenzene	mg/L	< 0.00200	0.00209	< 0.00200	< 0.00200
Hexachlorobutadiene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Iodomethane	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
Isobutyl alcohol	mg/L	< 0.100	< 0.100	< 0.100	< 0.100
Isopropyl acetate	mg/L	< 0.0200	< 0.0200	< 0.0200	< 0.0200

Table 4
September 2012 Analytical Data

Analytical Result GC/MS Method 8260C/5030C*					
Compound	**Units**	**Sample ID**			
		U-001A	**U-002A**	**U-003A**	**U-004A**
Isopropyl alcohol	mg/L	< 0.0250	< 0.0250	< 0.0250	< 0.0250
Isopropylbenzene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
m,p-Xylene	mg/L	< 0.00200	0.0156 B	< 0.00200	< 0.00200
Methacrylonitrile	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
Methyl Acetate	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
Methyl methacrylate	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500
Methyl tert-butyl ether	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Methylcyclohexane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
Methylene chloride	mg/L	0.00329 B	0.00327 B	0.00268 B	0.00304 B
n-Amyl acetate	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
n-Butyl alcohol	mg/L	< 0.0500	< 0.0500	< 0.0500	< 0.0500
n-Butylbenzene	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200
n-Hexane	mg/L	0.0129	0.015	0.0138	< 0.00200
n-Octane	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200

American West
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e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Jon Schulman
JBR Environmental Consultants, Inc.
8160 So. Highland Dr. Ste A-4
Sandy, UT 84093
TEL: (801) 943-4144

RE: American Oil Sands

Dear Jon Schulman: Lab Set ID: 1209452

American West Analytical Laboratories received 8 sample(s) on 9/26/2012 for the analyses presented in the following report.

American West Analytical Laboratories (AWAL) is accredited by The National Environmental Laboratory Association Conference (NELAC) Institute in Utah and Texas; and is state accredited in Colorado, Idaho, New Mexico, and Missouri. In addition, AWAL is also accredited by the American Analytical Laboratory Association (A2LA) on ISO IEC 17025:2005, Department of Defense (DOD), UST for the State of Wyoming, and the National Lead Laboratory Accreditation Program (NLLAP). All analyses were performed in accordance to The NELAC Institute and/or A2LA protocols unless noted otherwise. Accreditation documents are available upon request. 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. The "Reporting Limit" found on the report is equivalent to the practical quantitation limit (PQL). This is the minimum concentration that can be reported by the method referenced and the sample matrix. The reporting limit must not be confused with any regulatory limit. Analytical results are reported to three significant figures for quality control and calculation purposes.

This is an addendum to a report originally issued on 10/12/2012.

Thank You,

Kyle F. Gross
Digitally signed by Kyle F. Gross
DN: cn=Kyle F. Gross, o=AWAL, ou=AWAL-Laboratory Director, email=kyle@awal-labs.com, c=US
Date: 2012.11.05 15:18:57 -07'00'

Approved by:
Laboratory Director or designee

INORGANIC ANALYTICAL REPORT

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

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web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-008
Client Sample ID: U-004B
Collection Date: 9/25/2012
Received Date: 9/26/2012 1100h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Oil & Grease	mg/kg-dry		11/1/2012 1221h	E1664AMod.	602	**34,900**	3H
Total Recoverable Petroleum Hydrocarbons	mg/kg-dry		11/2/2012 1515h	E1664A-SGT	602	**13,400**	H

3 - Matrix spike recoveries and/or high RPDs indicate suspected sample non-homogeneity. The method is in control as indicated by the LCS.
H - Analysis requested by the client after the holding time expired.

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e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: WC
QC Type: LCS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
LCS-R46948	Oil & Grease	mg/kg	E1664AMod.	1,690	2,000	0	84.7	78-114				11/1/2012 1221h
LCS-R47002	Total Recoverable Petroleum Hydrocarbons	mg/kg	E1664A-SGT	690	1,000	0	69.0	64-132				11/2/2012 1515h

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: WC
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB-R46948	Oil & Grease	mg/kg	E1664AMod.	< 150				-				11/1/2012 1221h
MB-R47002	Total Recoverable Petroleum Hydrocarbons	mg/kg	E1664A-SGT	< 150				-				11/2/2012 1515h

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: WC
QC Type: MS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
1209452-008AMS	Oil & Grease	mg/kg-dry	E1664AMod.	50,300	8,031	34,900	192	78-114			3	11/1/2012 1221h
1209452-008AMS	Total Recoverable Petroleum Hydrocarbons	mg/kg-dry	E1664A-SGT	16,400	4,016	13,430	74.0	64-132				11/2/2012 1515h

Analysis performed on an SPLP extract by method 1312.

3 - Matrix spike recoveries and/or high RPDs indicate suspected sample non-homogeneity. The method is in control as indicated by the LCS.

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: WC
QC Type: MSD

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
1209452-008AMSD	Oil & Grease	mg/kg-dry	E1664AMod.	53,800	8,031	34,900	236	78-114	6.71	18	3	11/1/2012 1221h
1209452-008AMSD	Total Recoverable Petroleum Hydrocarbons	mg/kg-dry	E1664A-SGT	17,600	4,016	13,430	105	64-132	7.31	34		11/2/2012 1515h

Analysis performed on an SPLP extract by method 1312.

3 - Matrix spike recoveries and/or high RPDs indicate suspected sample non-homogeneity. The method is in control as indicated by the LCS.

REVISED
DB 10/31/12
O&G/TRPH added to Sample #8

American West Analytical Laboratories

UL

WORK ORDER Summary

Work Order: 1209452
Page 1 of 4
10/31/2012

Client: JBR Environmental Consultants, Inc.
Client ID: JBR400
Contact: Jon Schulman
Project: American Oil Sands
QC Level: LEVEL II
WO Type: Standard
Comments: All analysis to be performed on the SPLP extract, for samples #1, #3, #5, #7. For samples #2, #4, #6, #8 run on a 1:1. Footnote report, pH received outside of hold. Email 3 people: John Schulman, Linda Matthews, and Will Gibbs. OGB & OGF added per Jon Schulman on 10-31-12 (client is aware sample is out of hold).; eh/db

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1209452-001A	U-001A	9/25/2012 0945h	9/26/2012 1100h	11/7/2012	Leachate	1312LM-PR	☐	SPLP	1
						1312ZHE-PR	☐	SPLP	
						3005A-SPLP-PR	☐	SPLP	
						3510-TPH-PR	☐	SPLP	
						6010C-SPLP	☑	SPLP	
	SEL Analytes: B CA CR FE LI MG MO K NA SR SN V								
						6020-SPLP	☑	SPLP	
	SEL Analytes: SB AS BA BE CD CU PB MN NI SE AG TL ZN								
						8015-W-TPH(1L)	☑	SPLP	
						8260-W-SPLP	☑	SPLP	
						ALK-W-2320B	☑	SPLP	
	SEL Analytes: ALK								
						CL-W-4500CLE	☐	SPLP	
						HG-SPLP-7470A	☐	SPLP	
						HG-SPLP-PR	☐	SPLP	
						OGB-W-1664A	☐	SPLP	
						OGF-W-1664SGT	☐	SPLP	
						PH-9040C	☐	SPLP	
						SO4-W-4500SO4E	☐	SPLP	
						TDS-W-2540C	☐	SPLP	
						TOC-W-5310B	☐	SPLP	
1209452-002A	U-001B				Solid	COND-S-9050A	☐	df / wc	
						PH-9045D	☐	df / wc	
						SAR-S	☐	df / wc	
						SOIL-PR	☐	df / wc	
1209452-003A	U-002A	9/25/2012 1055h			Leachate	1312LM-PR	☐	SPLP	
						1312ZHE-PR	☐	SPLP	
						3005A-SPLP-PR	☐	SPLP	
						3510-TPH-PR	☐	SPLP	

FOR LABORATORY USE ONLY [fill out on page 1]: %M ☑ RT ☑ CN ☑ TAT ☑ QC ☑ HOK____ HOK____ HOK____ COC Emailed____

WORK ORDER Summary

Client: JBR Environmental Consultants, Inc.

10/31/2012

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1209452-003A	U-002A	9/25/2012 1055h	9/26/2012 1100h	11/7/2012	Leachate	6010C-SPLP	☑	SPLP	1
	SEL Analytes: B CA CR FE LI MG MO K NA SR SN V								
						6020-SPLP	☑	SPLP	
	SEL Analytes: SB AS BA BE CD CU PB MN NI SE AG TL ZN								
						8015-W-TPH(1L)	☑	SPLP	
						8260-W-SPLP	☑	SPLP	
						ALK-W-2320B	☑	SPLP	
	SEL Analytes: ALK								
						CL-W-4500CLE	☐	SPLP	
						HG-SPLP-7470A	☐	SPLP	
						HG-SPLP-PR	☐	SPLP	
						OGB-W-1664A	☐	SPLP	
						OGF-W-1664SGT	☐	SPLP	
						PH-9040C	☐	SPLP	
						SO4-W-4500SO4E	☐	SPLP	
						TDS-W-2540C	☐	SPLP	
						TOC-W-5310B	☐	SPLP	
1209452-004A	U-002B				Solid	COND-S-9050A	☐	df / wc	
						PH-9045D	☐	df / wc	
						SAR-S	☐	df / wc	
						SOIL-PR	☐	df / wc	
1209452-005A	U-003A	9/25/2012 1240h			Leachate	1312LM-PR	☐	SPLP	
						1312ZHE-PR	☐	SPLP	
						3005A-SPLP-PR	☐	SPLP	
						3510-TPH-PR	☐	SPLP	
						6010C-SPLP	☑	SPLP	
	SEL Analytes: B CA CR FE LI MG MO K NA SR SN V								
						6020-SPLP	☑	SPLP	
	SEL Analytes: SB AS BA BE CD CU PB MN NI SE AG TL ZN								
						8015-W-TPH(1L)	☑	SPLP	
						8260-W-SPLP	☑	SPLP	
						ALK-W-2320B	☑	SPLP	
	SEL Analytes: ALK								
						CL-W-4500CLE	☐	SPLP	
						HG-SPLP-7470A	☐	SPLP	
						HG-SPLP-PR	☐	SPLP	

FOR L[illegible]ATORY USE ONLY [fill out on page 1]: %M ☐ RT ☐ CN ☐ TAT ☐ QC ☐ HOK_____ HOK_____ HOK_____ COC Emailed_____

WORK ORDER Summary

Client: JBR Environmental Consultants, Inc.

Work Order: **1209452**

10/31/2012

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1209452-005A	U-003A	9/25/2012 1240h	9/26/2012 1100h	11/7/2012	Leachate	OGB-W-1664A	☐	SPLP	1
						OGF-W-1664SGT	☐	SPLP	
						PH-9040C	☐	SPLP	
						SO4-W-4500SO4E	☐	SPLP	
						TDS-W-2540C	☐	SPLP	
						TOC-W-5310B	☐	SPLP	
1209452-006A	U-003B				Solid	COND-S-9050A	☐	df / wc	
						PH-9045D	☐	df / wc	
						SAR-S	☐	df / wc	
						SOIL-PR	☐	df / wc	
1209452-007A	U-004A	9/25/2012			Leachate	1312LM-PR	☐	SPLP	
						1312ZHE-PR	☐	SPLP	
						3005A-SPLP-PR	☐	SPLP	
						3510-TPH-PR	☐	SPLP	
						6010C-SPLP	☑	SPLP	
	SEL Analytes: B CA CR FE LI MG MO K NA SR SN V								
						6020-SPLP	☑	SPLP	
	SEL Analytes: SB AS BA BE CD CU PB MN NI SE AG TL ZN								
						8015-W-TPH(1L)	☑	SPLP	
						8260-W-SPLP	☑	SPLP	
						ALK-W-2320B	☑	SPLP	
	SEL Analytes: ALK								
						CL-W-4500CLE	☐	SPLP	
						HG-SPLP-7470A	☐	SPLP	
						HG-SPLP-PR	☐	SPLP	
						OGB-W-1664A	☐	SPLP	
						OGF-W-1664SGT	☐	SPLP	
						PH-9040C	☐	SPLP	
						SO4-W-4500SO4E	☐	SPLP	
						TDS-W-2540C	☐	SPLP	
						TOC-W-5310B	☐	SPLP	
1209452-008A	U-004B				Solid	COND-S-9050A	☐	df / wc	
						OGB-S-1664A	☐	df / wc	
						OGF-S-1664SGT	☐	df / wc	
						PH-9045D	☐	df / wc	

FOR LABORATORY USE ONLY [fill out on page 1]: %M ☐ RT ☐ CN ☐ TAT ☐ QC ☐ HOK______ HOK______ HOK______ COC Emailed__________

WORK ORDER Summary

Client: JBR Environmental Consultants, Inc.

Work Order: 1209452

10/31/2012

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1209452-008A	U-004B	9/25/2012	9/26/2012 1100h	11/7/2012	Solid	PMOIST	☐	df / wc	1
						SAR-S	☐	df / wc	
						SOIL-PR	☐	df / wc	

FOR L ATORY USE ONLY [fill out on page 1]: %M ☐ RT ☐ CN ☐ TAT ☐ QC ☐ HOK_____ HOK_____ HOK_____ COC Emailed_____

Client American Oil Sands
Address
City State Zip
Phone 801-277-7888 Fax Jon
Contact Will Gibbs / John Schulman
E-mail wgibbs@Americanoilsandsenergy.com
Project Name
Project Number/P.O.#
Sampler Name R.G. McGinnis 480-239-7700

AMERICAN WEST ANALYTICAL LABORATORIES
463 West 3600 South
Salt Lake City, Utah 84115

CHAIN OF CUSTODY

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(888) 263-8686
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Email:awal@awal-labs.com

Lab Sample Set # 1209452
Page ____ of ____

Turn Around Time (Circle One)
1 day 2 day 3 day 4 day 5 day Standard

	Sample ID	Date/Time Collected	Matrix	Number of Containers (Total)	TESTS REQUIRED: See attached	O&G & TRPH Δ (per Jon Schulman DB 10/31/12)						
1	U-001A	Sept25 9:45										
2	U-001B	" 9:45										
3	U-002A	" 10:55										
4	U-002B	" 10:55										
5	U-003A	" 12:40										
6	U-003B	" 12:40										
7	U-004A	Sept25										
8	U-004B	Sept25				X						

QC LEVEL
1 **2*** 2+
3 3+ 4

COMMENTS

Relinquished By: Signature	Date	Received By: Signature	Date
R. McGinnis	Sept25		
PRINT NAME R.G. McGinnis	Time 2:30pm	PRINT NAME	Time
Relinquished By: Signature	Date	Received By: Signature	Date
PRINT NAME	Time	PRINT NAME	Time
Relinquished By: Signature	Date	Received By: Signature	Date
PRINT NAME	Time	PRINT NAME	Time
Relinquished By: Signature	Date	Received By: Signature Elma Hay	Date 9-26-12
PRINT NAME	Time	PRINT NAME Elma Hayden	Time 1100

Special Instructions:
metals list from previous set: Ag, As, B, Ba, Be, Cd, Cr, Cu, Fe, Hg, Li, Pb, Mn, Mo, Ni, Sb, Se, Sr, Sn, Tl, V, Zn along with cations.

* per Jon Schulman. 10/5/12 MH

Δ Client is aware sample is out of hold - DB 10/31/12

LABORATORY USE ONLY

SAMPLES WERE:
1 Shipped or hand delivered
Notes: Fed X
2 Ambient or Chilled
Notes:
3 Temperature 2.9
4 Received Broken/Leaking (Improperly Sealed)
Y N
Notes:
5 Properly Preserved
Y N
Checked at Bench
Y N
Notes:
6 Received Within Holding Times
Y N
Notes: pH rec. outside of hold.

COC Tape Was:
1 Present on Outer Package
Y N NA
2 Unbroken on Outer Package
Y N NA
3 Present on Sample
Y N NA
4 Unbroken on Sample
Y N NA

Discrepancies Between Sample Labels and COC Record?
Y N
Notes:

Parameters for Tailings Analyses

These are the analyses required for the tailings samples:

1) Use the Synthetic Precipitation Leachate Procedure (SPLP) extraction (EPA Method SW-846 1312)

The leachate must be analyzed for the following:

- Residual solvents used in the bitumen extraction process (the actual, proprietary solvent that you will use or the closest available proxy),
- Benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN),
- Volatile organic compounds (VOCs),
- ~~Hazardous air pollutants (HAPs),~~
- Oil and grease,
- Total petroleum hydrocarbon-diesel range (TPH-DRO),
- Total petroleum hydrocarbon-gasoline range (TPH-GRO),
- Total recoverable petroleum hydrocarbon (TRPH),
- Total organic carbon (TOC),
- Total dissolved solids (TDS),
- pH,
- Metals, and – from previous set (1201439)
- Major ions (Na, Ca, K, Mg, Cl, SO_4, alkalinity).

#1

2) Use either a saturated paste extract or a 1:1 (liquid:solid) extract: the extract should be analyzed for pH, conductivity and SAR.

2

Laboratory minimum detection limits must be equal to or less than Utah ground water standards or other applicable standards to enable meaningful comparisons with the laboratory analytical results. Some of these are for groundwater permitting, others are for air quality permitting, and others are for the engineers.

3) In addition to these chemical characteristics, Mine Engineers need to have physical tests performed. Eldon has a lab he uses in Cheyenne that he uses for these, so please send a five-gallon bucket or two of tailings sample to him. Those tests include the following:

Relative Density (ASTM D253 & D4254)
Direct Shear (ASTM D3080)
Sieve Analysis (ASTM C136 & C117)
Proctored Density

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

William Gibbs
American Sands Energy Corp.

TEL: (801) 277-7888

RE: Green River Resources

Dear William Gibbs: Lab Set ID: 1201439

American West Analytical Laboratories received 3 sample(s) on 1/31/2012 for the analyses presented in the following report.

All analyses were performed in accordance to The NELAC Institute protocols unless noted otherwise. American West Analytical Laboratories is accredited by The NELAC Institute in Utah and Texas; and is state accredited in Colorado, Idaho, and Missouri. Accreditation documents are available upon request. 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. The "Reporting Limit" found on the report is equivalent to the practical quantitation limit (PQL). This is the minimum concentration that can be reported by the method referenced and the sample matrix. The reporting limit must not be confused with any regulatory limit. Analytical results are reported to three significant figures for quality control and calculation purposes.

Thank You,

Kyle F. Gross

Digitally signed by Kyle F. Gross
DN: cn=Kyle F. Gross, o=AWAL, ou=AWAL, email=kyle@awal-labs.com, c=US
Date: 2012.02.16 13:26:36 -07'00'

Approved by:

Laboratory Director or designee

INORGANIC ANALYTICAL REPORT

American West ANALYTICAL LABORATORIES

Client:	American Sands Energy Corp.	**Contact:**	William Gibbs
Project:	Green River Resources		
Lab Sample ID:	1201439-001		
Client Sample ID:	1A,B+C		
Collection Date:	1/30/2012 1400h		
Received Date:	1/31/2012 1010h		

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Analytical Results SPLP METALS Method 1312

SPLP Prep Date: 2/1/2012 1840h

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	2/7/2012 230h	2/8/2012 1804h	SW6020A	0.00100	< 0.00100	
Arsenic	mg/L	2/7/2012 230h	2/8/2012 1804h	SW6020A	0.000600	**0.00106**	
Barium	mg/L	2/7/2012 230h	2/8/2012 1804h	SW6020A	0.000400	**0.0120**	
Beryllium	mg/L	2/7/2012 230h	2/8/2012 1804h	SW6020A	0.000600	< 0.000600	
Boron	mg/L	2/7/2012 230h	2/9/2012 1554h	SW6010C	0.500	< 0.500	
Cadmium	mg/L	2/7/2012 230h	2/8/2012 1804h	SW6020A	0.000180	< 0.000180	
Calcium	mg/L	2/7/2012 230h	2/9/2012 1554h	SW6010C	1.00	**1.27**	
Chromium	mg/L	2/7/2012 230h	2/9/2012 1554h	SW6010C	0.0100	< 0.0100	
Copper	mg/L	2/7/2012 230h	2/8/2012 1804h	SW6020A	0.000800	**0.00161**	
Iron	mg/L	2/7/2012 230h	2/9/2012 1554h	SW6010C	0.100	**0.782**	
Lead	mg/L	2/7/2012 230h	2/8/2012 1804h	SW6020A	0.000400	**0.000710**	
Lithium	mg/L	2/7/2012 230h	2/9/2012 1559h	SW6010C	0.100	< 0.100	~
Magnesium	mg/L	2/7/2012 230h	2/9/2012 1554h	SW6010C	1.00	< 1.00	
Manganese	mg/L	2/7/2012 230h	2/8/2012 1804h	SW6020A	0.00120	**0.216**	
Mercury	mg/L	2/6/2012 1530h	2/7/2012 845h	SW7470A	0.0100	< 0.0100	*
Molybdenum	mg/L	2/7/2012 230h	2/9/2012 1554h	SW6010C	0.0200	< 0.0200	
Nickel	mg/L	2/7/2012 230h	2/8/2012 1804h	SW6020A	0.000800	**0.00336**	
Potassium	mg/L	2/7/2012 230h	2/9/2012 1554h	SW6010C	1.00	< 1.00	
Selenium	mg/L	2/7/2012 230h	2/8/2012 1804h	SW6020A	0.000800	< 0.000800	
Silver	mg/L	2/7/2012 230h	2/8/2012 1804h	SW6020A	0.000400	< 0.000400	
Sodium	mg/L	2/7/2012 230h	2/9/2012 1554h	SW6010C	1.00	**1.07**	
Strontium	mg/L	2/7/2012 230h	2/9/2012 1554h	SW6010C	0.0500	< 0.0500	
Thallium	mg/L	2/7/2012 230h	2/8/2012 1804h	SW6020A	0.000400	< 0.000400	
Tin	mg/L	2/7/2012 230h	2/9/2012 1554h	SW6010C	0.500	< 0.500	
Vanadium	mg/L	2/7/2012 230h	2/9/2012 1554h	SW6010C	0.0500	< 0.0500	
Zinc	mg/L	2/7/2012 230h	2/8/2012 1804h	SW6020A	0.00500	**0.0245**	

** - The reporting limits were raised due to sample matrix interferences.*

~ - The above result was not performed in accordance with NELAP requirements.

INORGANIC ANALYTICAL REPORT

American West
ANALYTICAL LABORATORIES

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Green River Resources
Lab Sample ID: 1201439-002
Client Sample ID: 2A,B+C
Collection Date: 1/30/2012 1400h
Received Date: 1/31/2012 1010h

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Analytical Results SPLP METALS Method 1312

SPLP Prep Date: 2/1/2012 1840h

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	2/7/2012 230h	2/8/2012 1838h	SW6020A	0.00100	< 0.00100	
Arsenic	mg/L	2/7/2012 230h	2/8/2012 1838h	SW6020A	0.000600	**0.00146**	
Barium	mg/L	2/7/2012 230h	2/8/2012 1838h	SW6020A	0.000400	**0.0124**	
Beryllium	mg/L	2/7/2012 230h	2/8/2012 1838h	SW6020A	0.000600	< 0.000600	
Boron	mg/L	2/7/2012 230h	2/9/2012 1611h	SW6010C	0.500	< 0.500	
Cadmium	mg/L	2/7/2012 230h	2/8/2012 1838h	SW6020A	0.000180	< 0.000180	
Calcium	mg/L	2/7/2012 230h	2/9/2012 1611h	SW6010C	1.00	**1.31**	
Chromium	mg/L	2/7/2012 230h	2/9/2012 1611h	SW6010C	0.0100	< 0.0100	
Copper	mg/L	2/7/2012 230h	2/8/2012 1838h	SW6020A	0.000800	**0.00130**	
Iron	mg/L	2/7/2012 230h	2/9/2012 1611h	SW6010C	0.100	**1.20**	
Lead	mg/L	2/7/2012 230h	2/8/2012 1838h	SW6020A	0.000400	**0.000846**	
Lithium	mg/L	2/7/2012 230h	2/9/2012 1601h	SW6010C	0.100	< 0.100	~
Magnesium	mg/L	2/7/2012 230h	2/9/2012 1611h	SW6010C	1.00	< 1.00	
Manganese	mg/L	2/7/2012 230h	2/8/2012 1838h	SW6020A	0.00120	**0.243**	
Mercury	mg/L	2/6/2012 1530h	2/7/2012 853h	SW7470A	0.0100	< 0.0100	*
Molybdenum	mg/L	2/7/2012 230h	2/9/2012 1611h	SW6010C	0.0200	< 0.0200	
Nickel	mg/L	2/7/2012 230h	2/8/2012 1838h	SW6020A	0.000800	**0.00364**	
Potassium	mg/L	2/7/2012 230h	2/9/2012 1611h	SW6010C	1.00	< 1.00	
Selenium	mg/L	2/7/2012 230h	2/8/2012 1838h	SW6020A	0.000800	**0.00105**	
Silver	mg/L	2/7/2012 230h	2/8/2012 1838h	SW6020A	0.000400	< 0.000400	
Sodium	mg/L	2/7/2012 230h	2/9/2012 1611h	SW6010C	1.00	< 1.00	
Strontium	mg/L	2/7/2012 230h	2/9/2012 1611h	SW6010C	0.0500	< 0.0500	
Thallium	mg/L	2/7/2012 230h	2/8/2012 1838h	SW6020A	0.000400	**0.000692**	
Tin	mg/L	2/7/2012 230h	2/9/2012 1611h	SW6010C	0.500	< 0.500	
Vanadium	mg/L	2/7/2012 230h	2/9/2012 1611h	SW6010C	0.0500	< 0.0500	
Zinc	mg/L	2/7/2012 230h	2/8/2012 1838h	SW6020A	0.00500	**0.0210**	

** - The reporting limits were raised due to sample matrix interferences.*

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INORGANIC ANALYTICAL REPORT

American West ANALYTICAL LABORATORIES

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Green River Resources
Lab Sample ID: 1201439-003
Client Sample ID: 3A,B+C
Collection Date: 1/30/2012 1400h
Received Date: 1/31/2012 1010h

Analytical Results SPLP METALS Method 1312

SPLP Prep Date: 2/1/2012 1840h

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	2/7/2012 230h	2/8/2012 1845h	SW6020A	0.00100	< 0.00100	
Arsenic	mg/L	2/7/2012 230h	2/8/2012 1845h	SW6020A	0.000600	**0.00135**	
Barium	mg/L	2/7/2012 230h	2/8/2012 1845h	SW6020A	0.000400	**0.0142**	
Beryllium	mg/L	2/7/2012 230h	2/8/2012 1845h	SW6020A	0.000600	< 0.000600	
Boron	mg/L	2/7/2012 230h	2/9/2012 1615h	SW6010C	0.500	< 0.500	
Cadmium	mg/L	2/7/2012 230h	2/8/2012 1845h	SW6020A	0.000180	< 0.000180	
Calcium	mg/L	2/7/2012 230h	2/9/2012 1615h	SW6010C	1.00	**1.86**	
Chromium	mg/L	2/7/2012 230h	2/9/2012 1615h	SW6010C	0.0100	< 0.0100	
Copper	mg/L	2/7/2012 230h	2/8/2012 1845h	SW6020A	0.000800	**0.00134**	
Iron	mg/L	2/7/2012 230h	2/9/2012 1615h	SW6010C	0.100	**1.10**	
Lead	mg/L	2/7/2012 230h	2/8/2012 1845h	SW6020A	0.000400	**0.000676**	
Lithium	mg/L	2/7/2012 230h	2/9/2012 1604h	SW6010C	0.100	< 0.100	~
Magnesium	mg/L	2/7/2012 230h	2/9/2012 1615h	SW6010C	1.00	< 1.00	
Manganese	mg/L	2/7/2012 230h	2/8/2012 1845h	SW6020A	0.00120	**0.366**	
Mercury	mg/L	2/6/2012 1530h	2/7/2012 854h	SW7470A	0.0100	< 0.0100	*
Molybdenum	mg/L	2/7/2012 230h	2/9/2012 1615h	SW6010C	0.0200	< 0.0200	
Nickel	mg/L	2/7/2012 230h	2/8/2012 1845h	SW6020A	0.000800	**0.00449**	
Potassium	mg/L	2/7/2012 230h	2/9/2012 1615h	SW6010C	1.00	< 1.00	
Selenium	mg/L	2/7/2012 230h	2/8/2012 1845h	SW6020A	0.000800	< 0.000800	
Silver	mg/L	2/7/2012 230h	2/8/2012 1845h	SW6020A	0.000400	< 0.000400	
Sodium	mg/L	2/7/2012 230h	2/9/2012 1615h	SW6010C	1.00	< 1.00	
Strontium	mg/L	2/7/2012 230h	2/9/2012 1615h	SW6010C	0.0500	< 0.0500	
Thallium	mg/L	2/7/2012 230h	2/8/2012 1845h	SW6020A	0.000400	< 0.000400	
Tin	mg/L	2/7/2012 230h	2/9/2012 1615h	SW6010C	0.500	< 0.500	
Vanadium	mg/L	2/7/2012 230h	2/9/2012 1615h	SW6010C	0.0500	< 0.0500	
Zinc	mg/L	2/7/2012 230h	2/8/2012 1845h	SW6020A	0.00500	**0.0156**	

** - The reporting limits were raised due to sample matrix interferences.*
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INORGANIC ANALYTICAL REPORT

American West
ANALYTICAL LABORATORIES

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Green River Resources
Lab Sample ID: 1201439-001
Client Sample ID: 1A,B+C
Collection Date: 1/30/2012 1400h
Received Date: 1/31/2012 1010h

Analytical Results

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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Alkalinity (as CaCO3)	mg/L		2/3/2012 1100h	SM2320B	10.0	**14.6**	
Chloride	mg/L		2/10/2012 1143h	E300.0	0.100	< 0.100	
Fluoride	mg/L		2/10/2012 1143h	E300.0	0.100	< 0.100	
Nitrate/Nitrite (as N)	mg/L		2/2/2012 1703h	E353.2	0.0100	**0.0419**	
Oil & Grease	mg/L		2/6/2012 1425h	E1664A	3.00	**3.07**	
pH @ 25° C	pH Units		2/2/2012 1600h	SM4500-H+B	1.00	**9.42**	
Sulfate	mg/L		2/10/2012 1143h	E300.0	0.750	**2.63**	
Total Dissolved Solids	mg/L		2/3/2012 1330h	SM2540C	20.0	< 20.0	
Total Organic Carbon	mg/L		2/5/2012 2048h	SM5310B	1.00	**3.96**	

Analysis performed on an SPLP extract.

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

INORGANIC ANALYTICAL REPORT

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Green River Resources
Lab Sample ID: 1201439-002
Client Sample ID: 2A,B+C
Collection Date: 1/30/2012 1400h
Received Date: 1/31/2012 1010h

American West
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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Alkalinity (as CaCO3)	mg/L		2/3/2012 1100h	SM2320B	10.0	**13.7**	
Chloride	mg/L		2/10/2012 1207h	E300.0	0.100	< 0.100	
Fluoride	mg/L		2/10/2012 1207h	E300.0	0.100	< 0.100	
Nitrate/Nitrite (as N)	mg/L		2/2/2012 1704h	E353.2	0.0100	**0.0407**	
Oil & Grease	mg/L		2/6/2012 1425h	E1664A	3.00	**4.39**	
pH @ 25° C	pH Units		2/2/2012 1600h	SM4500-H+B	1.00	**9.42**	
Sulfate	mg/L		2/10/2012 1207h	E300.0	0.750	**2.68**	
Total Dissolved Solids	mg/L		2/3/2012 1330h	SM2540C	20.0	< 20.0	
Total Organic Carbon	mg/L		2/5/2012 2110h	SM5310B	1.00	**4.58**	

Analysis performed on an SPLP extract.

INORGANIC ANALYTICAL REPORT

American West
ANALYTICAL LABORATORIES

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Green River Resources
Lab Sample ID: 1201439-003
Client Sample ID: 3A,B+C
Collection Date: 1/30/2012 1400h
Received Date: 1/31/2012 1010h

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Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Alkalinity (as CaCO3)	mg/L		2/3/2012 1100h	SM2320B	10.0	**10.9**	
Chloride	mg/L		2/10/2012 1229h	E300.0	0.100	< 0.100	
Fluoride	mg/L		2/10/2012 1229h	E300.0	0.100	< 0.100	
Nitrate/Nitrite (as N)	mg/L		2/2/2012 1706h	E353.2	0.0100	**0.0422**	
Oil & Grease	mg/L		2/6/2012 1425h	E1664A	3.00	**3.69**	
pH @ 25° C	pH Units		2/2/2012 1600h	SM4500-H+B	1.00	**9.35**	
Sulfate	mg/L		2/10/2012 1229h	E300.0	0.750	**3.13**	
Total Dissolved Solids	mg/L		2/3/2012 1330h	SM2540C	20.0	< 20.0	
Total Organic Carbon	mg/L		2/5/2012 2131h	SM5310B	1.00	**4.51**	

Analysis performed on an SPLP extract.

ORGANIC ANALYTICAL REPORT

American West ANALYTICAL LABORATORIES

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Green River Resources
Lab Sample ID: 1201439-001B
Client Sample ID: 1A,B+C
Collection Date: 1/30/2012 1400h
Received Date: 1/31/2012 1010h **Method:** SW8270D

Analytical Results SVOA SPLP by GC/MS Method 8270D/1312/3510C

Analyzed: 2/7/2012 1351h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

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Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,1´-Biphenyl	92-52-4	0.0100	< 0.0100	
1,2,4,5-Tetrachlorobenzene	95-94-3	0.0100	< 0.0100	
1,2,4-Trichlorobenzene	120-82-1	0.0100	< 0.0100	
1,2-Dichlorobenzene	95-50-1	0.0100	< 0.0100	
1,3,5-Trinitrobenzene	99-35-4	0.0100	< 0.0100	
1,4-Naphthoquinone	130-15-4	0.0100	< 0.0100	
1,3-Dichlorobenzene	541-73-1	0.0100	< 0.0100	
1,3-Dinitrobenzene	99-65-0	0.0100	< 0.0100	
1,4-Dichlorobenzene	106-46-7	0.0100	< 0.0100	
1,4-Phenylenediamine	106-50-3	0.0100	< 0.0100	
1-Chloronaphthalene	90-13-1	0.0100	< 0.0100	
1-Methylnaphthalene	90-12-0	0.0100	< 0.0100	
1-Naphthylamine	134-32-7	0.0100	< 0.0100	
2,3,4,6-Tetrachlorophenol	58-90-2	0.0100	< 0.0100	
2,4,5-Trichlorophenol	95-95-4	0.0100	< 0.0100	
2,4,6-Trichlorophenol	88-06-2	0.0100	< 0.0100	
2,4-Dichlorophenol	120-83-2	0.0100	< 0.0100	
2,4-Dimethylphenol	105-67-9	0.0100	< 0.0100	
2,4-Dinitrophenol	51-28-5	0.0100	< 0.0100	
2,4-Dinitrotoluene	121-14-2	0.0100	< 0.0100	
2,6-Dichlorophenol	87-65-0	0.0100	< 0.0100	
2,6-Dinitrotoluene	606-20-2	0.0100	< 0.0100	
2-Acetylaminofluorene	53-96-3	0.0100	< 0.0100	
2-Chloronaphthalene	91-58-7	0.0100	< 0.0100	
2-Chlorophenol	95-57-8	0.0100	< 0.0100	
2-Methylnaphthalene	91-57-6	0.0100	< 0.0100	
2-Methylphenol	95-48-7	0.0100	< 0.0100	
2-Naphthylamine	91-59-8	0.0100	< 0.0100	
2-Nitroaniline	88-74-4	0.0100	< 0.0100	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1201439-001B
Client Sample ID: 1A,B+C

Analyzed: 2/7/2012 1351h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
2-Nitrophenol	88-75-5	0.0100	< 0.0100	
2-Picoline	109-06-8	0.0100	< 0.0100	
3&4-Methylphenol		0.0100	< 0.0100	
3,3′-Dichlorobenzidine	91-94-1	0.0100	< 0.0100	
3,3′-Dimethylbenzidine	119-93-7	0.0100	< 0.0100	
3-Methylcholanthrene	56-49-5	0.0100	< 0.0100	
3-Nitroaniline	99-09-2	0.0100	< 0.0100	
4,6-Dinitro-2-methylphenol	534-52-1	0.0100	< 0.0100	
4-Aminobiphenyl	92-67-1	0.0100	< 0.0100	
4-Bromophenyl phenyl ether	101-55-3	0.0100	< 0.0100	
4-Chloro-3-methylphenol	59-50-7	0.0100	< 0.0100	
4-Chloroaniline	106-47-8	0.0100	< 0.0100	
4-Chlorophenyl phenyl ether	7005-72-3	0.0100	< 0.0100	
4-Nitroaniline	100-01-6	0.0100	< 0.0100	
4-Nitrophenol	100-02-7	0.0100	< 0.0100	
5-Nitro-o-toluidine	99-55-8	0.0100	< 0.0100	
7,12-Dimethylbenz(a)anthracene	57-97-6	0.0100	< 0.0100	
a,a-Dimethylphenethylamine	122-09-8	0.0100	< 0.0100	
Acenaphthene	83-32-9	0.0100	< 0.0100	
Acenaphthylene	208-96-8	0.0100	< 0.0100	
Acetophenone	98-86-2	0.0100	< 0.0100	
alpha-Terpineol	98-55-5	0.0100	< 0.0100	
Aniline	62-53-3	0.0100	< 0.0100	
Anthracene	120-12-7	0.0100	< 0.0100	
Aramite	140-57-8	0.0100	< 0.0100	
Azobenzene	103-33-3	0.0100	< 0.0100	
Benz(a)anthracene	56-55-3	0.0100	< 0.0100	
Benzidine	92-87-5	0.0100	< 0.0100	
Benzo(a)pyrene	50-32-8	0.0100	< 0.0100	
Benzo(b)fluoranthene	205-99-2	0.0100	< 0.0100	
Benzo(g,h,i)perylene	191-24-2	0.0100	< 0.0100	
Benzo(k)fluoranthene	207-08-9	0.0100	< 0.0100	
Benzoic acid	65-85-0	0.0200	< 0.0200	
Benzyl alcohol	100-51-6	0.0100	< 0.0100	
Bis(2-chloroethoxy)methane	111-91-1	0.0100	< 0.0100	

American West
ANALYTICAL LABORATORIES

Lab Sample ID: 1201439-001B
Client Sample ID: 1A,B+C

Analyzed: 2/7/2012 1351h | Extracted: 2/3/2012 1025h | SPLP Prep Date: 2/1/2012 1840h
Units: mg/L | Dilution Factor: 1

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Bis(2-chloroethyl) ether	111-44-4	0.0100	< 0.0100	
Bis(2-chloroisopropyl) ether	108-60-1	0.0100	< 0.0100	
Bis(2-ethylhexyl) phthalate	117-81-7	0.0100	< 0.0100	
bis(2-ethylhexyl)adipate	103-23-1	0.0100	< 0.0100	
Butyl benzyl phthalate	85-68-7	0.0100	< 0.0100	
Carbazole	86-74-8	0.0100	< 0.0100	
Chlorobenzilate	510-15-6	0.0100	< 0.0100	
Chrysene	218-01-9	0.0100	< 0.0100	
Di-n-butyl phthalate	84-74-2	0.0100	< 0.0100	
Di-n-octyl phthalate	117-84-0	0.0100	< 0.0100	
Diallate (cis or trans)	2303-16-4	0.0100	< 0.0100	
Dibenz(a,h)anthracene	53-70-3	0.0100	< 0.0100	
Dibenzofuran	132-64-9	0.0100	< 0.0100	
Diethyl phthalate	84-66-2	0.0100	< 0.0100	
Dimethoate	60-51-5	0.0100	< 0.0100	
Dimethyl phthalate	131-11-3	0.0100	< 0.0100	
Dimethylaminoazobenzene	60-11-7	0.0100	< 0.0100	
Dinoseb	88-85-7	0.0100	< 0.0100	
Diphenylamine	122-39-4	0.0100	< 0.0100	
Disulfoton	298-04-4	0.0100	< 0.0100	
Ethyl methanesulfonate	62-50-0	0.0100	< 0.0100	
Famphur	52-85-7	0.0100	< 0.0100	
Fluoranthene	206-44-0	0.0100	< 0.0100	
Fluorene	86-73-7	0.0100	< 0.0100	
Hexachlorobenzene	118-74-1	0.0100	< 0.0100	
Hexachlorobutadiene	87-68-3	0.0100	< 0.0100	
Hexachlorocyclopentadiene	77-47-4	0.0100	< 0.0100	
Hexachloroethane	67-72-1	0.0100	< 0.0100	
Hexachlorophene	70-30-4	0.0100	< 0.0100	
Hexachloropropene	1888-71-7	0.0100	< 0.0100	
Indene	95-13-6	0.0100	< 0.0100	
Indeno(1,2,3-cd)pyrene	193-39-5	0.0100	< 0.0100	
Isodrin	465-73-6	0.0100	< 0.0100	
Isophorone	78-59-1	0.0100	< 0.0100	
Isosafrole	120-58-1	0.0100	< 0.0100	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1201439-001B
Client Sample ID: 1A,B+C

Analyzed: 2/7/2012 1351h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Kepone	143-50-0	0.0100	< 0.0100	
Methapyrilene	91-80-5	0.0100	< 0.0100	
Methyl methanesulfonate	66-27-3	0.0100	< 0.0100	
n-Decane	124-18-5	0.0100	< 0.0100	
N-Nitrosodi-n-butylamine	924-16-3	0.0100	< 0.0100	
N-Nitrosodiethylamine	55-18-5	0.0100	< 0.0100	
N-Nitrosodimethylamine	62-75-9	0.0100	< 0.0100	
N-Nitrosodiphenylamine	86-30-6	0.0100	< 0.0100	
N-Nitrosodi-n-propylamine	621-64-7	0.0100	< 0.0100	
N-Nitrosomethylethylamine	10595-95-6	0.0100	< 0.0100	
N-Nitrosomorpholine	59-89-2	0.0100	< 0.0100	
N-Nitrosopiperidine	100-75-4	0.0100	< 0.0100	
N-Nitrosopyrrolidine	930-55-2	0.0100	< 0.0100	
n-Octadecane	593-45-3	0.0100	< 0.0100	
Naphthalene	91-20-3	0.0100	< 0.0100	
Nitrobenzene	98-95-3	0.0100	< 0.0100	
Nitroquinoline-1-oxide	56-57-5	0.0100	< 0.0100	
O,O,O-Triethyl phosphorothioate	126-68-1	0.0100	< 0.0100	
o-Toluidine	95-53-4	0.0100	< 0.0100	
Parathion	56-38-2	0.0100	< 0.0100	
Methyl parathion	298-00-0	0.0100	< 0.0100	
Pentachlorobenzene	608-93-5	0.0100	< 0.0100	
Pentachloronitrobenzene	82-68-8	0.0100	< 0.0100	
Pentachlorophenol	87-86-5	0.0100	< 0.0100	
Phenacetin	62-44-2	0.0100	< 0.0100	
Phenanthrene	85-01-8	0.0100	< 0.0100	
Phenol	108-95-2	0.0100	< 0.0100	
Phorate	298-02-2	0.0100	< 0.0100	
Pronamide	23950-58-5	0.0100	< 0.0100	
Pyrene	129-00-0	0.0100	< 0.0100	
Pyridine	110-86-1	0.0100	< 0.0100	
Quinoline	91-22-5	0.0100	< 0.0100	
Safrole	94-59-7	0.0100	< 0.0100	
Tetraethyl dithiopyrophosphate	3689-24-5	0.0100	< 0.0100	
Thionazin	297-97-2	0.0100	< 0.0100	

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Lab Sample ID: 1201439-001B
Client Sample ID: 1A,B+C

Analyzed: 2/7/2012 1351h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: Terphenyl-d14	1718-51-0	0.0419	0.04000	105	10-199	
Surr: Phenol-d6	13127-88-3	0.0201	0.08000	25.2	10-122	
Surr: Nitrobenzene-d5	4165-60-0	0.0218	0.04000	54.4	10-180	
Surr: 2-Fluorophenol	367-12-4	0.0273	0.08000	34.1	14-106	
Surr: 2-Fluorobiphenyl	321-60-8	0.0233	0.04000	58.2	10-124	
Surr: 2,4,6-Tribromophenol	118-79-6	0.0660	0.08000	82.6	10-159	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

ORGANIC ANALYTICAL REPORT

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Laboratory Director

Jose Rocha
QA Officer

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Green River Resources
Lab Sample ID: 1201439-002B
Client Sample ID: 2A,B+C
Collection Date: 1/30/2012 1400h
Received Date: 1/31/2012 1010h **Method:** SW8270D

Analytical Results SVOA SPLP by GC/MS Method 8270D/1312/3510C

Analyzed: 2/7/2012 1507h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,1´-Biphenyl	92-52-4	0.0100	< 0.0100	
1,2,4,5-Tetrachlorobenzene	95-94-3	0.0100	< 0.0100	
1,2,4-Trichlorobenzene	120-82-1	0.0100	< 0.0100	
1,2-Dichlorobenzene	95-50-1	0.0100	< 0.0100	
1,3,5-Trinitrobenzene	99-35-4	0.0100	< 0.0100	
1,4-Naphthoquinone	130-15-4	0.0100	< 0.0100	
1,3-Dichlorobenzene	541-73-1	0.0100	< 0.0100	
1,3-Dinitrobenzene	99-65-0	0.0100	< 0.0100	
1,4-Dichlorobenzene	106-46-7	0.0100	< 0.0100	
1,4-Phenylenediamine	106-50-3	0.0100	< 0.0100	
1-Chloronaphthalene	90-13-1	0.0100	< 0.0100	
1-Methylnaphthalene	90-12-0	0.0100	< 0.0100	
1-Naphthylamine	134-32-7	0.0100	< 0.0100	
2,3,4,6-Tetrachlorophenol	58-90-2	0.0100	< 0.0100	
2,4,5-Trichlorophenol	95-95-4	0.0100	< 0.0100	
2,4,6-Trichlorophenol	88-06-2	0.0100	< 0.0100	
2,4-Dichlorophenol	120-83-2	0.0100	< 0.0100	
2,4-Dimethylphenol	105-67-9	0.0100	< 0.0100	
2,4-Dinitrophenol	51-28-5	0.0100	< 0.0100	
2,4-Dinitrotoluene	121-14-2	0.0100	< 0.0100	
2,6-Dichlorophenol	87-65-0	0.0100	< 0.0100	
2,6-Dinitrotoluene	606-20-2	0.0100	< 0.0100	
2-Acetylaminofluorene	53-96-3	0.0100	< 0.0100	
2-Chloronaphthalene	91-58-7	0.0100	< 0.0100	
2-Chlorophenol	95-57-8	0.0100	< 0.0100	
2-Methylnaphthalene	91-57-6	0.0100	< 0.0100	
2-Methylphenol	95-48-7	0.0100	< 0.0100	
2-Naphthylamine	91-59-8	0.0100	< 0.0100	
2-Nitroaniline	88-74-4	0.0100	< 0.0100	

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Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1201439-002B
Client Sample ID: 2A,B+C

Analyzed: 2/7/2012 1507h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
2-Nitrophenol	88-75-5	0.0100	< 0.0100	
2-Picoline	109-06-8	0.0100	< 0.0100	
3&4-Methylphenol		0.0100	< 0.0100	
3,3′-Dichlorobenzidine	91-94-1	0.0100	< 0.0100	
3,3′-Dimethylbenzidine	119-93-7	0.0100	< 0.0100	
3-Methylcholanthrene	56-49-5	0.0100	< 0.0100	
3-Nitroaniline	99-09-2	0.0100	< 0.0100	
4,6-Dinitro-2-methylphenol	534-52-1	0.0100	< 0.0100	
4-Aminobiphenyl	92-67-1	0.0100	< 0.0100	
4-Bromophenyl phenyl ether	101-55-3	0.0100	< 0.0100	
4-Chloro-3-methylphenol	59-50-7	0.0100	< 0.0100	
4-Chloroaniline	106-47-8	0.0100	< 0.0100	
4-Chlorophenyl phenyl ether	7005-72-3	0.0100	< 0.0100	
4-Nitroaniline	100-01-6	0.0100	< 0.0100	
4-Nitrophenol	100-02-7	0.0100	< 0.0100	
5-Nitro-o-toluidine	99-55-8	0.0100	< 0.0100	
7,12-Dimethylbenz(a)anthracene	57-97-6	0.0100	< 0.0100	
a,a-Dimethylphenethylamine	122-09-8	0.0100	< 0.0100	
Acenaphthene	83-32-9	0.0100	< 0.0100	
Acenaphthylene	208-96-8	0.0100	< 0.0100	
Acetophenone	98-86-2	0.0100	< 0.0100	
alpha-Terpineol	98-55-5	0.0100	< 0.0100	
Aniline	62-53-3	0.0100	< 0.0100	
Anthracene	120-12-7	0.0100	< 0.0100	
Aramite	140-57-8	0.0100	< 0.0100	
Azobenzene	103-33-3	0.0100	< 0.0100	
Benz(a)anthracene	56-55-3	0.0100	< 0.0100	
Benzidine	92-87-5	0.0100	< 0.0100	
Benzo(a)pyrene	50-32-8	0.0100	< 0.0100	
Benzo(b)fluoranthene	205-99-2	0.0100	< 0.0100	
Benzo(g,h,i)perylene	191-24-2	0.0100	< 0.0100	
Benzo(k)fluoranthene	207-08-9	0.0100	< 0.0100	
Benzoic acid	65-85-0	0.0200	< 0.0200	
Benzyl alcohol	100-51-6	0.0100	< 0.0100	
Bis(2-chloroethoxy)methane	111-91-1	0.0100	< 0.0100	

Lab Sample ID: 1201439-002B
Client Sample ID: 2A,B+C

Analyzed: 2/7/2012 1507h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

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Laboratory Director

Jose Rocha
QA Officer

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Bis(2-chloroethyl) ether	111-44-4	0.0100	< 0.0100	
Bis(2-chloroisopropyl) ether	108-60-1	0.0100	< 0.0100	
Bis(2-ethylhexyl) phthalate	117-81-7	0.0100	< 0.0100	
bis(2-ethylhexyl)adipate	103-23-1	0.0100	< 0.0100	
Butyl benzyl phthalate	85-68-7	0.0100	< 0.0100	
Carbazole	86-74-8	0.0100	< 0.0100	
Chlorobenzilate	510-15-6	0.0100	< 0.0100	
Chrysene	218-01-9	0.0100	< 0.0100	
Di-n-butyl phthalate	84-74-2	0.0100	< 0.0100	
Di-n-octyl phthalate	117-84-0	0.0100	< 0.0100	
Diallate (cis or trans)	2303-16-4	0.0100	< 0.0100	
Dibenz(a,h)anthracene	53-70-3	0.0100	< 0.0100	
Dibenzofuran	132-64-9	0.0100	< 0.0100	
Diethyl phthalate	84-66-2	0.0100	< 0.0100	
Dimethoate	60-51-5	0.0100	< 0.0100	
Dimethyl phthalate	131-11-3	0.0100	< 0.0100	
Dimethylaminoazobenzene	60-11-7	0.0100	< 0.0100	
Dinoseb	88-85-7	0.0100	< 0.0100	
Diphenylamine	122-39-4	0.0100	< 0.0100	
Disulfoton	298-04-4	0.0100	< 0.0100	
Ethyl methanesulfonate	62-50-0	0.0100	< 0.0100	
Famphur	52-85-7	0.0100	< 0.0100	
Fluoranthene	206-44-0	0.0100	< 0.0100	
Fluorene	86-73-7	0.0100	< 0.0100	
Hexachlorobenzene	118-74-1	0.0100	< 0.0100	
Hexachlorobutadiene	87-68-3	0.0100	< 0.0100	
Hexachlorocyclopentadiene	77-47-4	0.0100	< 0.0100	
Hexachloroethane	67-72-1	0.0100	< 0.0100	
Hexachlorophene	70-30-4	0.0100	< 0.0100	
Hexachloropropene	1888-71-7	0.0100	< 0.0100	
Indene	95-13-6	0.0100	< 0.0100	
Indeno(1,2,3-cd)pyrene	193-39-5	0.0100	< 0.0100	
Isodrin	465-73-6	0.0100	< 0.0100	
Isophorone	78-59-1	0.0100	< 0.0100	
Isosafrole	120-58-1	0.0100	< 0.0100	

Lab Sample ID: 1201439-002B
Client Sample ID: 2A,B+C

Analyzed: 2/7/2012 1507h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

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Laboratory Director

Jose Rocha
QA Officer

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Kepone	143-50-0	0.0100	< 0.0100	
Methapyrilene	91-80-5	0.0100	< 0.0100	
Methyl methanesulfonate	66-27-3	0.0100	< 0.0100	
n-Decane	124-18-5	0.0100	< 0.0100	
N-Nitrosodi-n-butylamine	924-16-3	0.0100	< 0.0100	
N-Nitrosodiethylamine	55-18-5	0.0100	< 0.0100	
N-Nitrosodimethylamine	62-75-9	0.0100	< 0.0100	
N-Nitrosodiphenylamine	86-30-6	0.0100	< 0.0100	
N-Nitrosodi-n-propylamine	621-64-7	0.0100	< 0.0100	
N-Nitrosomethylethylamine	10595-95-6	0.0100	< 0.0100	
N-Nitrosomorpholine	59-89-2	0.0100	< 0.0100	
N-Nitrosopiperidine	100-75-4	0.0100	< 0.0100	
N-Nitrosopyrrolidine	930-55-2	0.0100	< 0.0100	
n-Octadecane	593-45-3	0.0100	< 0.0100	
Naphthalene	91-20-3	0.0100	< 0.0100	
Nitrobenzene	98-95-3	0.0100	< 0.0100	
Nitroquinoline-1-oxide	56-57-5	0.0100	< 0.0100	
O,O,O-Triethyl phosphorothioate	126-68-1	0.0100	< 0.0100	
o-Toluidine	95-53-4	0.0100	< 0.0100	
Parathion	56-38-2	0.0100	< 0.0100	
Methyl parathion	298-00-0	0.0100	< 0.0100	
Pentachlorobenzene	608-93-5	0.0100	< 0.0100	
Pentachloronitrobenzene	82-68-8	0.0100	< 0.0100	
Pentachlorophenol	87-86-5	0.0100	< 0.0100	
Phenacetin	62-44-2	0.0100	< 0.0100	
Phenanthrene	85-01-8	0.0100	< 0.0100	
Phenol	108-95-2	0.0100	< 0.0100	
Phorate	298-02-2	0.0100	< 0.0100	
Pronamide	23950-58-5	0.0100	< 0.0100	
Pyrene	129-00-0	0.0100	< 0.0100	
Pyridine	110-86-1	0.0100	< 0.0100	
Quinoline	91-22-5	0.0100	< 0.0100	
Safrole	94-59-7	0.0100	< 0.0100	
Tetraethyl dithiopyrophosphate	3689-24-5	0.0100	< 0.0100	
Thionazin	297-97-2	0.0100	< 0.0100	

Lab Sample ID: 1201439-002B
Client Sample ID: 2A,B+C

Analyzed: 2/7/2012 1507h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: Terphenyl-d14	1718-51-0	0.0368	0.04000	92.0	10-199	
Surr: Phenol-d6	13127-88-3	0.0202	0.08000	25.2	10-122	
Surr: Nitrobenzene-d5	4165-60-0	0.0150	0.04000	37.4	10-180	
Surr: 2-Fluorophenol	367-12-4	0.0262	0.08000	32.8	14-106	
Surr: 2-Fluorobiphenyl	321-60-8	0.0149	0.04000	37.3	10-124	
Surr: 2,4,6-Tribromophenol	118-79-6	0.0702	0.08000	87.8	10-159	

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ORGANIC ANALYTICAL REPORT

American West
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Client:	American Sands Energy Corp.	**Contact:**	William Gibbs
Project:	Green River Resources		
Lab Sample ID:	1201439-003B		
Client Sample ID:	3A,B+C		
Collection Date:	1/30/2012 1400h		
Received Date:	1/31/2012 1010h	**Method:**	SW8270D

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Analytical Results SVOA SPLP by GC/MS Method 8270D/1312/3510C

Analyzed: 2/7/2012 1533h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,1´-Biphenyl	92-52-4	0.0100	< 0.0100	
1,2,4,5-Tetrachlorobenzene	95-94-3	0.0100	< 0.0100	
1,2,4-Trichlorobenzene	120-82-1	0.0100	< 0.0100	
1,2-Dichlorobenzene	95-50-1	0.0100	< 0.0100	
1,3,5-Trinitrobenzene	99-35-4	0.0100	< 0.0100	
1,4-Naphthoquinone	130-15-4	0.0100	< 0.0100	
1,3-Dichlorobenzene	541-73-1	0.0100	< 0.0100	
1,3-Dinitrobenzene	99-65-0	0.0100	< 0.0100	
1,4-Dichlorobenzene	106-46-7	0.0100	< 0.0100	
1,4-Phenylenediamine	106-50-3	0.0100	< 0.0100	
1-Chloronaphthalene	90-13-1	0.0100	< 0.0100	
1-Methylnaphthalene	90-12-0	0.0100	< 0.0100	
1-Naphthylamine	134-32-7	0.0100	< 0.0100	
2,3,4,6-Tetrachlorophenol	58-90-2	0.0100	< 0.0100	
2,4,5-Trichlorophenol	95-95-4	0.0100	< 0.0100	
2,4,6-Trichlorophenol	88-06-2	0.0100	< 0.0100	
2,4-Dichlorophenol	120-83-2	0.0100	< 0.0100	
2,4-Dimethylphenol	105-67-9	0.0100	< 0.0100	
2,4-Dinitrophenol	51-28-5	0.0100	< 0.0100	
2,4-Dinitrotoluene	121-14-2	0.0100	< 0.0100	
2,6-Dichlorophenol	87-65-0	0.0100	< 0.0100	
2,6-Dinitrotoluene	606-20-2	0.0100	< 0.0100	
2-Acetylaminofluorene	53-96-3	0.0100	< 0.0100	
2-Chloronaphthalene	91-58-7	0.0100	< 0.0100	
2-Chlorophenol	95-57-8	0.0100	< 0.0100	
2-Methylnaphthalene	91-57-6	0.0100	< 0.0100	
2-Methylphenol	95-48-7	0.0100	< 0.0100	
2-Naphthylamine	91-59-8	0.0100	< 0.0100	
2-Nitroaniline	88-74-4	0.0100	< 0.0100	

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Lab Sample ID: 1201439-003B
Client Sample ID: 3A,B+C

Analyzed: 2/7/2012 1533h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
2-Nitrophenol	88-75-5	0.0100	< 0.0100	
2-Picoline	109-06-8	0.0100	< 0.0100	
3&4-Methylphenol		0.0100	< 0.0100	
3,3´-Dichlorobenzidine	91-94-1	0.0100	< 0.0100	
3,3´-Dimethylbenzidine	119-93-7	0.0100	< 0.0100	
3-Methylcholanthrene	56-49-5	0.0100	< 0.0100	
3-Nitroaniline	99-09-2	0.0100	< 0.0100	
4,6-Dinitro-2-methylphenol	534-52-1	0.0100	< 0.0100	
4-Aminobiphenyl	92-67-1	0.0100	< 0.0100	
4-Bromophenyl phenyl ether	101-55-3	0.0100	< 0.0100	
4-Chloro-3-methylphenol	59-50-7	0.0100	< 0.0100	
4-Chloroaniline	106-47-8	0.0100	< 0.0100	
4-Chlorophenyl phenyl ether	7005-72-3	0.0100	< 0.0100	
4-Nitroaniline	100-01-6	0.0100	< 0.0100	
4-Nitrophenol	100-02-7	0.0100	< 0.0100	
5-Nitro-o-toluidine	99-55-8	0.0100	< 0.0100	
7,12-Dimethylbenz(a)anthracene	57-97-6	0.0100	< 0.0100	
a,a-Dimethylphenethylamine	122-09-8	0.0100	< 0.0100	
Acenaphthene	83-32-9	0.0100	< 0.0100	
Acenaphthylene	208-96-8	0.0100	< 0.0100	
Acetophenone	98-86-2	0.0100	< 0.0100	
alpha-Terpineol	98-55-5	0.0100	< 0.0100	
Aniline	62-53-3	0.0100	< 0.0100	
Anthracene	120-12-7	0.0100	< 0.0100	
Aramite	140-57-8	0.0100	< 0.0100	
Azobenzene	103-33-3	0.0100	< 0.0100	
Benz(a)anthracene	56-55-3	0.0100	< 0.0100	
Benzidine	92-87-5	0.0100	< 0.0100	
Benzo(a)pyrene	50-32-8	0.0100	< 0.0100	
Benzo(b)fluoranthene	205-99-2	0.0100	< 0.0100	
Benzo(g,h,i)perylene	191-24-2	0.0100	< 0.0100	
Benzo(k)fluoranthene	207-08-9	0.0100	< 0.0100	
Benzoic acid	65-85-0	0.0200	< 0.0200	
Benzyl alcohol	100-51-6	0.0100	< 0.0100	
Bis(2-chloroethoxy)methane	111-91-1	0.0100	< 0.0100	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1201439-003B
Client Sample ID: 3A,B+C

Analyzed: 2/7/2012 1533h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Bis(2-chloroethyl) ether	111-44-4	0.0100	< 0.0100	
Bis(2-chloroisopropyl) ether	108-60-1	0.0100	< 0.0100	
Bis(2-ethylhexyl) phthalate	117-81-7	0.0100	< 0.0100	
bis(2-ethylhexyl)adipate	103-23-1	0.0100	< 0.0100	
Butyl benzyl phthalate	85-68-7	0.0100	< 0.0100	
Carbazole	86-74-8	0.0100	< 0.0100	
Chlorobenzilate	510-15-6	0.0100	< 0.0100	
Chrysene	218-01-9	0.0100	< 0.0100	
Di-n-butyl phthalate	84-74-2	0.0100	< 0.0100	
Di-n-octyl phthalate	117-84-0	0.0100	< 0.0100	
Diallate (cis or trans)	2303-16-4	0.0100	< 0.0100	
Dibenz(a,h)anthracene	53-70-3	0.0100	< 0.0100	
Dibenzofuran	132-64-9	0.0100	< 0.0100	
Diethyl phthalate	84-66-2	0.0100	< 0.0100	
Dimethoate	60-51-5	0.0100	< 0.0100	
Dimethyl phthalate	131-11-3	0.0100	< 0.0100	
Dimethylaminoazobenzene	60-11-7	0.0100	< 0.0100	
Dinoseb	88-85-7	0.0100	< 0.0100	
Diphenylamine	122-39-4	0.0100	< 0.0100	
Disulfoton	298-04-4	0.0100	< 0.0100	
Ethyl methanesulfonate	62-50-0	0.0100	< 0.0100	
Famphur	52-85-7	0.0100	< 0.0100	
Fluoranthene	206-44-0	0.0100	< 0.0100	
Fluorene	86-73-7	0.0100	< 0.0100	
Hexachlorobenzene	118-74-1	0.0100	< 0.0100	
Hexachlorobutadiene	87-68-3	0.0100	< 0.0100	
Hexachlorocyclopentadiene	77-47-4	0.0100	< 0.0100	
Hexachloroethane	67-72-1	0.0100	< 0.0100	
Hexachlorophene	70-30-4	0.0100	< 0.0100	
Hexachloropropene	1888-71-7	0.0100	< 0.0100	
Indene	95-13-6	0.0100	< 0.0100	
Indeno(1,2,3-cd)pyrene	193-39-5	0.0100	< 0.0100	
Isodrin	465-73-6	0.0100	< 0.0100	
Isophorone	78-59-1	0.0100	< 0.0100	
Isosafrole	120-58-1	0.0100	< 0.0100	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1201439-003B
Client Sample ID: 3A,B+C

Analyzed: 2/7/2012 1533h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Kepone	143-50-0	0.0100	< 0.0100	
Methapyrilene	91-80-5	0.0100	< 0.0100	
Methyl methanesulfonate	66-27-3	0.0100	< 0.0100	
n-Decane	124-18-5	0.0100	< 0.0100	
N-Nitrosodi-n-butylamine	924-16-3	0.0100	< 0.0100	
N-Nitrosodiethylamine	55-18-5	0.0100	< 0.0100	
N-Nitrosodimethylamine	62-75-9	0.0100	< 0.0100	
N-Nitrosodiphenylamine	86-30-6	0.0100	< 0.0100	
N-Nitrosodi-n-propylamine	621-64-7	0.0100	< 0.0100	
N-Nitrosomethylethylamine	10595-95-6	0.0100	< 0.0100	
N-Nitrosomorpholine	59-89-2	0.0100	< 0.0100	
N-Nitrosopiperidine	100-75-4	0.0100	< 0.0100	
N-Nitrosopyrrolidine	930-55-2	0.0100	< 0.0100	
n-Octadecane	593-45-3	0.0100	< 0.0100	
Naphthalene	91-20-3	0.0100	< 0.0100	
Nitrobenzene	98-95-3	0.0100	< 0.0100	
Nitroquinoline-1-oxide	56-57-5	0.0100	< 0.0100	
O,O,O-Triethyl phosphorothioate	126-68-1	0.0100	< 0.0100	
o-Toluidine	95-53-4	0.0100	< 0.0100	
Parathion	56-38-2	0.0100	< 0.0100	
Methyl parathion	298-00-0	0.0100	< 0.0100	
Pentachlorobenzene	608-93-5	0.0100	< 0.0100	
Pentachloronitrobenzene	82-68-8	0.0100	< 0.0100	
Pentachlorophenol	87-86-5	0.0100	< 0.0100	
Phenacetin	62-44-2	0.0100	< 0.0100	
Phenanthrene	85-01-8	0.0100	< 0.0100	
Phenol	108-95-2	0.0100	< 0.0100	
Phorate	298-02-2	0.0100	< 0.0100	
Pronamide	23950-58-5	0.0100	< 0.0100	
Pyrene	129-00-0	0.0100	< 0.0100	
Pyridine	110-86-1	0.0100	< 0.0100	
Quinoline	91-22-5	0.0100	< 0.0100	
Safrole	94-59-7	0.0100	< 0.0100	
Tetraethyl dithiopyrophosphate	3689-24-5	0.0100	< 0.0100	
Thionazin	297-97-2	0.0100	< 0.0100	

Lab Sample ID: 1201439-003B
Client Sample ID: 3A,B+C

Analyzed: 2/7/2012 1533h **Extracted:** 2/3/2012 1025h **SPLP Prep Date:** 2/1/2012 1840h
Units: mg/L **Dilution Factor:** 1

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: Terphenyl-d14	1718-51-0	0.0389	0.04000	97.3	10-199	
Surr: Phenol-d6	13127-88-3	0.0181	0.08000	22.6	10-122	
Surr: Nitrobenzene-d5	4165-60-0	0.0138	0.04000	34.6	10-180	
Surr: 2-Fluorophenol	367-12-4	0.0238	0.08000	29.8	14-106	
Surr: 2-Fluorobiphenyl	321-60-8	0.0134	0.04000	33.6	10-124	
Surr: 2,4,6-Tribromophenol	118-79-6	0.0580	0.08000	72.5	10-159	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

ORGANIC ANALYTICAL REPORT

American West ANALYTICAL LABORATORIES

Client:	American Sands Energy Corp.	**Contact:**	William Gibbs
Project:	Green River Resources		
Lab Sample ID:	1201439-001A		
Client Sample ID:	1A,B+C		
Collection Date:	1/30/2012 1400h		
Received Date:	1/31/2012 1010h	**Method:**	SW8260C

Analytical Results VOAs SPLP 1312 List by GC/MS Method 8260C/5030C

Analyzed: 2/5/2012 153h **SPLP Prep Date:** 2/1/2012 1945h

Units: mg/L **Dilution Factor:** 1

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Kyle F. Gross
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QA Officer

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,1,1,2-Tetrachloroethane	630-20-6	0.00200	< 0.00200	
1,1,1-Trichloroethane	71-55-6	0.00200	< 0.00200	
1,1,2,2-Tetrachloroethane	79-34-5	0.00200	< 0.00200	
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.00200	< 0.00200	
1,1,2-Trichloroethane	79-00-5	0.00200	< 0.00200	
1,1-Dichloropropene	563-58-6	0.00200	< 0.00200	
1,1-Dichloroethane	75-34-3	0.00200	< 0.00200	
1,1-Dichloroethene	75-35-4	0.00200	< 0.00200	
1,2,3-Trichlorobenzene	87-61-6	0.00200	< 0.00200	
1,2,3-Trichloropropane	96-18-4	0.00200	< 0.00200	
1,2,3-Trimethylbenzene	526-73-8	0.00200	< 0.00200	
1,2,4-Trichlorobenzene	120-82-1	0.00200	< 0.00200	
1,2,4-Trimethylbenzene	95-63-6	0.00200	< 0.00200	
1,2-Dibromo-3-chloropropane	96-12-8	0.00500	< 0.00500	
1,2-Dibromoethane	106-93-4	0.00200	< 0.00200	
1,2-Dichlorobenzene	95-50-1	0.00200	< 0.00200	
1,2-Dichloroethane	107-06-2	0.00200	< 0.00200	
1,2-Dichloropropane	78-87-5	0.00200	< 0.00200	
1,3,5-Trimethylbenzene	108-67-8	0.00200	< 0.00200	
1,3-Dichlorobenzene	541-73-1	0.00200	< 0.00200	
1,3-Dichloropropane	142-28-9	0.00200	< 0.00200	
1,4-Dichlorobenzene	106-46-7	0.00200	< 0.00200	
1,4-Dioxane	123-91-1	0.0500	< 0.0500	
2,2-Dichloropropane	594-20-7	0.00200	< 0.00200	
2-Butanone	78-93-3	0.0100	**0.0722**	
2-Chloroethyl vinyl ether	110-75-8	0.00500	< 0.00500	
2-Chlorotoluene	95-49-8	0.00200	< 0.00200	
2-Hexanone	591-78-6	0.00500	< 0.00500	
2-Nitropropane	79-46-9	0.00500	< 0.00500	

American West ANALYTICAL LABORATORIES

Lab Sample ID: 1201439-001A
Client Sample ID: 1A,B+C

Analyzed: 2/5/2012 153h **SPLP Prep Date:** 2/1/2012 1945h
Units: mg/L **Dilution Factor:** 1

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Laboratory Director

Jose Rocha
QA Officer

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
4-Chlorotoluene	106-43-4	0.00200	< 0.00200	
4-Isopropyltoluene	99-87-6	0.00200	< 0.00200	
4-Methyl-2-pentanone	108-10-1	0.00500	< 0.00500	
Acetone	67-64-1	0.0100	< 0.0100	
Acetonitrile	75-05-8	0.00500	< 0.00500	
Acrolein	107-02-8	0.00500	< 0.00500	
Acrylonitrile	107-13-1	0.0100	< 0.0100	
Allyl chloride	107-05-1	0.00500	< 0.00500	
Benzene	71-43-2	0.00100	< 0.00100	
Benzyl chloride	100-44-7	0.00500	< 0.00500	
Bis(2-chloroisopropyl) ether	108-60-1	0.00500	< 0.00500	
Bromobenzene	108-86-1	0.00200	< 0.00200	
Bromochloromethane	74-97-5	0.00200	< 0.00200	
Bromodichloromethane	75-27-4	0.00200	< 0.00200	
Bromoform	75-25-2	0.00200	< 0.00200	
Bromomethane	74-83-9	0.00500	< 0.00500	
Butyl acetate	123-86-4	0.00500	< 0.00500	
Carbon disulfide	75-15-0	0.00200	< 0.00200	
Carbon tetrachloride	56-23-5	0.00200	< 0.00200	
Chlorobenzene	108-90-7	0.00200	< 0.00200	
Chloroethane	75-00-3	0.00200	< 0.00200	
Chloroform	67-66-3	0.00200	< 0.00200	
Chloromethane	74-87-3	0.00300	< 0.00300	
Chloroprene	126-99-8	0.00200	< 0.00200	
cis-1,2-Dichloroethene	156-59-2	0.00200	< 0.00200	
cis-1,3-Dichloropropene	10061-01-5	0.00200	< 0.00200	
Cyclohexane	110-82-7	0.00200	< 0.00200	
Cyclohexanone	108-94-1	0.0500	< 0.0500	
Dibromochloromethane	124-48-1	0.00200	< 0.00200	
Dibromomethane	74-95-3	0.00200	< 0.00200	
Dichlorodifluoromethane	75-71-8	0.00200	< 0.00200	
Ethyl acetate	141-78-6	0.0100	< 0.0100	
Ethyl ether	60-29-7	0.0100	< 0.0100	
Ethyl methacrylate	97-63-2	0.00200	< 0.00200	
Ethylbenzene	100-41-4	0.00200	< 0.00200	

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Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1201439-001A
Client Sample ID: 1A,B+C

Analyzed: 2/5/2012 153h **SPLP Prep Date:** 2/1/2012 1945h
Units: mg/L **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Hexachlorobutadiene	87-68-3	0.00200	< 0.00200	
Iodomethane	74-88-4	0.00500	< 0.00500	
Isobutyl alcohol	78-83-1	0.100	< 0.100	
Isopropyl acetate	108-21-4	0.0200	< 0.0200	
Isopropyl alcohol	67-63-0	0.0250	< 0.0250	
Isopropylbenzene	98-82-8	0.00200	< 0.00200	
m,p-Xylene	179601-23-1	0.00200	< 0.00200	
Methacrylonitrile	126-98-7	0.00500	< 0.00500	
Methyl Acetate	79-20-9	0.00500	< 0.00500	
Methyl methacrylate	80-62-6	0.00500	< 0.00500	
Methyl tert-butyl ether	1634-04-4	0.00200	< 0.00200	
Methylcyclohexane	108-87-2	0.00200	< 0.00200	
Methylene chloride	75-09-2	0.00200	< 0.00200	
n-Amyl acetate	628-63-7	0.00200	< 0.00200	
n-Butyl alcohol	71-36-3	0.0500	< 0.0500	
n-Butylbenzene	104-51-8	0.00200	< 0.00200	
n-Hexane	110-54-3	0.00200	< 0.00200	
n-Octane	111-65-9	0.00200	< 0.00200	
n-Propylbenzene	103-65-1	0.00200	< 0.00200	
Naphthalene	91-20-3	0.00200	< 0.00200	
o-Xylene	95-47-6	0.00200	< 0.00200	
Pentachloroethane	76-01-7	0.00500	< 0.00500	
Propionitrile	107-12-0	0.0250	< 0.0250	
Propyl acetate	109-60-4	0.00200	< 0.00200	
sec-Butylbenzene	135-98-8	0.00200	< 0.00200	
Styrene	100-42-5	0.00200	< 0.00200	
tert-Butyl alcohol	76-65-0	0.0200	< 0.0200	
tert-Butylbenzene	98-06-6	0.00200	< 0.00200	
Tetrachloroethene	127-18-4	0.00200	< 0.00200	
Tetrahydrofuran	109-99-9	0.00200	< 0.00200	
Toluene	108-88-3	0.00200	< 0.00200	
trans-1,2-Dichloroethene	156-60-5	0.00200	< 0.00200	
trans-1,3-Dichloropropene	10061-02-6	0.00200	< 0.00200	
trans-1,4-Dichloro-2-butene	110-57-6	0.00200	< 0.00200	
Trichloroethene	79-01-6	0.00200	< 0.00200	

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Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1201439-001A
Client Sample ID: 1A,B+C

Analyzed: 2/5/2012 153h   **SPLP Prep Date:** 2/1/2012 1945h
Units: mg/L   **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Trichlorofluoromethane	75-69-4	0.00200	< 0.00200	
Vinyl acetate	108-05-4	0.0100	< 0.0100	
Vinyl chloride	75-01-4	0.00100	< 0.00100	
Xylenes, Total	1330-20-7	0.00200	< 0.00200	
TPH C11-C15 (DRO)		0.0200	**0.0308**	
TPH C6-C10 (GRO)		0.0200	< 0.0200	

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: Toluene-d8	2037-26-5	0.0509	0.05000	102	77-129	
Surr: Dibromofluoromethane	1868-53-7	0.0495	0.05000	99.0	80-124	
Surr: 4-Bromofluorobenzene	460-00-4	0.0511	0.05000	102	80-128	
Surr: 1,2-Dichloroethane-d4	17060-07-0	0.0466	0.05000	93.2	72-151	

ORGANIC ANALYTICAL REPORT

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Jose Rocha
QA Officer

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Green River Resources
Lab Sample ID: 1201439-002A
Client Sample ID: 2A,B+C
Collection Date: 1/30/2012 1400h
Received Date: 1/31/2012 1010h **Method:** SW8260C

Analytical Results VOAs SPLP 1312 List by GC/MS Method 8260C/5030C

Analyzed: 2/5/2012 215h **SPLP Prep Date:** 2/1/2012 1945h
Units: mg/L **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,1,1,2-Tetrachloroethane	630-20-6	0.00200	< 0.00200	
1,1,1-Trichloroethane	71-55-6	0.00200	< 0.00200	
1,1,2,2-Tetrachloroethane	79-34-5	0.00200	< 0.00200	
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.00200	< 0.00200	
1,1,2-Trichloroethane	79-00-5	0.00200	< 0.00200	
1,1-Dichloropropene	563-58-6	0.00200	< 0.00200	
1,1-Dichloroethane	75-34-3	0.00200	< 0.00200	
1,1-Dichloroethene	75-35-4	0.00200	< 0.00200	
1,2,3-Trichlorobenzene	87-61-6	0.00200	< 0.00200	
1,2,3-Trichloropropane	96-18-4	0.00200	< 0.00200	
1,2,3-Trimethylbenzene	526-73-8	0.00200	< 0.00200	
1,2,4-Trichlorobenzene	120-82-1	0.00200	< 0.00200	
1,2,4-Trimethylbenzene	95-63-6	0.00200	< 0.00200	
1,2-Dibromo-3-chloropropane	96-12-8	0.00500	< 0.00500	
1,2-Dibromoethane	106-93-4	0.00200	< 0.00200	
1,2-Dichlorobenzene	95-50-1	0.00200	< 0.00200	
1,2-Dichloroethane	107-06-2	0.00200	< 0.00200	
1,2-Dichloropropane	78-87-5	0.00200	< 0.00200	
1,3,5-Trimethylbenzene	108-67-8	0.00200	< 0.00200	
1,3-Dichlorobenzene	541-73-1	0.00200	< 0.00200	
1,3-Dichloropropane	142-28-9	0.00200	< 0.00200	
1,4-Dichlorobenzene	106-46-7	0.00200	< 0.00200	
1,4-Dioxane	123-91-1	0.0500	< 0.0500	
2,2-Dichloropropane	594-20-7	0.00200	< 0.00200	
2-Butanone	78-93-3	0.0100	**0.0648**	
2-Chloroethyl vinyl ether	110-75-8	0.00500	< 0.00500	
2-Chlorotoluene	95-49-8	0.00200	< 0.00200	
2-Hexanone	591-78-6	0.00500	< 0.00500	
2-Nitropropane	79-46-9	0.00500	< 0.00500	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1201439-002A
Client Sample ID: 2A,B+C

Analyzed: 2/5/2012 215h **SPLP Prep Date:** 2/1/2012 1945h
Units: mg/L **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
4-Chlorotoluene	106-43-4	0.00200	< 0.00200	
4-Isopropyltoluene	99-87-6	0.00200	< 0.00200	
4-Methyl-2-pentanone	108-10-1	0.00500	< 0.00500	
Acetone	67-64-1	0.0100	< 0.0100	
Acetonitrile	75-05-8	0.00500	< 0.00500	
Acrolein	107-02-8	0.00500	< 0.00500	
Acrylonitrile	107-13-1	0.0100	< 0.0100	
Allyl chloride	107-05-1	0.00500	< 0.00500	
Benzene	71-43-2	0.00100	< 0.00100	
Benzyl chloride	100-44-7	0.00500	< 0.00500	
Bis(2-chloroisopropyl) ether	108-60-1	0.00500	< 0.00500	
Bromobenzene	108-86-1	0.00200	< 0.00200	
Bromochloromethane	74-97-5	0.00200	< 0.00200	
Bromodichloromethane	75-27-4	0.00200	< 0.00200	
Bromoform	75-25-2	0.00200	< 0.00200	
Bromomethane	74-83-9	0.00500	< 0.00500	
Butyl acetate	123-86-4	0.00500	< 0.00500	
Carbon disulfide	75-15-0	0.00200	< 0.00200	
Carbon tetrachloride	56-23-5	0.00200	< 0.00200	
Chlorobenzene	108-90-7	0.00200	< 0.00200	
Chloroethane	75-00-3	0.00200	< 0.00200	
Chloroform	67-66-3	0.00200	< 0.00200	
Chloromethane	74-87-3	0.00300	< 0.00300	
Chloroprene	126-99-8	0.00200	< 0.00200	
cis-1,2-Dichloroethene	156-59-2	0.00200	< 0.00200	
cis-1,3-Dichloropropene	10061-01-5	0.00200	< 0.00200	
Cyclohexane	110-82-7	0.00200	< 0.00200	
Cyclohexanone	108-94-1	0.0500	< 0.0500	
Dibromochloromethane	124-48-1	0.00200	< 0.00200	
Dibromomethane	74-95-3	0.00200	< 0.00200	
Dichlorodifluoromethane	75-71-8	0.00200	< 0.00200	
Ethyl acetate	141-78-6	0.0100	< 0.0100	
Ethyl ether	60-29-7	0.0100	< 0.0100	
Ethyl methacrylate	97-63-2	0.00200	< 0.00200	
Ethylbenzene	100-41-4	0.00200	< 0.00200	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1201439-002A
Client Sample ID: 2A,B+C

Analyzed: 2/5/2012 215h **SPLP Prep Date:** 2/1/2012 1945h
Units: mg/L **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Hexachlorobutadiene	87-68-3	0.00200	< 0.00200	
Iodomethane	74-88-4	0.00500	< 0.00500	
Isobutyl alcohol	78-83-1	0.100	< 0.100	
Isopropyl acetate	108-21-4	0.0200	< 0.0200	
Isopropyl alcohol	67-63-0	0.0250	< 0.0250	
Isopropylbenzene	98-82-8	0.00200	< 0.00200	
m,p-Xylene	179601-23-1	0.00200	**0.00501**	
Methacrylonitrile	126-98-7	0.00500	< 0.00500	
Methyl Acetate	79-20-9	0.00500	< 0.00500	
Methyl methacrylate	80-62-6	0.00500	< 0.00500	
Methyl tert-butyl ether	1634-04-4	0.00200	< 0.00200	
Methylcyclohexane	108-87-2	0.00200	< 0.00200	
Methylene chloride	75-09-2	0.00200	< 0.00200	
n-Amyl acetate	628-63-7	0.00200	< 0.00200	
n-Butyl alcohol	71-36-3	0.0500	< 0.0500	
n-Butylbenzene	104-51-8	0.00200	< 0.00200	
n-Hexane	110-54-3	0.00200	< 0.00200	
n-Octane	111-65-9	0.00200	< 0.00200	
n-Propylbenzene	103-65-1	0.00200	< 0.00200	
Naphthalene	91-20-3	0.00200	< 0.00200	
o-Xylene	95-47-6	0.00200	< 0.00200	
Pentachloroethane	76-01-7	0.00500	< 0.00500	
Propionitrile	107-12-0	0.0250	< 0.0250	
Propyl acetate	109-60-4	0.00200	< 0.00200	
sec-Butylbenzene	135-98-8	0.00200	< 0.00200	
Styrene	100-42-5	0.00200	< 0.00200	
tert-Butyl alcohol	76-65-0	0.0200	< 0.0200	
tert-Butylbenzene	98-06-6	0.00200	< 0.00200	
Tetrachloroethene	127-18-4	0.00200	< 0.00200	
Tetrahydrofuran	109-99-9	0.00200	< 0.00200	
Toluene	108-88-3	0.00200	< 0.00200	
trans-1,2-Dichloroethene	156-60-5	0.00200	< 0.00200	
trans-1,3-Dichloropropene	10061-02-6	0.00200	< 0.00200	
trans-1,4-Dichloro-2-butene	110-57-6	0.00200	< 0.00200	
Trichloroethene	79-01-6	0.00200	< 0.00200	

Lab Sample ID:	1201439-002A		
Client Sample ID:	2A,B+C		
Analyzed:	2/5/2012 215h	SPLP Prep Date:	2/1/2012 1945h
Units:	mg/L	Dilution Factor:	1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Trichlorofluoromethane	75-69-4	0.00200	< 0.00200	
Vinyl acetate	108-05-4	0.0100	< 0.0100	
Vinyl chloride	75-01-4	0.00100	< 0.00100	
Xylenes, Total	1330-20-7	0.00200	**0.00663**	
TPH C11-C15 (DRO)		0.0200	**0.0363**	
TPH C6-C10 (GRO)		0.0200	**0.0223**	

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: Toluene-d8	2037-26-5	0.0524	0.05000	105	77-129	
Surr: Dibromofluoromethane	1868-53-7	0.0510	0.05000	102	80-124	
Surr: 4-Bromofluorobenzene	460-00-4	0.0524	0.05000	105	80-128	
Surr: 1,2-Dichloroethane-d4	17060-07-0	0.0483	0.05000	96.6	72-151	

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Laboratory Director

Jose Rocha
QA Officer

ORGANIC ANALYTICAL REPORT

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Laboratory Director

Jose Rocha
QA Officer

Client: American Sands Energy Corp. **Contact:** William Gibbs
Project: Green River Resources
Lab Sample ID: 1201439-003A
Client Sample ID: 3A,B+C
Collection Date: 1/30/2012 1400h
Received Date: 1/31/2012 1010h **Method:** SW8260C

Analytical Results VOAs SPLP 1312 List by GC/MS Method 8260C/5030C

Analyzed: 2/5/2012 237h **SPLP Prep Date:** 2/1/2012 1945h
Units: mg/L **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,1,1,2-Tetrachloroethane	630-20-6	0.00200	< 0.00200	
1,1,1-Trichloroethane	71-55-6	0.00200	**0.00364**	
1,1,2,2-Tetrachloroethane	79-34-5	0.00200	< 0.00200	
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.00200	< 0.00200	
1,1,2-Trichloroethane	79-00-5	0.00200	< 0.00200	
1,1-Dichloropropene	563-58-6	0.00200	< 0.00200	
1,1-Dichloroethane	75-34-3	0.00200	< 0.00200	
1,1-Dichloroethene	75-35-4	0.00200	< 0.00200	
1,2,3-Trichlorobenzene	87-61-6	0.00200	< 0.00200	
1,2,3-Trichloropropane	96-18-4	0.00200	< 0.00200	
1,2,3-Trimethylbenzene	526-73-8	0.00200	< 0.00200	
1,2,4-Trichlorobenzene	120-82-1	0.00200	< 0.00200	
1,2,4-Trimethylbenzene	95-63-6	0.00200	**0.00460**	
1,2-Dibromo-3-chloropropane	96-12-8	0.00500	< 0.00500	
1,2-Dibromoethane	106-93-4	0.00200	< 0.00200	
1,2-Dichlorobenzene	95-50-1	0.00200	< 0.00200	
1,2-Dichloroethane	107-06-2	0.00200	< 0.00200	
1,2-Dichloropropane	78-87-5	0.00200	< 0.00200	
1,3,5-Trimethylbenzene	108-67-8	0.00200	< 0.00200	
1,3-Dichlorobenzene	541-73-1	0.00200	< 0.00200	
1,3-Dichloropropane	142-28-9	0.00200	< 0.00200	
1,4-Dichlorobenzene	106-46-7	0.00200	< 0.00200	
1,4-Dioxane	123-91-1	0.0500	< 0.0500	
2,2-Dichloropropane	594-20-7	0.00200	< 0.00200	
2-Butanone	78-93-3	0.0100	**0.0426**	
2-Chloroethyl vinyl ether	110-75-8	0.00500	< 0.00500	
2-Chlorotoluene	95-49-8	0.00200	< 0.00200	
2-Hexanone	591-78-6	0.00500	< 0.00500	
2-Nitropropane	79-46-9	0.00500	< 0.00500	

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Lab Sample ID: 1201439-003A
Client Sample ID: 3A,B+C

Analyzed: 2/5/2012 237h **SPLP Prep Date:** 2/1/2012 1945h
Units: mg/L **Dilution Factor:** 1

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Laboratory Director

Jose Rocha
QA Officer

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
4-Chlorotoluene	106-43-4	0.00200	< 0.00200	
4-Isopropyltoluene	99-87-6	0.00200	< 0.00200	
4-Methyl-2-pentanone	108-10-1	0.00500	< 0.00500	
Acetone	67-64-1	0.0100	**0.0104**	
Acetonitrile	75-05-8	0.00500	< 0.00500	
Acrolein	107-02-8	0.00500	< 0.00500	
Acrylonitrile	107-13-1	0.0100	< 0.0100	
Allyl chloride	107-05-1	0.00500	< 0.00500	
Benzene	71-43-2	0.00100	**0.00516**	
Benzyl chloride	100-44-7	0.00500	< 0.00500	
Bis(2-chloroisopropyl) ether	108-60-1	0.00500	< 0.00500	
Bromobenzene	108-86-1	0.00200	< 0.00200	
Bromochloromethane	74-97-5	0.00200	< 0.00200	
Bromodichloromethane	75-27-4	0.00200	< 0.00200	
Bromoform	75-25-2	0.00200	< 0.00200	
Bromomethane	74-83-9	0.00500	< 0.00500	
Butyl acetate	123-86-4	0.00500	< 0.00500	
Carbon disulfide	75-15-0	0.00200	< 0.00200	
Carbon tetrachloride	56-23-5	0.00200	< 0.00200	
Chlorobenzene	108-90-7	0.00200	< 0.00200	
Chloroethane	75-00-3	0.00200	< 0.00200	
Chloroform	67-66-3	0.00200	< 0.00200	
Chloromethane	74-87-3	0.00300	< 0.00300	
Chloroprene	126-99-8	0.00200	< 0.00200	
cis-1,2-Dichloroethene	156-59-2	0.00200	< 0.00200	
cis-1,3-Dichloropropene	10061-01-5	0.00200	< 0.00200	
Cyclohexane	110-82-7	0.00200	< 0.00200	
Cyclohexanone	108-94-1	0.0500	< 0.0500	
Dibromochloromethane	124-48-1	0.00200	< 0.00200	
Dibromomethane	74-95-3	0.00200	< 0.00200	
Dichlorodifluoromethane	75-71-8	0.00200	< 0.00200	
Ethyl acetate	141-78-6	0.0100	< 0.0100	
Ethyl ether	60-29-7	0.0100	< 0.0100	
Ethyl methacrylate	97-63-2	0.00200	< 0.00200	
Ethylbenzene	100-41-4	0.00200	**0.00761**	

Lab Sample ID: 1201439-003A

Client Sample ID: 3A,B+C

Analyzed: 2/5/2012 237h **SPLP Prep Date:** 2/1/2012 1945h

Units: mg/L **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Hexachlorobutadiene	87-68-3	0.00200	< 0.00200	
Iodomethane	74-88-4	0.00500	< 0.00500	
Isobutyl alcohol	78-83-1	0.100	< 0.100	
Isopropyl acetate	108-21-4	0.0200	< 0.0200	
Isopropyl alcohol	67-63-0	0.0250	< 0.0250	
Isopropylbenzene	98-82-8	0.00200	< 0.00200	
m,p-Xylene	179601-23-1	0.00200	**0.0383**	
Methacrylonitrile	126-98-7	0.00500	< 0.00500	
Methyl Acetate	79-20-9	0.00500	< 0.00500	
Methyl methacrylate	80-62-6	0.00500	< 0.00500	
Methyl tert-butyl ether	1634-04-4	0.00200	< 0.00200	
Methylcyclohexane	108-87-2	0.00200	< 0.00200	
Methylene chloride	75-09-2	0.00200	< 0.00200	
n-Amyl acetate	628-63-7	0.00200	< 0.00200	
n-Butyl alcohol	71-36-3	0.0500	< 0.0500	
n-Butylbenzene	104-51-8	0.00200	< 0.00200	
n-Hexane	110-54-3	0.00200	< 0.00200	
n-Octane	111-65-9	0.00200	< 0.00200	
n-Propylbenzene	103-65-1	0.00200	< 0.00200	
Naphthalene	91-20-3	0.00200	< 0.00200	
o-Xylene	95-47-6	0.00200	**0.0146**	
Pentachloroethane	76-01-7	0.00500	< 0.00500	
Propionitrile	107-12-0	0.0250	< 0.0250	
Propyl acetate	109-60-4	0.00200	< 0.00200	
sec-Butylbenzene	135-98-8	0.00200	< 0.00200	
Styrene	100-42-5	0.00200	< 0.00200	
tert-Butyl alcohol	76-65-0	0.0200	< 0.0200	
tert-Butylbenzene	98-06-6	0.00200	< 0.00200	
Tetrachloroethene	127-18-4	0.00200	**0.00312**	
Tetrahydrofuran	109-99-9	0.00200	< 0.00200	
Toluene	108-88-3	0.00200	**0.0511**	
trans-1,2-Dichloroethene	156-60-5	0.00200	< 0.00200	
trans-1,3-Dichloropropene	10061-02-6	0.00200	< 0.00200	
trans-1,4-Dichloro-2-butene	110-57-6	0.00200	< 0.00200	
Trichloroethene	79-01-6	0.00200	< 0.00200	

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Jose Rocha
QA Officer

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Lab Sample ID: 1201439-003A
Client Sample ID: 3A,B+C

Analyzed: 2/5/2012 237h | **SPLP Prep Date:** 2/1/2012 1945h
Units: mg/L | **Dilution Factor:** 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Trichlorofluoromethane	75-69-4	0.00200	< 0.00200	
Vinyl acetate	108-05-4	0.0100	< 0.0100	
Vinyl chloride	75-01-4	0.00100	< 0.00100	
Xylenes, Total	1330-20-7	0.00200	**0.0528**	
TPH C11-C15 (DRO)		0.0200	**0.0429**	
TPH C6-C10 (GRO)		0.0200	**0.134**	

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: Toluene-d8	2037-26-5	0.0489	0.05000	97.8	77-129	
Surr: Dibromofluoromethane	1868-53-7	0.0462	0.05000	92.5	80-124	
Surr: 4-Bromofluorobenzene	460-00-4	0.0495	0.05000	99.0	80-128	
Surr: 1,2-Dichloroethane-d4	17060-07-0	0.0459	0.05000	91.8	72-151	

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Laboratory Director

Jose Rocha
QA Officer

WORK ORDER Summary

Client: American Sands Energy Corp.
Client ID: WALKIN
Project: Green River Resources
Contact: William Gibbs
QC Level: LEVEL I
Work Order: 1201439

2/1/2012
WO Type: Standard
Comments: Do not release w/o Financial Arrangements! / email to Karla Knoop @ JBR and Larry777@roadrunner.com; Run All analysis on leachate created from SPLP; pH received out of hold; Use Fluid #3 (DI Water) for SPLP;

SB

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1201439-001A	1A,B+C	1/30/2012 1400h	1/31/2012 1010h	2/14/2012	Miscellaneous	1312ZHE-PR	[ ]	SPLP - voc	1
						8260-W-SPLP	[x]	SPLP - voc	
1201439-001B						1312LM-PR	[ ]	SPLP - svoc	
						1312LO-PR	[ ]	SPLP - svoc	
						3005A-SPLP-PR	[ ]	SPLP - svoc	
						3510-SVOA-SPLP-PR	[ ]	SPLP - svoc	
	SEL Analytes: B CA CR FE LI MG MO K NA SR SN V					6010C-SPLP	[x]	SPLP - svoc	
	SEL Analytes: SB AS BA BE CD CU PB MN NI SE AG TL ZN					6020-SPLP	[x]	SPLP - svoc	
						8270-W-SPLP	[x]	SPLP - svoc	
						HG-SPLP-7470A	[ ]	SPLP - svoc	
						HG-SPLP-PR	[ ]	SPLP - svoc	
1201439-001C						1312LM-PR	[ ]	SPLP - wc	
	SEL Analytes: CL F SO4					300.0-W	[x]	SPLP - wc	
	SEL Analytes: ALK					ALK-W-2320B	[x]	SPLP - wc	
						NO2/NO3-W-353.2	[ ]	SPLP - wc	
						OGB-W-1664A	[ ]	SPLP - wc	
						PH-4500H+B	[ ]	SPLP - wc	
						TDS-W-2540C	[ ]	SPLP - wc	
						TOC-W-5310B	[ ]	SPLP - wc	
1201439-002A	2A,B+C					1312ZHE-PR	[ ]	SPLP - voc	
						8260-W-SPLP	[x]	SPLP - voc	
1201439-002B						1312LM-PR	[ ]	SPLP - svoc	
						1312LO-PR	[ ]	SPLP - svoc	
						3005A-SPLP-PR	[ ]	SPLP - svoc	

WORK ORDER Summary

Client: American Sands Energy Corp.

Work Order: **1201439**

2/1/2012

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1201439-002B	2A,B+C	1/30/2012 1400h	1/31/2012 1010h	2/14/2012	Miscellaneous	3510-SVOA-SPLP-PR	☐	SPLP - svoc	1
						6010C-SPLP	☑	SPLP - svoc	
	SEL Analytes: B CA CR FE LI MG MO K NA SR SN V								
						6020-SPLP	☑	SPLP - svoc	
	SEL Analytes: SB AS BA BE CD CU PB MN NI SE AG TL ZN								
						8270-W-SPLP	☑	SPLP - svoc	
						HG-SPLP-7470A	☐	SPLP - svoc	
						HG-SPLP-PR	☐	SPLP - svoc	
1201439-002C						1312LM-PR	☐	SPLP - wc	
						300.0-W	☑	SPLP - wc	
	SEL Analytes: CL F SO4								
						ALK-W-2320B	☑	SPLP - wc	
	SEL Analytes: ALK								
						NO2/NO3-W-353.2	☐	SPLP - wc	
						OGB-W-1664A	☐	SPLP - wc	
						PH-4500H+B	☐	SPLP - wc	
						TDS-W-2540C	☐	SPLP - wc	
						TOC-W-5310B	☐	SPLP - wc	
1201439-003A	3A,B+C					1312ZHE-PR	☐	SPLP - voc	
						8260-W-SPLP	☑	SPLP - voc	
1201439-003B						1312LM-PR	☐	SPLP - svoc	
						1312LO-PR	☐	SPLP - svoc	
						3005A-SPLP-PR	☐	SPLP - svoc	
						3510-SVOA-SPLP-PR	☐	SPLP - svoc	
						6010C-SPLP	☑	SPLP - svoc	
	SEL Analytes: B CA CR FE LI MG MO K NA SR SN V								
						6020-SPLP	☑	SPLP - svoc	
	SEL Analytes: SB AS BA BE CD CU PB MN NI SE AG TL ZN								
						8270-W-SPLP	☑	SPLP - svoc	
						HG-SPLP-7470A	☐	SPLP - svoc	
						HG-SPLP-PR	☐	SPLP - svoc	
1201439-003C						1312LM-PR	☐	SPLP - wc	
						300.0-W	☑	SPLP - wc	
	SEL Analytes: CL F SO4								

WORK ORDER Summary

Work Order: **1201439**

Client: American Sands Energy Corp.

 2/1/2012

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1201439-003C	3A,B+C **SEL Analytes: ALK**	1/30/2012 1400h	1/31/2012 1010h	2/14/2012	Miscellaneous	ALK-W-2320B	☑	SPLP - wc	1
						NO2/NO3-W-353.2	☐	SPLP - wc	
						OGB-W-1664A	☐	SPLP - wc	
						PH-4500H+B	☐	SPLP - wc	
						TDS-W-2540C	☐	SPLP - wc	
						TOC-W-5310B	☐	SPLP - wc	

fill out completely; Client is whoever will used to set up acct.

GO-BY

AMERICAN WEST ANALYTICAL LABORATORIES
463 West 3600 South
Salt Lake City, Utah 84115
(801) 263-8686
(888) 263-8686
Fax (801) 263-8687
Email:awal@awal-labs.com

CHAIN OF CUSTODY

Lab Sample Set # 201439

Page 1 of 2

Turn Around Time (Circle One)
1 day 2 day 3 day 4 day 5 day Standard

Client American Sands Energy Corp.
Address
City State Zip
Phone 801 277 7888 Fax Cell (801) 699 3966
Contact William Gibbs
E-mail wgibbs@greenriverresources.net
Project Name Green River Resources
Project Number/P.O.#
Sampler Name

Sample ID	Date/Time Collected	Matrix	Number of Containers (Total)	SPLP, with leachate as per attachment	TESTS REQUIRED									QC LEVEL: 1 2 2+ 3 3+ 4 — COMMENTS
	1/30/12 14:00													
Processed Sands, Run 1 1A, B+C	mm/dd/yy hh:mm	S	3	X										Use SPLP
Processed Sands, Run 2 2A, B+C	mm/dd/yy hh:mm	S	3	X										fluid #3
Processed Sands, Run 3 3A, B+C	mm/dd/yy hh:mm	S	3	X										(DI water)
	*per Larry Shultz SB 2/1/12	S for solids	1 large + 1 small											1-31-12
Above-listed are example IDs only;														as
Use whatever descriptive ID you														
choose.														

Relinquished By: Signature	Date	Received By: Signature	Date
PRINT NAME LARRY SHULTZ	1/30/12 Time 3PM	PRINT NAME 2	Time
Relinquished By: Signature 3	Date	Received By: Signature	Date
PRINT NAME	Time	PRINT NAME	Time
Relinquished By: Signature	Date	Received By: Signature	Date
PRINT NAME	Time	PRINT NAME	Time
Relinquished By: Signature	Date	Received By: Signature	Date 1/31/12
PRINT NAME	Time	PRINT NAME Elona Hayward	Time

Special Instructions:
Leachate from SPLP should be analzed for the general chemistry, organics, and metals listed on the attached list.
Send analytical report to above Client and to Karla Knoop, JBR Environmental at kknoop@jbrenv.com. If questions, call Karla Knoop @ 801-438-2245. Cell (435) 650-1238
SEND COPY TO LARRY777@ROADRUNNER.COM

LABORATORY USE ONLY
SAMPLES WERE:
1. Shipped or hand delivered Notes: Fed X
2. Ambient or Chilled Notes: on ice
3. Temperature 2.7
4. Received Broken/Leaking (Improperly Sealed) Y N Notes:
5. Properly Preserved Y N
Checked at Bench Y N Notes:
6. Received Within Holding Times Y N Notes: PH out of Hold

COC Tape Was:
1. Present on Outer Package Y N NA
2. Unbroken on Outer Package Y N NA
3. Present on Sample Y N NA
4. Unbroken on Sample Y N NA
Discrepancies Between Sample Labels and COC Record? Y N Notes:

[illegible] ual sampler should complete first block. If a different person is responsible for shipping, that person would complete blocks 2 + 3.

SAMPLES 1A, 1B, 1C
2A, 2B, 2C
3A, 3B, 3C

American Sands Energy Corp.
Processed Tar Sands analysis
Additional Information attached to Chain-of-Custody
Date: 1/30/12

Three

Three sample sets composed of ~~two~~ 3 containers each should be subjected to SPLP, EPA Method 1312. Note that nitrate+nitrite is included in list below; do not use nitric acid in the leaching fluid for this component of the analysis.

use SPLP. fluid #3 (DI water) as previously discussed with John Wallace + Bob Boyer
1-31-12

Analyze leachate for the following:

General:

- pH
- total dissolved solids
- major ions (including Ca, Cl, K, Mg, Na, SO^4, alkalinity)

Organics:

- Total organic carbon
- Oil and grease
- VOCs using complete list
- SVOCs using complete list

Metals:

Ag,	Pb,
As,	Mn,
B,	Mo,
Ba	Ni,
Be,	Sb,
Cd,	Se,
Cr,	Sn
Cu,	Tl
Fe,	V
Hg,	Zn
Li,	

Other:

- Nitrate+nitrite
- Fluoride
- Strontium

(end)

American West
ANALYTICAL LABORATORIES

Jon Schulman
JBR Environmental Consultants, Inc.
8160 So. Highland Dr. Ste A-4
Sandy, UT 84093
TEL: (801) 943-4144

RE: American Oil Sands

Dear Jon Schulman: Lab Set ID: 1209452

463 West 3600 South
Salt Lake City, UT 84115

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

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

American West Analytical Laboratories received 8 sample(s) on 9/26/2012 for the analyses presented in the following report.

American West Analytical Laboratories (AWAL) is accredited by The National Environmental Laboratory Association Conference (NELAC) Institute in Utah and Texas; and is state accredited in Colorado, Idaho, New Mexico, and Missouri. In addition, AWAL is also accredited by the American Analytical Laboratory Association (A2LA) on ISO IEC 17025:2005, Department of Defense (DOD), UST for the State of Wyoming, and the National Lead Laboratory Accreditation Program (NLLAP). All analyses were performed in accordance to The NELAC Institute and/or A2LA protocols unless noted otherwise. Accreditation documents are available upon request. 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. The "Reporting Limit" found on the report is equivalent to the practical quantitation limit (PQL). This is the minimum concentration that can be reported by the method referenced and the sample matrix. The reporting limit must not be confused with any regulatory limit. Analytical results are reported to three significant figures for quality control and calculation purposes.

Thank You,

Kyle F. Gross

Digitally signed by Kyle F. Gross
DN: cn=Kyle F. Gross, o=AWAL, ou=AWAL-Laboratory Director, email=kyle@awal-labs.com, c=US
Date: 2012.10.12 16:05:06 -06'00'

Approved by:

Laboratory Director or designee

American West
ANALYTICAL LABORATORIES

INORGANIC ANALYTICAL REPORT

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-001
Client Sample ID: U-001A
Collection Date: 9/25/2012 945h
Received Date: 9/26/2012 1100h

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web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Analytical Results SPLP METALS Method 1312

SPLP Prep Date:

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	10/2/2012 1125h	10/4/2012 1803h	SW6020A	0.00200	< 0.00200	
Arsenic	mg/L	10/2/2012 1125h	10/4/2012 1803h	SW6020A	0.00200	< 0.00200	
Barium	mg/L	10/2/2012 1125h	10/4/2012 1803h	SW6020A	0.0100	**0.0413**	
Beryllium	mg/L	10/2/2012 1125h	10/4/2012 1803h	SW6020A	0.00200	< 0.00200	
Boron	mg/L	10/9/2012 1050h	10/10/2012 1442h	SW6010C	0.500	< 0.500	
Cadmium	mg/L	10/2/2012 1125h	10/4/2012 1803h	SW6020A	0.000500	< 0.000500	
Calcium	mg/L	10/11/2012 920h	10/11/2012 1405h	SW6010C	1.00	**2.81**	
Chromium	mg/L	10/9/2012 1050h	10/10/2012 1442h	SW6010C	0.0100	< 0.0100	
Copper	mg/L	10/2/2012 1125h	10/4/2012 1803h	SW6020A	0.00200	< 0.00200	
Iron	mg/L	10/9/2012 1050h	10/10/2012 1442h	SW6010C	0.100	**1.17**	
Lead	mg/L	10/2/2012 1125h	10/4/2012 1803h	SW6020A	0.0100	< 0.0100	
Lithium	mg/L	10/9/2012 1050h	10/10/2012 1448h	SW6010C	0.100	< 0.100	~
Magnesium	mg/L	10/9/2012 1050h	10/10/2012 1442h	SW6010C	1.00	< 1.00	
Manganese	mg/L	10/2/2012 1125h	10/4/2012 1803h	SW6020A	0.00200	**0.684**	
Mercury	mg/L	10/1/2012 1455h	10/2/2012 1110h	SW7470A	0.00100	< 0.00100	
Molybdenum	mg/L	10/9/2012 1050h	10/10/2012 1442h	SW6010C	0.0200	< 0.0200	
Nickel	mg/L	10/2/2012 1125h	10/4/2012 1803h	SW6020A	0.00200	**0.0277**	
Potassium	mg/L	10/9/2012 1050h	10/10/2012 1442h	SW6010C	1.00	< 1.00	
Selenium	mg/L	10/2/2012 1125h	10/4/2012 1803h	SW6020A	0.00200	< 0.00200	
Silver	mg/L	10/2/2012 1125h	10/4/2012 1803h	SW6020A	0.00200	< 0.00200	
Sodium	mg/L	10/11/2012 920h	10/11/2012 1405h	SW6010C	1.00	< 1.00	
Strontium	mg/L	10/9/2012 1050h	10/10/2012 1442h	SW6010C	0.0500	< 0.0500	
Thallium	mg/L	10/2/2012 1125h	10/4/2012 1803h	SW6020A	0.00200	< 0.00200	
Tin	mg/L	10/9/2012 1050h	10/10/2012 1442h	SW6010C	0.500	< 0.500	
Vanadium	mg/L	10/9/2012 1050h	10/10/2012 1442h	SW6010C	0.0500	< 0.0500	
Zinc	mg/L	10/2/2012 1125h	10/4/2012 1803h	SW6020A	0.100	< 0.100	

~ - *The above result was not performed in accordance with NELAP requirements.*

INORGANIC ANALYTICAL REPORT

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-003
Client Sample ID: U-002A
Collection Date: 9/25/2012 1055h
Received Date: 9/26/2012 1100h

American West
ANALYTICAL LABORATORIES

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Analytical Results SPLP METALS Method 1312

SPLP Prep Date:

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	10/2/2012 1125h	10/4/2012 1849h	SW6020A	0.00200	< 0.00200	
Arsenic	mg/L	10/2/2012 1125h	10/4/2012 1849h	SW6020A	0.00200	< 0.00200	
Barium	mg/L	10/2/2012 1125h	10/4/2012 1849h	SW6020A	0.0100	**0.0401**	
Beryllium	mg/L	10/2/2012 1125h	10/4/2012 1849h	SW6020A	0.00200	< 0.00200	
Boron	mg/L	10/9/2012 1050h	10/10/2012 1450h	SW6010C	0.500	< 0.500	
Cadmium	mg/L	10/2/2012 1125h	10/4/2012 1849h	SW6020A	0.000500	< 0.000500	
Calcium	mg/L	10/11/2012 920h	10/11/2012 1421h	SW6010C	1.00	**2.62**	
Chromium	mg/L	10/9/2012 1050h	10/10/2012 1450h	SW6010C	0.0100	< 0.0100	
Copper	mg/L	10/2/2012 1125h	10/4/2012 1849h	SW6020A	0.00200	**0.00302**	
Iron	mg/L	10/9/2012 1050h	10/10/2012 1450h	SW6010C	0.100	**1.18**	
Lead	mg/L	10/2/2012 1125h	10/4/2012 1849h	SW6020A	0.0100	< 0.0100	
Lithium	mg/L	10/9/2012 1050h	10/10/2012 1451h	SW6010C	0.100	< 0.100	~
Magnesium	mg/L	10/9/2012 1050h	10/10/2012 1450h	SW6010C	1.00	< 1.00	
Manganese	mg/L	10/2/2012 1125h	10/4/2012 1849h	SW6020A	0.00200	**0.614**	
Mercury	mg/L	10/1/2012 1455h	10/2/2012 1117h	SW7470A	0.00100	< 0.00100	
Molybdenum	mg/L	10/9/2012 1050h	10/10/2012 1450h	SW6010C	0.0200	< 0.0200	
Nickel	mg/L	10/2/2012 1125h	10/4/2012 1849h	SW6020A	0.00200	**0.0283**	
Potassium	mg/L	10/9/2012 1050h	10/10/2012 1450h	SW6010C	1.00	< 1.00	
Selenium	mg/L	10/2/2012 1125h	10/4/2012 1849h	SW6020A	0.00200	< 0.00200	
Silver	mg/L	10/2/2012 1125h	10/4/2012 1849h	SW6020A	0.00200	< 0.00200	
Sodium	mg/L	10/11/2012 920h	10/11/2012 1421h	SW6010C	1.00	**1.24**	
Strontium	mg/L	10/9/2012 1050h	10/10/2012 1450h	SW6010C	0.0500	< 0.0500	
Thallium	mg/L	10/2/2012 1125h	10/4/2012 1849h	SW6020A	0.00200	< 0.00200	
Tin	mg/L	10/9/2012 1050h	10/10/2012 1450h	SW6010C	0.500	< 0.500	
Vanadium	mg/L	10/9/2012 1050h	10/10/2012 1450h	SW6010C	0.0500	< 0.0500	
Zinc	mg/L	10/2/2012 1125h	10/4/2012 1849h	SW6020A	0.100	< 0.100	

~ - The above result was not performed in accordance with NELAP requirements.

INORGANIC ANALYTICAL REPORT

American West ANALYTICAL LABORATORIES

Client:	JBR Environmental Consultants, Inc.	**Contact:**	Jon Schulman
Project:	American Oil Sands		
Lab Sample ID:	1209452-005		
Client Sample ID:	U-003A		
Collection Date:	9/25/2012 1240h		
Received Date:	9/26/2012 1100h		

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web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Analytical Results SPLP METALS Method 1312

SPLP Prep Date:

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	10/2/2012 1125h	10/4/2012 1925h	SW6020A	0.00200	< 0.00200	
Arsenic	mg/L	10/2/2012 1125h	10/4/2012 1925h	SW6020A	0.00200	< 0.00200	
Barium	mg/L	10/2/2012 1125h	10/4/2012 1925h	SW6020A	0.0100	**0.0353**	
Beryllium	mg/L	10/2/2012 1125h	10/4/2012 1925h	SW6020A	0.00200	< 0.00200	
Boron	mg/L	10/9/2012 1050h	10/10/2012 1519h	SW6010C	0.500	< 0.500	
Cadmium	mg/L	10/2/2012 1125h	10/4/2012 1925h	SW6020A	0.000500	< 0.000500	
Calcium	mg/L	10/11/2012 920h	10/11/2012 1425h	SW6010C	1.00	**2.24**	
Chromium	mg/L	10/9/2012 1050h	10/10/2012 1519h	SW6010C	0.0100	< 0.0100	
Copper	mg/L	10/2/2012 1125h	10/4/2012 1925h	SW6020A	0.00200	**0.00252**	
Iron	mg/L	10/9/2012 1050h	10/10/2012 1519h	SW6010C	0.100	**1.17**	
Lead	mg/L	10/2/2012 1125h	10/4/2012 1925h	SW6020A	0.0100	< 0.0100	
Lithium	mg/L	10/9/2012 1050h	10/10/2012 1453h	SW6010C	0.100	< 0.100	~
Magnesium	mg/L	10/9/2012 1050h	10/10/2012 1519h	SW6010C	1.00	< 1.00	
Manganese	mg/L	10/2/2012 1125h	10/4/2012 1925h	SW6020A	0.00200	**0.457**	
Mercury	mg/L	10/1/2012 1455h	10/2/2012 1123h	SW7470A	0.00100	< 0.00100	
Molybdenum	mg/L	10/9/2012 1050h	10/10/2012 1519h	SW6010C	0.0200	< 0.0200	
Nickel	mg/L	10/2/2012 1125h	10/4/2012 1925h	SW6020A	0.00200	**0.0243**	
Potassium	mg/L	10/9/2012 1050h	10/10/2012 1519h	SW6010C	1.00	< 1.00	
Selenium	mg/L	10/2/2012 1125h	10/4/2012 1925h	SW6020A	0.00200	< 0.00200	
Silver	mg/L	10/2/2012 1125h	10/4/2012 1925h	SW6020A	0.00200	< 0.00200	
Sodium	mg/L	10/11/2012 920h	10/11/2012 1425h	SW6010C	1.00	**1.50**	
Strontium	mg/L	10/9/2012 1050h	10/10/2012 1519h	SW6010C	0.0500	< 0.0500	
Thallium	mg/L	10/2/2012 1125h	10/4/2012 1925h	SW6020A	0.00200	< 0.00200	
Tin	mg/L	10/9/2012 1050h	10/10/2012 1519h	SW6010C	0.500	< 0.500	
Vanadium	mg/L	10/9/2012 1050h	10/10/2012 1519h	SW6010C	0.0500	< 0.0500	
Zinc	mg/L	10/2/2012 1125h	10/4/2012 1925h	SW6020A	0.100	< 0.100	

~ - The above result was not performed in accordance with NELAP requirements.

INORGANIC ANALYTICAL REPORT

American West
ANALYTICAL LABORATORIES

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-007
Client Sample ID: U-004A
Collection Date: 9/25/2012
Received Date: 9/26/2012 1100h

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web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Analytical Results SPLP METALS Method 1312

SPLP Prep Date:

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	10/2/2012 1125h	10/4/2012 1935h	SW6020A	0.00200	< 0.00200	
Arsenic	mg/L	10/2/2012 1125h	10/4/2012 1935h	SW6020A	0.00200	< 0.00200	
Barium	mg/L	10/2/2012 1125h	10/4/2012 1935h	SW6020A	0.0100	**0.0266**	
Beryllium	mg/L	10/2/2012 1125h	10/4/2012 1935h	SW6020A	0.00200	< 0.00200	
Boron	mg/L	10/9/2012 1050h	10/10/2012 1604h	SW6010C	0.500	< 0.500	
Cadmium	mg/L	10/2/2012 1125h	10/4/2012 1935h	SW6020A	0.000500	**0.000924**	
Calcium	mg/L	10/11/2012 920h	10/11/2012 1443h	SW6010C	1.00	**5.42**	
Chromium	mg/L	10/9/2012 1050h	10/10/2012 1604h	SW6010C	0.0100	< 0.0100	
Copper	mg/L	10/2/2012 1125h	10/4/2012 1935h	SW6020A	0.00200	**0.0176**	
Iron	mg/L	10/9/2012 1050h	10/10/2012 1604h	SW6010C	0.100	**0.300**	
Lead	mg/L	10/2/2012 1125h	10/4/2012 1935h	SW6020A	0.0100	< 0.0100	
Lithium	mg/L	10/9/2012 1050h	10/10/2012 1456h	SW6010C	0.100	< 0.100	~
Magnesium	mg/L	10/9/2012 1050h	10/10/2012 1604h	SW6010C	1.00	< 1.00	
Manganese	mg/L	10/2/2012 1125h	10/4/2012 1935h	SW6020A	0.00200	**0.0669**	
Mercury	mg/L	10/1/2012 1455h	10/2/2012 1124h	SW7470A	0.00100	< 0.00100	
Molybdenum	mg/L	10/9/2012 1050h	10/10/2012 1604h	SW6010C	0.0200	< 0.0200	
Nickel	mg/L	10/2/2012 1125h	10/4/2012 1935h	SW6020A	0.00200	**0.0309**	
Potassium	mg/L	10/9/2012 1050h	10/10/2012 1604h	SW6010C	1.00	< 1.00	
Selenium	mg/L	10/2/2012 1125h	10/4/2012 1935h	SW6020A	0.00200	< 0.00200	
Silver	mg/L	10/2/2012 1125h	10/4/2012 1935h	SW6020A	0.00200	< 0.00200	
Sodium	mg/L	10/11/2012 920h	10/11/2012 1443h	SW6010C	1.00	**1.48**	
Strontium	mg/L	10/9/2012 1050h	10/10/2012 1604h	SW6010C	0.0500	< 0.0500	
Thallium	mg/L	10/2/2012 1125h	10/4/2012 1935h	SW6020A	0.00200	< 0.00200	
Tin	mg/L	10/9/2012 1050h	10/10/2012 1604h	SW6010C	0.500	< 0.500	
Vanadium	mg/L	10/9/2012 1050h	10/10/2012 1604h	SW6010C	0.0500	< 0.0500	
Zinc	mg/L	10/2/2012 1125h	10/4/2012 1935h	SW6020A	0.100	**0.306**	

~ - The above result was not performed in accordance with NELAP requirements.

INORGANIC ANALYTICAL REPORT

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-001
Client Sample ID: U-001A
Collection Date: 9/25/2012 945h
Received Date: 9/26/2012 1100h

American West
ANALYTICAL LABORATORIES

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web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Alkalinity (as CaCO3)	mg/L		10/2/2012 952h	SM2320B	10.0	< 10.0	
Chloride	mg/L		10/1/2012 1824h	SM4500-Cl-E	5.00	< 5.00	
Oil & Grease	mg/L		10/2/2012 1351h	E1664A	3.00	< 3.00	
pH @ 25° C	pH Units		10/1/2012 1630h	SW9040C	1.00	**6.27**	
Sulfate	mg/L		10/2/2012 600h	SM4500-SO4-E	5.00	**11.2**	
Total Dissolved Solids	mg/L		10/2/2012 1215h	SM2540C	10.0	**14.0**	#
Total Organic Carbon	mg/L		10/3/2012 1558h	SM5310B	1.00	**6.69**	B
Total Recoverable Petroleum Hydrocarbons	mg/L		10/3/2012 1501h	E1664A-SGT	3.00	< 3.00	

Analysis performed on an SPLP extract by method 1312.
B - This analyte was also detected in the SPLP method blank above the PQL at 1.0056 mg/L. The batch method blank was below the PQL.
 # - High RPD due to low analyte concentration. In this range, high RPDs are expected.

INORGANIC ANALYTICAL REPORT

American West ANALYTICAL LABORATORIES

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-002
Client Sample ID: U-001B
Collection Date: 9/25/2012 945h
Received Date: 9/26/2012 1100h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Conductivity	µmhos/cm		10/1/2012 610h	SW9050A	10.0	**169**	&
pH @ 25° C	pH Units		9/28/2012 1720h	SW9045D	1.00	**4.90**	H
Sodium Adsorption Ratio			10/10/2012	Calc.	0.0100	**0.0861**	&

H - Sample was received outside of the holding time.
& - Analysis is performed on a 1:1 DI water extract for soils.

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INORGANIC ANALYTICAL REPORT

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-003
Client Sample ID: U-002A
Collection Date: 9/25/2012 1055h
Received Date: 9/26/2012 1100h

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Jose Rocha
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Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Alkalinity (as CaCO3)	mg/L		10/2/2012 952h	SM2320B	10.0	< 10.0	
Chloride	mg/L		10/1/2012 1825h	SM4500-Cl-E	5.00	< 5.00	
Oil & Grease	mg/L		10/2/2012 1351h	E1664A	3.00	< 3.00	
pH @ 25° C	pH Units		10/1/2012 1630h	SW9040C	1.00	**5.89**	
Sulfate	mg/L		10/2/2012 600h	SM4500-SO4-E	5.00	**9.03**	
Total Dissolved Solids	mg/L		10/2/2012 1215h	SM2540C	10.0	**14.0**	
Total Organic Carbon	mg/L		10/3/2012 1708h	SM5310B	1.00	**7.14**	B
Total Recoverable Petroleum Hydrocarbons	mg/L		10/3/2012 1501h	E1664A-SGT	3.00	< 3.00	

Analysis performed on an SPLP extract by method 1312.

B - This analyte was also detected in the SPLP method blank above the PQL at 1.0056 mg/L. The batch method blank was below the PQL.

INORGANIC ANALYTICAL REPORT

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Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-004
Client Sample ID: U-002B
Collection Date: 9/25/2012 1055h
Received Date: 9/26/2012 1100h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Conductivity	µmhos/cm		10/1/2012 610h	SW9050A	10.0	**179**	&
pH @ 25° C	pH Units		9/28/2012 1720h	SW9045D	1.00	**4.74**	H
Sodium Adsorption Ratio			10/10/2012	Calc.	0.0100	**0.0947**	&

H - Sample was received outside of the holding time.
& - Analysis is performed on a 1:1 DI water extract for soils.

INORGANIC ANALYTICAL REPORT

American West
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Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-005
Client Sample ID: U-003A
Collection Date: 9/25/2012 1240h
Received Date: 9/26/2012 1100h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Alkalinity (as CaCO3)	mg/L		10/2/2012 952h	SM2320B	10.0	< 10.0	
Chloride	mg/L		10/1/2012 1826h	SM4500-Cl-E	5.00	< 5.00	
Oil & Grease	mg/L		10/2/2012 1351h	E1664A	3.00	< 3.00	
pH @ 25° C	pH Units		10/1/2012 1630h	SW9040C	1.00	**4.51**	
Sulfate	mg/L		10/2/2012 600h	SM4500-SO4-E	5.00	**7.95**	
Total Dissolved Solids	mg/L		10/2/2012 1215h	SM2540C	10.0	**20.0**	
Total Organic Carbon	mg/L		10/3/2012 1731h	SM5310B	1.00	**6.90**	B
Total Recoverable Petroleum Hydrocarbons	mg/L		10/3/2012 1501h	E1664A-SGT	3.00	< 3.00	

Analysis performed on an SPLP extract by method 1312.

B - This analyte was also detected in the SPLP method blank above the PQL at 1.0056 mg/L. The batch method blank was below the PQL.

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INORGANIC ANALYTICAL REPORT

American West
ANALYTICAL LABORATORIES

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-006
Client Sample ID: U-003B
Collection Date: 9/25/2012 1240h
Received Date: 9/26/2012 1100h

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Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Conductivity	µmhos/cm		10/1/2012 610h	SW9050A	10.0	**223**	&
pH @ 25° C	pH Units		9/28/2012 1720h	SW9045D	1.00	**4.70**	H
Sodium Adsorption Ratio			10/10/2012	Calc.	0.0100	**0.104**	&

H - Sample was received outside of the holding time.
& - Analysis is performed on a 1:1 DI water extract for soils.

INORGANIC ANALYTICAL REPORT

American West
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Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-007
Client Sample ID: U-004A
Collection Date: 9/25/2012
Received Date: 9/26/2012 1100h

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Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Alkalinity (as CaCO3)	mg/L		10/2/2012 952h	SM2320B	10.0	< 10.0	
Chloride	mg/L		10/1/2012 1828h	SM4500-Cl-E	5.00	< 5.00	
Oil & Grease	mg/L		10/2/2012 1351h	E1664A	3.00	< 3.00	
pH @ 25° C	pH Units		10/1/2012 1630h	SW9040C	1.00	**3.60**	
Sulfate	mg/L		10/2/2012 600h	SM4500-SO4-E	5.00	**22.1**	
Total Dissolved Solids	mg/L		10/2/2012 1215h	SM2540C	10.0	**46.0**	
Total Organic Carbon	mg/L		10/3/2012 1753h	SM5310B	1.00	**2.83**	B
Total Recoverable Petroleum Hydrocarbons	mg/L		10/3/2012 1501h	E1664A-SGT	3.00	< 3.00	

Analysis performed on an SPLP extract by method 1312.

B - This analyte was also detected in the SPLP method blank above the PQL at 1.0056 mg/L. The batch method blank was below the PQL.

INORGANIC ANALYTICAL REPORT

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-008
Client Sample ID: U-004B
Collection Date: 9/25/2012
Received Date: 9/26/2012 1100h

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Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Conductivity	µmhos/cm		10/2/2012 710h	SW9050A	10.0	**332**	&
pH @ 25° C	pH Units		10/1/2012 1625h	SW9045D	1.00	**4.24**	H
Sodium Adsorption Ratio			10/10/2012	Calc.	0.0100	**0.222**	&

H - Sample was received outside of the holding time.
& - Analysis is performed on a 1:1 DI water extract for soils.

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ORGANIC ANALYTICAL REPORT

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-001A
Client Sample ID: U-001A
Collection Date: 9/25/2012 945h
Received Date: 9/26/2012 1100h

Analytical Results TPH-DRO (C10-C28) by GC/FID Method 8015D/3510C

Analyzed: 10/2/2012 1428h **Extracted:** 10/2/2012 939h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8015D

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Diesel Range Organics (DRO) (C10-C28)	68476-34-6	0.500	**0.676**	

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: 4-Bromofluorobenzene	460-00-4	0.118	0.4000	29.4	10-190	

Analysis performed on an SPLP extract by method 1312.

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Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-003A
Client Sample ID: U-002A
Collection Date: 9/25/2012 1055h
Received Date: 9/26/2012 1100h

Analytical Results TPH-DRO (C10-C28) by GC/FID Method 8015D/3510C

Analyzed: 10/2/2012 1526h **Extracted:** 10/2/2012 939h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8015D

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Diesel Range Organics (DRO) (C10-C28)	68476-34-6	0.500	**0.755**	

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: 4-Bromofluorobenzene	460-00-4	0.138	0.4000	34.4	10-190	

Analysis performed on an SPLP extract by method 1312.

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ORGANIC ANALYTICAL REPORT

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-005A
Client Sample ID: U-003A
Collection Date: 9/25/2012 1240h
Received Date: 9/26/2012 1100h

Analytical Results TPH-DRO (C10-C28) by GC/FID Method 8015D/3510C

Analyzed: 10/2/2012 1546h **Extracted:** 10/2/2012 939h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8015D

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Diesel Range Organics (DRO) (C10-C28)	68476-34-6	0.500	**0.832**	

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: 4-Bromofluorobenzene	460-00-4	0.136	0.4000	33.9	10-190	

Analysis performed on an SPLP extract by method 1312.

ORGANIC ANALYTICAL REPORT

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-007A
Client Sample ID: U-004A
Collection Date: 9/25/2012
Received Date: 9/26/2012 1100h

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Analytical Results TPH-DRO (C10-C28) by GC/FID Method 8015D/3510C

Analyzed: 10/2/2012 1605h **Extracted:** 10/2/2012 939h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8015D

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Diesel Range Organics (DRO) (C10-C28)	68476-34-6	0.500	**1.40**	

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: 4-Bromofluorobenzene	460-00-4	0.134	0.4000	33.4	10-190	

Analysis performed on an SPLP extract by method 1312.

ORGANIC ANALYTICAL REPORT

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Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-001A
Client Sample ID: U-001A
Collection Date: 9/25/2012 945h
Received Date: 9/26/2012 1100h

Analytical Results VOAs SPLP 1312 List by GC/MS Method 8260C/5030C

Analyzed: 10/2/2012 1110h **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8260C

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,1,1,2-Tetrachloroethane	630-20-6	0.00200	< 0.00200	
1,1,1-Trichloroethane	71-55-6	0.00200	< 0.00200	
1,1,2,2-Tetrachloroethane	79-34-5	0.00200	< 0.00200	
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.00200	< 0.00200	
1,1,2-Trichloroethane	79-00-5	0.00200	< 0.00200	
1,1-Dichloropropene	563-58-6	0.00200	< 0.00200	
1,1-Dichloroethane	75-34-3	0.00200	< 0.00200	
1,1-Dichloroethene	75-35-4	0.00200	< 0.00200	
1,2,3-Trichlorobenzene	87-61-6	0.00200	< 0.00200	
1,2,3-Trichloropropane	96-18-4	0.00200	< 0.00200	
1,2,3-Trimethylbenzene	526-73-8	0.00200	< 0.00200	
1,2,4-Trichlorobenzene	120-82-1	0.00200	< 0.00200	
1,2,4-Trimethylbenzene	95-63-6	0.00200	< 0.00200	
1,2-Dibromo-3-chloropropane	96-12-8	0.00500	< 0.00500	
1,2-Dibromoethane	106-93-4	0.00200	< 0.00200	
1,2-Dichlorobenzene	95-50-1	0.00200	< 0.00200	
1,2-Dichloroethane	107-06-2	0.00200	< 0.00200	
1,2-Dichloropropane	78-87-5	0.00200	< 0.00200	
1,3,5-Trimethylbenzene	108-67-8	0.00200	< 0.00200	
1,3-Dichlorobenzene	541-73-1	0.00200	< 0.00200	
1,3-Dichloropropane	142-28-9	0.00200	< 0.00200	
1,4-Dichlorobenzene	106-46-7	0.00200	< 0.00200	
1,4-Dioxane	123-91-1	0.0500	< 0.0500	
2,2-Dichloropropane	594-20-7	0.00200	< 0.00200	
2-Butanone	78-93-3	0.0100	**0.0101**	
2-Chloroethyl vinyl ether	110-75-8	0.00500	< 0.00500	
2-Chlorotoluene	95-49-8	0.00200	< 0.00200	
2-Hexanone	591-78-6	0.00500	< 0.00500	
2-Nitropropane	79-46-9	0.00500	< 0.00500	
4-Chlorotoluene	106-43-4	0.00200	< 0.00200	

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QA Officer

Lab Sample ID: 1209452-001A
Client Sample ID: U-001A

Analyzed: 10/2/2012 1110h | **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L | **Dilution Factor:** 1 | **Method:** SW8260C

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
4-Isopropyltoluene	99-87-6	0.00200	< 0.00200	
4-Methyl-2-pentanone	108-10-1	0.00500	< 0.00500	
Acetone	67-64-1	0.0100	< 0.0100	
Acetonitrile	75-05-8	0.00500	< 0.00500	
Acrolein	107-02-8	0.00500	< 0.00500	
Acrylonitrile	107-13-1	0.0100	< 0.0100	
Allyl chloride	107-05-1	0.00500	< 0.00500	
Benzene	71-43-2	0.00100	< 0.00100	
Benzyl chloride	100-44-7	0.00500	< 0.00500	
Bis(2-chloroisopropyl) ether	108-60-1	0.00500	< 0.00500	
Bromobenzene	108-86-1	0.00200	< 0.00200	
Bromochloromethane	74-97-5	0.00200	< 0.00200	
Bromodichloromethane	75-27-4	0.00200	< 0.00200	
Bromoform	75-25-2	0.00200	< 0.00200	
Bromomethane	74-83-9	0.00500	< 0.00500	
Butyl acetate	123-86-4	0.00500	< 0.00500	
Carbon disulfide	75-15-0	0.00200	< 0.00200	
Carbon tetrachloride	56-23-5	0.00200	< 0.00200	
Chlorobenzene	108-90-7	0.00200	< 0.00200	
Chloroethane	75-00-3	0.00200	< 0.00200	
Chloroform	67-66-3	0.00200	< 0.00200	
Chloromethane	74-87-3	0.00300	< 0.00300	
Chloroprene	126-99-8	0.00200	< 0.00200	
cis-1,2-Dichloroethene	156-59-2	0.00200	< 0.00200	
cis-1,3-Dichloropropene	10061-01-5	0.00200	< 0.00200	
Cyclohexane	110-82-7	0.00200	< 0.00200	
Cyclohexanone	108-94-1	0.0500	< 0.0500	
Dibromochloromethane	124-48-1	0.00200	< 0.00200	
Dibromomethane	74-95-3	0.00200	< 0.00200	
Dichlorodifluoromethane	75-71-8	0.00200	< 0.00200	
Ethyl acetate	141-78-6	0.0100	< 0.0100	
Ethyl ether	60-29-7	0.0100	< 0.0100	
Ethyl methacrylate	97-63-2	0.00200	< 0.00200	
Ethylbenzene	100-41-4	0.00200	< 0.00200	
Hexachlorobutadiene	87-68-3	0.00200	< 0.00200	
Iodomethane	74-88-4	0.00500	< 0.00500	
Isobutyl alcohol	78-83-1	0.100	< 0.100	

American West
ANALYTICAL LABORATORIES

Lab Sample ID: 1209452-001A
Client Sample ID: U-001A

Analyzed: 10/2/2012 1110h **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8260C

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Laboratory Director

Jose Rocha
QA Officer

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Isopropyl acetate	108-21-4	0.0200	< 0.0200	
Isopropyl alcohol	67-63-0	0.0250	< 0.0250	
Isopropylbenzene	98-82-8	0.00200	< 0.00200	
m,p-Xylene	179601-23-1	0.00200	< 0.00200	
Methacrylonitrile	126-98-7	0.00500	< 0.00500	
Methyl Acetate	79-20-9	0.00500	< 0.00500	
Methyl methacrylate	80-62-6	0.00500	< 0.00500	
Methyl tert-butyl ether	1634-04-4	0.00200	< 0.00200	
Methylcyclohexane	108-87-2	0.00200	< 0.00200	
Methylene chloride	75-09-2	0.00200	**0.00329**	B
n-Amyl acetate	628-63-7	0.00200	< 0.00200	
n-Butyl alcohol	71-36-3	0.0500	< 0.0500	
n-Butylbenzene	104-51-8	0.00200	< 0.00200	
n-Hexane	110-54-3	0.00200	**0.0129**	
n-Octane	111-65-9	0.00200	< 0.00200	
n-Propylbenzene	103-65-1	0.00200	< 0.00200	
Naphthalene	91-20-3	0.00200	< 0.00200	
o-Xylene	95-47-6	0.00200	< 0.00200	
Pentachloroethane	76-01-7	0.00500	< 0.00500	
Propionitrile	107-12-0	0.0250	< 0.0250	
Propyl acetate	109-60-4	0.00200	< 0.00200	
sec-Butylbenzene	135-98-8	0.00200	< 0.00200	
Styrene	100-42-5	0.00200	< 0.00200	
tert-Butyl alcohol	76-65-0	0.0200	< 0.0200	
tert-Butylbenzene	98-06-6	0.00200	< 0.00200	
Tetrachloroethene	127-18-4	0.00200	< 0.00200	
Tetrahydrofuran	109-99-9	0.00200	< 0.00200	
Toluene	108-88-3	0.00200	< 0.00200	
trans-1,2-Dichloroethene	156-60-5	0.00200	< 0.00200	
trans-1,3-Dichloropropene	10061-02-6	0.00200	< 0.00200	
trans-1,4-Dichloro-2-butene	110-57-6	0.00200	< 0.00200	
Trichloroethene	79-01-6	0.00200	< 0.00200	
Trichlorofluoromethane	75-69-4	0.00200	< 0.00200	
Vinyl acetate	108-05-4	0.0100	< 0.0100	
Vinyl chloride	75-01-4	0.00100	< 0.00100	
Xylenes, Total	1330-20-7	0.00200	< 0.00200	
TPH C11-C15 (DRO)		0.0200	< 0.0200	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1209452-001A
Client Sample ID: U-001A

Analyzed: 10/2/2012 1110h | **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L | **Dilution Factor:** 1 | **Method:** SW8260C

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
TPH C6-C10 (GRO)		0.0200	**0.0971**	

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: Toluene-d8	2037-26-5	0.0491	0.05000	98.3	77-129	
Surr: Dibromofluoromethane	1868-53-7	0.0572	0.05000	114	80-124	
Surr: 4-Bromofluorobenzene	460-00-4	0.0537	0.05000	107	80-128	
Surr: 1,2-Dichloroethane-d4	17060-07-0	0.0627	0.05000	125	72-151	

B - This analyte was also detected in MB-SPLP-21377.

ORGANIC ANALYTICAL REPORT

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-003A
Client Sample ID: U-002A
Collection Date: 9/25/2012 1055h
Received Date: 9/26/2012 1100h

Analytical Results VOAs SPLP 1312 List by GC/MS Method 8260C/5030C

Analyzed: 10/2/2012 1129h **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8260C

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,1,1,2-Tetrachloroethane	630-20-6	0.00200	< 0.00200	
1,1,1-Trichloroethane	71-55-6	0.00200	< 0.00200	
1,1,2,2-Tetrachloroethane	79-34-5	0.00200	< 0.00200	
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.00200	< 0.00200	
1,1,2-Trichloroethane	79-00-5	0.00200	< 0.00200	
1,1-Dichloropropene	563-58-6	0.00200	< 0.00200	
1,1-Dichloroethane	75-34-3	0.00200	< 0.00200	
1,1-Dichloroethene	75-35-4	0.00200	< 0.00200	
1,2,3-Trichlorobenzene	87-61-6	0.00200	< 0.00200	
1,2,3-Trichloropropane	96-18-4	0.00200	< 0.00200	
1,2,3-Trimethylbenzene	526-73-8	0.00200	< 0.00200	
1,2,4-Trichlorobenzene	120-82-1	0.00200	< 0.00200	
1,2,4-Trimethylbenzene	95-63-6	0.00200	**0.0175**	
1,2-Dibromo-3-chloropropane	96-12-8	0.00500	< 0.00500	
1,2-Dibromoethane	106-93-4	0.00200	< 0.00200	
1,2-Dichlorobenzene	95-50-1	0.00200	< 0.00200	
1,2-Dichloroethane	107-06-2	0.00200	< 0.00200	
1,2-Dichloropropane	78-87-5	0.00200	< 0.00200	
1,3,5-Trimethylbenzene	108-67-8	0.00200	**0.0110**	
1,3-Dichlorobenzene	541-73-1	0.00200	< 0.00200	
1,3-Dichloropropane	142-28-9	0.00200	< 0.00200	
1,4-Dichlorobenzene	106-46-7	0.00200	< 0.00200	
1,4-Dioxane	123-91-1	0.0500	< 0.0500	
2,2-Dichloropropane	594-20-7	0.00200	< 0.00200	
2-Butanone	78-93-3	0.0100	< 0.0100	
2-Chloroethyl vinyl ether	110-75-8	0.00500	< 0.00500	
2-Chlorotoluene	95-49-8	0.00200	< 0.00200	
2-Hexanone	591-78-6	0.00500	< 0.00500	
2-Nitropropane	79-46-9	0.00500	< 0.00500	
4-Chlorotoluene	106-43-4	0.00200	< 0.00200	

Lab Sample ID: 1209452-003A
Client Sample ID: U-002A

Analyzed: 10/2/2012 1129h | **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L | **Dilution Factor:** 1 | **Method:** SW8260C

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
4-Isopropyltoluene	99-87-6	0.00200	< 0.00200	
4-Methyl-2-pentanone	108-10-1	0.00500	< 0.00500	
Acetone	67-64-1	0.0100	< 0.0100	
Acetonitrile	75-05-8	0.00500	< 0.00500	
Acrolein	107-02-8	0.00500	< 0.00500	
Acrylonitrile	107-13-1	0.0100	< 0.0100	
Allyl chloride	107-05-1	0.00500	< 0.00500	
Benzene	71-43-2	0.00100	< 0.00100	
Benzyl chloride	100-44-7	0.00500	< 0.00500	
Bis(2-chloroisopropyl) ether	108-60-1	0.00500	< 0.00500	
Bromobenzene	108-86-1	0.00200	< 0.00200	
Bromochloromethane	74-97-5	0.00200	< 0.00200	
Bromodichloromethane	75-27-4	0.00200	< 0.00200	
Bromoform	75-25-2	0.00200	< 0.00200	
Bromomethane	74-83-9	0.00500	< 0.00500	
Butyl acetate	123-86-4	0.00500	< 0.00500	
Carbon disulfide	75-15-0	0.00200	< 0.00200	
Carbon tetrachloride	56-23-5	0.00200	< 0.00200	
Chlorobenzene	108-90-7	0.00200	< 0.00200	
Chloroethane	75-00-3	0.00200	< 0.00200	
Chloroform	67-66-3	0.00200	< 0.00200	
Chloromethane	74-87-3	0.00300	< 0.00300	
Chloroprene	126-99-8	0.00200	< 0.00200	
cis-1,2-Dichloroethene	156-59-2	0.00200	< 0.00200	
cis-1,3-Dichloropropene	10061-01-5	0.00200	< 0.00200	
Cyclohexane	110-82-7	0.00200	< 0.00200	
Cyclohexanone	108-94-1	0.0500	< 0.0500	
Dibromochloromethane	124-48-1	0.00200	< 0.00200	
Dibromomethane	74-95-3	0.00200	< 0.00200	
Dichlorodifluoromethane	75-71-8	0.00200	< 0.00200	
Ethyl acetate	141-78-6	0.0100	< 0.0100	
Ethyl ether	60-29-7	0.0100	< 0.0100	
Ethyl methacrylate	97-63-2	0.00200	< 0.00200	
Ethylbenzene	100-41-4	0.00200	**0.00209**	
Hexachlorobutadiene	87-68-3	0.00200	< 0.00200	
Iodomethane	74-88-4	0.00500	< 0.00500	
Isobutyl alcohol	78-83-1	0.100	< 0.100	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

American West
ANALYTICAL LABORATORIES

Lab Sample ID: 1209452-003A
Client Sample ID: U-002A

Analyzed: 10/2/2012 1129h **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8260C

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Jose Rocha
QA Officer

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Isopropyl acetate	108-21-4	0.0200	< 0.0200	
Isopropyl alcohol	67-63-0	0.0250	< 0.0250	
Isopropylbenzene	98-82-8	0.00200	< 0.00200	
m,p-Xylene	179601-23-1	0.00200	**0.0156**	B
Methacrylonitrile	126-98-7	0.00500	< 0.00500	
Methyl Acetate	79-20-9	0.00500	< 0.00500	
Methyl methacrylate	80-62-6	0.00500	< 0.00500	
Methyl tert-butyl ether	1634-04-4	0.00200	< 0.00200	
Methylcyclohexane	108-87-2	0.00200	< 0.00200	
Methylene chloride	75-09-2	0.00200	**0.00327**	B
n-Amyl acetate	628-63-7	0.00200	< 0.00200	
n-Butyl alcohol	71-36-3	0.0500	< 0.0500	
n-Butylbenzene	104-51-8	0.00200	< 0.00200	
n-Hexane	110-54-3	0.00200	**0.0150**	
n-Octane	111-65-9	0.00200	< 0.00200	
n-Propylbenzene	103-65-1	0.00200	< 0.00200	
Naphthalene	91-20-3	0.00200	**0.00350**	
o-Xylene	95-47-6	0.00200	**0.00569**	
Pentachloroethane	76-01-7	0.00500	< 0.00500	
Propionitrile	107-12-0	0.0250	< 0.0250	
Propyl acetate	109-60-4	0.00200	< 0.00200	
sec-Butylbenzene	135-98-8	0.00200	< 0.00200	
Styrene	100-42-5	0.00200	< 0.00200	
tert-Butyl alcohol	76-65-0	0.0200	< 0.0200	
tert-Butylbenzene	98-06-6	0.00200	< 0.00200	
Tetrachloroethene	127-18-4	0.00200	< 0.00200	
Tetrahydrofuran	109-99-9	0.00200	< 0.00200	
Toluene	108-88-3	0.00200	**0.00466**	
trans-1,2-Dichloroethene	156-60-5	0.00200	< 0.00200	
trans-1,3-Dichloropropene	10061-02-6	0.00200	< 0.00200	
trans-1,4-Dichloro-2-butene	110-57-6	0.00200	< 0.00200	
Trichloroethene	79-01-6	0.00200	< 0.00200	
Trichlorofluoromethane	75-69-4	0.00200	< 0.00200	
Vinyl acetate	108-05-4	0.0100	< 0.0100	
Vinyl chloride	75-01-4	0.00100	< 0.00100	
Xylenes, Total	1330-20-7	0.00200	**0.0213**	B
TPH C11-C15 (DRO)		0.0200	< 0.0200	

Lab Sample ID: 1209452-003A
Client Sample ID: U-002A

Analyzed: 10/2/2012 1129h **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8260C

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
TPH C6-C10 (GRO)		0.0200	**0.190**	

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: Dibromofluoromethane	1868-53-7	0.0581	0.05000	116	80-124	
Surr: 4-Bromofluorobenzene	460-00-4	0.0507	0.05000	101	80-128	
Surr: 1,2-Dichloroethane-d4	17060-07-0	0.0628	0.05000	126	72-151	
Surr: Toluene-d8	2037-26-5	0.0502	0.05000	100	77-129	

B - This analyte was also detected in MB-SPLP-21377.

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Laboratory Director

Jose Rocha
QA Officer

ORGANIC ANALYTICAL REPORT

American West
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Client:	JBR Environmental Consultants, Inc.	**Contact:**	Jon Schulman
Project:	American Oil Sands		
Lab Sample ID:	1209452-005A		
Client Sample ID:	U-003A		
Collection Date:	9/25/2012 1240h		
Received Date:	9/26/2012 1100h		

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Jose Rocha
QA Officer

Analytical Results VOAs SPLP 1312 List by GC/MS Method 8260C/5030C

Analyzed: 10/2/2012 1149h **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8260C

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,1,1,2-Tetrachloroethane	630-20-6	0.00200	< 0.00200	
1,1,1-Trichloroethane	71-55-6	0.00200	< 0.00200	
1,1,2,2-Tetrachloroethane	79-34-5	0.00200	< 0.00200	
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.00200	< 0.00200	
1,1,2-Trichloroethane	79-00-5	0.00200	< 0.00200	
1,1-Dichloropropene	563-58-6	0.00200	< 0.00200	
1,1-Dichloroethane	75-34-3	0.00200	< 0.00200	
1,1-Dichloroethene	75-35-4	0.00200	< 0.00200	
1,2,3-Trichlorobenzene	87-61-6	0.00200	< 0.00200	
1,2,3-Trichloropropane	96-18-4	0.00200	< 0.00200	
1,2,3-Trimethylbenzene	526-73-8	0.00200	**0.00281**	
1,2,4-Trichlorobenzene	120-82-1	0.00200	< 0.00200	
1,2,4-Trimethylbenzene	95-63-6	0.00200	**0.00425**	
1,2-Dibromo-3-chloropropane	96-12-8	0.00500	< 0.00500	
1,2-Dibromoethane	106-93-4	0.00200	< 0.00200	
1,2-Dichlorobenzene	95-50-1	0.00200	< 0.00200	
1,2-Dichloroethane	107-06-2	0.00200	< 0.00200	
1,2-Dichloropropane	78-87-5	0.00200	< 0.00200	
1,3,5-Trimethylbenzene	108-67-8	0.00200	**0.00245**	
1,3-Dichlorobenzene	541-73-1	0.00200	< 0.00200	
1,3-Dichloropropane	142-28-9	0.00200	< 0.00200	
1,4-Dichlorobenzene	106-46-7	0.00200	< 0.00200	
1,4-Dioxane	123-91-1	0.0500	< 0.0500	
2,2-Dichloropropane	594-20-7	0.00200	< 0.00200	
2-Butanone	78-93-3	0.0100	**0.0118**	
2-Chloroethyl vinyl ether	110-75-8	0.00500	< 0.00500	
2-Chlorotoluene	95-49-8	0.00200	< 0.00200	
2-Hexanone	591-78-6	0.00500	< 0.00500	
2-Nitropropane	79-46-9	0.00500	< 0.00500	
4-Chlorotoluene	106-43-4	0.00200	< 0.00200	

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Kyle F. Gross
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Jose Rocha
QA Officer

Lab Sample ID: 1209452-005A
Client Sample ID: U-003A

Analyzed: 10/2/2012 1149h **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8260C

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
4-Isopropyltoluene	99-87-6	0.00200	< 0.00200	
4-Methyl-2-pentanone	108-10-1	0.00500	< 0.00500	
Acetone	67-64-1	0.0100	< 0.0100	
Acetonitrile	75-05-8	0.00500	< 0.00500	
Acrolein	107-02-8	0.00500	< 0.00500	
Acrylonitrile	107-13-1	0.0100	< 0.0100	
Allyl chloride	107-05-1	0.00500	< 0.00500	
Benzene	71-43-2	0.00100	< 0.00100	
Benzyl chloride	100-44-7	0.00500	< 0.00500	
Bis(2-chloroisopropyl) ether	108-60-1	0.00500	< 0.00500	
Bromobenzene	108-86-1	0.00200	< 0.00200	
Bromochloromethane	74-97-5	0.00200	< 0.00200	
Bromodichloromethane	75-27-4	0.00200	< 0.00200	
Bromoform	75-25-2	0.00200	< 0.00200	
Bromomethane	74-83-9	0.00500	< 0.00500	
Butyl acetate	123-86-4	0.00500	< 0.00500	
Carbon disulfide	75-15-0	0.00200	< 0.00200	
Carbon tetrachloride	56-23-5	0.00200	< 0.00200	
Chlorobenzene	108-90-7	0.00200	< 0.00200	
Chloroethane	75-00-3	0.00200	< 0.00200	
Chloroform	67-66-3	0.00200	< 0.00200	
Chloromethane	74-87-3	0.00300	< 0.00300	
Chloroprene	126-99-8	0.00200	< 0.00200	
cis-1,2-Dichloroethene	156-59-2	0.00200	< 0.00200	
cis-1,3-Dichloropropene	10061-01-5	0.00200	< 0.00200	
Cyclohexane	110-82-7	0.00200	< 0.00200	
Cyclohexanone	108-94-1	0.0500	< 0.0500	
Dibromochloromethane	124-48-1	0.00200	< 0.00200	
Dibromomethane	74-95-3	0.00200	< 0.00200	
Dichlorodifluoromethane	75-71-8	0.00200	< 0.00200	
Ethyl acetate	141-78-6	0.0100	< 0.0100	
Ethyl ether	60-29-7	0.0100	< 0.0100	
Ethyl methacrylate	97-63-2	0.00200	< 0.00200	
Ethylbenzene	100-41-4	0.00200	< 0.00200	
Hexachlorobutadiene	87-68-3	0.00200	< 0.00200	
Iodomethane	74-88-4	0.00500	< 0.00500	
Isobutyl alcohol	78-83-1	0.100	< 0.100	

Lab Sample ID: 1209452-005A
Client Sample ID: U-003A

Analyzed: 10/2/2012 1149h | **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L | **Dilution Factor:** 1 | **Method:** SW8260C

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Isopropyl acetate	108-21-4	0.0200	< 0.0200	
Isopropyl alcohol	67-63-0	0.0250	< 0.0250	
Isopropylbenzene	98-82-8	0.00200	< 0.00200	
m,p-Xylene	179601-23-1	0.00200	< 0.00200	
Methacrylonitrile	126-98-7	0.00500	< 0.00500	
Methyl Acetate	79-20-9	0.00500	< 0.00500	
Methyl methacrylate	80-62-6	0.00500	< 0.00500	
Methyl tert-butyl ether	1634-04-4	0.00200	< 0.00200	
Methylcyclohexane	108-87-2	0.00200	< 0.00200	
Methylene chloride	75-09-2	0.00200	**0.00268**	B
n-Amyl acetate	628-63-7	0.00200	< 0.00200	
n-Butyl alcohol	71-36-3	0.0500	< 0.0500	
n-Butylbenzene	104-51-8	0.00200	< 0.00200	
n-Hexane	110-54-3	0.00200	**0.0138**	
n-Octane	111-65-9	0.00200	< 0.00200	
n-Propylbenzene	103-65-1	0.00200	< 0.00200	
Naphthalene	91-20-3	0.00200	**0.00351**	
o-Xylene	95-47-6	0.00200	< 0.00200	
Pentachloroethane	76-01-7	0.00500	< 0.00500	
Propionitrile	107-12-0	0.0250	< 0.0250	
Propyl acetate	109-60-4	0.00200	< 0.00200	
sec-Butylbenzene	135-98-8	0.00200	< 0.00200	
Styrene	100-42-5	0.00200	< 0.00200	
tert-Butyl alcohol	76-65-0	0.0200	< 0.0200	
tert-Butylbenzene	98-06-6	0.00200	< 0.00200	
Tetrachloroethene	127-18-4	0.00200	< 0.00200	
Tetrahydrofuran	109-99-9	0.00200	< 0.00200	
Toluene	108-88-3	0.00200	< 0.00200	
trans-1,2-Dichloroethene	156-60-5	0.00200	< 0.00200	
trans-1,3-Dichloropropene	10061-02-6	0.00200	< 0.00200	
trans-1,4-Dichloro-2-butene	110-57-6	0.00200	< 0.00200	
Trichloroethene	79-01-6	0.00200	< 0.00200	
Trichlorofluoromethane	75-69-4	0.00200	< 0.00200	
Vinyl acetate	108-05-4	0.0100	< 0.0100	
Vinyl chloride	75-01-4	0.00100	< 0.00100	
Xylenes, Total	1330-20-7	0.00200	< 0.00200	
TPH C11-C15 (DRO)		0.0200	< 0.0200	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1209452-005A
Client Sample ID: U-003A

Analyzed: 10/2/2012 1149h **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8260C

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
TPH C6-C10 (GRO)		0.0200	**0.162**	

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: Toluene-d8	2037-26-5	0.0491	0.05000	98.2	77-129	
Surr: Dibromofluoromethane	1868-53-7	0.0560	0.05000	112	80-124	
Surr: 4-Bromofluorobenzene	460-00-4	0.0502	0.05000	100	80-128	
Surr: 1,2-Dichloroethane-d4	17060-07-0	0.0608	0.05000	122	72-151	

B - This analyte was also detected in MB-SPLP-21377.

ORGANIC ANALYTICAL REPORT

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Jose Rocha
QA Officer

Client: JBR Environmental Consultants, Inc. **Contact:** Jon Schulman
Project: American Oil Sands
Lab Sample ID: 1209452-007A
Client Sample ID: U-004A
Collection Date: 9/25/2012
Received Date: 9/26/2012 1100h

Analytical Results VOAs SPLP 1312 List by GC/MS Method 8260C/5030C

Analyzed: 10/2/2012 1208h **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8260C

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,1,1,2-Tetrachloroethane	630-20-6	0.00200	< 0.00200	
1,1,1-Trichloroethane	71-55-6	0.00200	< 0.00200	
1,1,2,2-Tetrachloroethane	79-34-5	0.00200	< 0.00200	
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.00200	< 0.00200	
1,1,2-Trichloroethane	79-00-5	0.00200	< 0.00200	
1,1-Dichloropropene	563-58-6	0.00200	< 0.00200	
1,1-Dichloroethane	75-34-3	0.00200	< 0.00200	
1,1-Dichloroethene	75-35-4	0.00200	< 0.00200	
1,2,3-Trichlorobenzene	87-61-6	0.00200	< 0.00200	
1,2,3-Trichloropropane	96-18-4	0.00200	< 0.00200	
1,2,3-Trimethylbenzene	526-73-8	0.00200	< 0.00200	
1,2,4-Trichlorobenzene	120-82-1	0.00200	< 0.00200	
1,2,4-Trimethylbenzene	95-63-6	0.00200	< 0.00200	
1,2-Dibromo-3-chloropropane	96-12-8	0.00500	< 0.00500	
1,2-Dibromoethane	106-93-4	0.00200	< 0.00200	
1,2-Dichlorobenzene	95-50-1	0.00200	< 0.00200	
1,2-Dichloroethane	107-06-2	0.00200	< 0.00200	
1,2-Dichloropropane	78-87-5	0.00200	< 0.00200	
1,3,5-Trimethylbenzene	108-67-8	0.00200	< 0.00200	
1,3-Dichlorobenzene	541-73-1	0.00200	< 0.00200	
1,3-Dichloropropane	142-28-9	0.00200	< 0.00200	
1,4-Dichlorobenzene	106-46-7	0.00200	< 0.00200	
1,4-Dioxane	123-91-1	0.0500	< 0.0500	
2,2-Dichloropropane	594-20-7	0.00200	< 0.00200	
2-Butanone	78-93-3	0.0100	< 0.0100	
2-Chloroethyl vinyl ether	110-75-8	0.00500	< 0.00500	
2-Chlorotoluene	95-49-8	0.00200	< 0.00200	
2-Hexanone	591-78-6	0.00500	< 0.00500	
2-Nitropropane	79-46-9	0.00500	< 0.00500	
4-Chlorotoluene	106-43-4	0.00200	< 0.00200	

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Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1209452-007A
Client Sample ID: U-004A

Analyzed: 10/2/2012 1208h | **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L | **Dilution Factor:** 1 | **Method:** SW8260C

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
4-Isopropyltoluene	99-87-6	0.00200	< 0.00200	
4-Methyl-2-pentanone	108-10-1	0.00500	< 0.00500	
Acetone	67-64-1	0.0100	< 0.0100	
Acetonitrile	75-05-8	0.00500	< 0.00500	
Acrolein	107-02-8	0.00500	< 0.00500	
Acrylonitrile	107-13-1	0.0100	< 0.0100	
Allyl chloride	107-05-1	0.00500	< 0.00500	
Benzene	71-43-2	0.00100	< 0.00100	
Benzyl chloride	100-44-7	0.00500	< 0.00500	
Bis(2-chloroisopropyl) ether	108-60-1	0.00500	< 0.00500	
Bromobenzene	108-86-1	0.00200	< 0.00200	
Bromochloromethane	74-97-5	0.00200	< 0.00200	
Bromodichloromethane	75-27-4	0.00200	< 0.00200	
Bromoform	75-25-2	0.00200	< 0.00200	
Bromomethane	74-83-9	0.00500	< 0.00500	
Butyl acetate	123-86-4	0.00500	< 0.00500	
Carbon disulfide	75-15-0	0.00200	< 0.00200	
Carbon tetrachloride	56-23-5	0.00200	< 0.00200	
Chlorobenzene	108-90-7	0.00200	< 0.00200	
Chloroethane	75-00-3	0.00200	< 0.00200	
Chloroform	67-66-3	0.00200	< 0.00200	
Chloromethane	74-87-3	0.00300	< 0.00300	
Chloroprene	126-99-8	0.00200	< 0.00200	
cis-1,2-Dichloroethene	156-59-2	0.00200	< 0.00200	
cis-1,3-Dichloropropene	10061-01-5	0.00200	< 0.00200	
Cyclohexane	110-82-7	0.00200	< 0.00200	
Cyclohexanone	108-94-1	0.0500	< 0.0500	
Dibromochloromethane	124-48-1	0.00200	< 0.00200	
Dibromomethane	74-95-3	0.00200	< 0.00200	
Dichlorodifluoromethane	75-71-8	0.00200	< 0.00200	
Ethyl acetate	141-78-6	0.0100	< 0.0100	
Ethyl ether	60-29-7	0.0100	< 0.0100	
Ethyl methacrylate	97-63-2	0.00200	< 0.00200	
Ethylbenzene	100-41-4	0.00200	< 0.00200	
Hexachlorobutadiene	87-68-3	0.00200	< 0.00200	
Iodomethane	74-88-4	0.00500	< 0.00500	
Isobutyl alcohol	78-83-1	0.100	< 0.100	

Lab Sample ID: 1209452-007A
Client Sample ID: U-004A

Analyzed: 10/2/2012 1208h **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8260C

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Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Isopropyl acetate	108-21-4	0.0200	< 0.0200	
Isopropyl alcohol	67-63-0	0.0250	< 0.0250	
Isopropylbenzene	98-82-8	0.00200	< 0.00200	
m,p-Xylene	179601-23-1	0.00200	< 0.00200	
Methacrylonitrile	126-98-7	0.00500	< 0.00500	
Methyl Acetate	79-20-9	0.00500	< 0.00500	
Methyl methacrylate	80-62-6	0.00500	< 0.00500	
Methyl tert-butyl ether	1634-04-4	0.00200	< 0.00200	
Methylcyclohexane	108-87-2	0.00200	< 0.00200	
Methylene chloride	75-09-2	0.00200	**0.00304**	B
n-Amyl acetate	628-63-7	0.00200	< 0.00200	
n-Butyl alcohol	71-36-3	0.0500	< 0.0500	
n-Butylbenzene	104-51-8	0.00200	< 0.00200	
n-Hexane	110-54-3	0.00200	< 0.00200	
n-Octane	111-65-9	0.00200	< 0.00200	
n-Propylbenzene	103-65-1	0.00200	< 0.00200	
Naphthalene	91-20-3	0.00200	< 0.00200	
o-Xylene	95-47-6	0.00200	< 0.00200	
Pentachloroethane	76-01-7	0.00500	< 0.00500	
Propionitrile	107-12-0	0.0250	< 0.0250	
Propyl acetate	109-60-4	0.00200	< 0.00200	
sec-Butylbenzene	135-98-8	0.00200	< 0.00200	
Styrene	100-42-5	0.00200	< 0.00200	
tert-Butyl alcohol	76-65-0	0.0200	< 0.0200	
tert-Butylbenzene	98-06-6	0.00200	< 0.00200	
Tetrachloroethene	127-18-4	0.00200	< 0.00200	
Tetrahydrofuran	109-99-9	0.00200	< 0.00200	
Toluene	108-88-3	0.00200	< 0.00200	
trans-1,2-Dichloroethene	156-60-5	0.00200	< 0.00200	
trans-1,3-Dichloropropene	10061-02-6	0.00200	< 0.00200	
trans-1,4-Dichloro-2-butene	110-57-6	0.00200	< 0.00200	
Trichloroethene	79-01-6	0.00200	< 0.00200	
Trichlorofluoromethane	75-69-4	0.00200	< 0.00200	
Vinyl acetate	108-05-4	0.0100	< 0.0100	
Vinyl chloride	75-01-4	0.00100	< 0.00100	
Xylenes, Total	1330-20-7	0.00200	< 0.00200	
TPH C11-C15 (DRO)		0.0200	< 0.0200	

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Lab Sample ID: 1209452-007A
Client Sample ID: U-004A

Analyzed: 10/2/2012 1208h **SPLP Prep Date:** 9/30/2012 1645h
Units: mg/L **Dilution Factor:** 1 **Method:** SW8260C

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
TPH C6-C10 (GRO)		0.0200	< 0.0200	

Surrogate	CAS	Result	Amount Spiked	% REC	Limits	Qual
Surr: Toluene-d8	2037-26-5	0.0505	0.05000	101	77-129	
Surr: Dibromofluoromethane	1868-53-7	0.0571	0.05000	114	80-124	
Surr: 4-Bromofluorobenzene	460-00-4	0.0559	0.05000	112	80-128	
Surr: 1,2-Dichloroethane-d4	17060-07-0	0.0610	0.05000	122	72-151	

B - This analyte was also detected in MB-SPLP-21377.

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American West
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Kyle F. Gross
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Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: ME
QC Type: LCS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
LCS-21529	Boron	mg/L	SW6010C	2.28	2.000	0	114	80-120				10/10/2012 1018h
LCS-21529	Chromium	mg/L	SW6010C	0.438	0.4000	0	109	80-120				10/10/2012 1018h
LCS-21529	Iron	mg/L	SW6010C	2.18	2.000	0	109	80-120				10/10/2012 1018h
LCS-21529	Magnesium	mg/L	SW6010C	21.4	20.00	0	107	80-120				10/10/2012 1018h
LCS-21529	Molybdenum	mg/L	SW6010C	0.422	0.4000	0	105	80-120				10/10/2012 1018h
LCS-21529	Potassium	mg/L	SW6010C	22.2	20.00	0	111	80-120				10/10/2012 1018h
LCS-21529	Strontium	mg/L	SW6010C	0.434	0.4000	0	109	80-120				10/10/2012 1018h
LCS-21529	Tin	mg/L	SW6010C	2.10	2.000	0	105	80-120				10/10/2012 1018h
LCS-21529	Vanadium	mg/L	SW6010C	0.428	0.4000	0	107	80-120				10/10/2012 1018h
LCS-21585	Calcium	mg/L	SW6010C	19.2	20.00	0	96.1	80-120				10/11/2012 1356h
LCS-21585	Sodium	mg/L	SW6010C	20.1	20.00	0	101	80-120				10/11/2012 1356h
LCS-21399	Antimony	mg/L	SW6020A	0.222	0.2000	0	111	85-115				10/4/2012 1753h
LCS-21399	Arsenic	mg/L	SW6020A	0.223	0.2000	0	112	85-115				10/4/2012 1753h
LCS-21399	Barium	mg/L	SW6020A	0.208	0.2000	0	104	85-115				10/4/2012 1753h
LCS-21399	Beryllium	mg/L	SW6020A	0.190	0.2000	0	95.2	85-115				10/4/2012 1753h
LCS-21399	Cadmium	mg/L	SW6020A	0.207	0.2000	0	104	85-115				10/4/2012 1753h
LCS-21399	Copper	mg/L	SW6020A	0.222	0.2000	0	111	85-115				10/4/2012 1753h
LCS-21399	Lead	mg/L	SW6020A	0.209	0.2000	0	104	85-115				10/4/2012 1753h
LCS-21399	Manganese	mg/L	SW6020A	0.217	0.2000	0	109	85-115				10/4/2012 1753h
LCS-21399	Nickel	mg/L	SW6020A	0.209	0.2000	0	105	85-115				10/4/2012 1753h
LCS-21399	Selenium	mg/L	SW6020A	0.214	0.2000	0	107	85-115				10/4/2012 1753h
LCS-21399	Silver	mg/L	SW6020A	0.208	0.2000	0	104	85-115				10/4/2012 1753h
LCS-21399	Thallium	mg/L	SW6020A	0.196	0.2000	0	97.9	85-115				10/4/2012 1753h

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: ME
QC Type: LCS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
LCS-21399	Zinc	mg/L	SW6020A	1.04	1.000	0	104	85-115				10/4/2012 1753h
LCS-21387	Mercury	mg/L	SW7470A	0.00309	0.003330	0	92.8	80-120				10/2/2012 1106h

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Jose Rocha
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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: ME
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB-21529	Boron	mg/L	SW6010C	< 0.500				-				10/10/2012 1014h
MB-21529	Chromium	mg/L	SW6010C	< 0.0100				-				10/10/2012 1014h
MB-21529	Iron	mg/L	SW6010C	< 0.100				-				10/10/2012 1014h
MB-21529	Lithium	mg/L	SW6010C	< 0.100				-				10/10/2012 1443h
MB-21529	Magnesium	mg/L	SW6010C	< 1.00				-				10/10/2012 1014h
MB-21529	Molybdenum	mg/L	SW6010C	< 0.0200				-				10/10/2012 1014h
MB-21529	Potassium	mg/L	SW6010C	< 1.00				-				10/10/2012 1014h
MB-21529	Strontium	mg/L	SW6010C	< 0.0500				-				10/10/2012 1014h
MB-21529	Tin	mg/L	SW6010C	< 0.500				-				10/10/2012 1014h
MB-21529	Vanadium	mg/L	SW6010C	< 0.0500				-				10/10/2012 1014h
MB-21585	Calcium	mg/L	SW6010C	< 1.00				-				10/11/2012 1352h
MB-21585	Sodium	mg/L	SW6010C	< 1.00				-				10/11/2012 1352h
MB-SPLP-21369	Boron	mg/L	SW6010C	< 0.500				-				10/10/2012 1022h
MB-SPLP-21369	Chromium	mg/L	SW6010C	< 0.0100				-				10/10/2012 1022h
MB-SPLP-21369	Iron	mg/L	SW6010C	< 0.100				-				10/10/2012 1022h
MB-SPLP-21369	Lithium	mg/L	SW6010C	< 0.100				-				10/10/2012 1445h
MB-SPLP-21369	Magnesium	mg/L	SW6010C	< 1.00				-				10/10/2012 1022h
MB-SPLP-21369	Molybdenum	mg/L	SW6010C	< 0.0200				-				10/10/2012 1022h
MB-SPLP-21369	Potassium	mg/L	SW6010C	< 1.00				-				10/10/2012 1022h
MB-SPLP-21369	Strontium	mg/L	SW6010C	< 0.0500				-				10/10/2012 1022h
MB-SPLP-21369	Tin	mg/L	SW6010C	< 0.500				-				10/10/2012 1022h
MB-SPLP-21369	Vanadium	mg/L	SW6010C	< 0.0500				-				10/10/2012 1022h
MB-SPLP-21575	Calcium	mg/L	SW6010C	< 1.00				-				10/11/2012 1348h

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: ME
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB-SPLP-21575	Sodium	mg/L	SW6010C	< 1.00				-				10/11/2012 1348h
MB-21399	Antimony	mg/L	SW6020A	< 0.00200				-				10/4/2012 1735h
MB-21399	Arsenic	mg/L	SW6020A	< 0.00200				-				10/4/2012 1735h
MB-21399	Barium	mg/L	SW6020A	< 0.0100				-				10/4/2012 1735h
MB-21399	Beryllium	mg/L	SW6020A	< 0.00200				-				10/4/2012 1735h
MB-21399	Cadmium	mg/L	SW6020A	< 0.000500				-				10/4/2012 1735h
MB-21399	Copper	mg/L	SW6020A	< 0.00200				-				10/4/2012 1735h
MB-21399	Lead	mg/L	SW6020A	< 0.0100				-				10/4/2012 1735h
MB-21399	Manganese	mg/L	SW6020A	< 0.00200				-				10/4/2012 1735h
MB-21399	Nickel	mg/L	SW6020A	< 0.00200				-				10/4/2012 1735h
MB-21399	Selenium	mg/L	SW6020A	< 0.00200				-				10/4/2012 1735h
MB-21399	Silver	mg/L	SW6020A	< 0.00200				-				10/4/2012 1735h
MB-21399	Thallium	mg/L	SW6020A	< 0.00200				-				10/4/2012 1735h
MB-21399	Zinc	mg/L	SW6020A	< 0.100				-				10/4/2012 1735h
MB-SPLP-21369	Antimony	mg/L	SW6020A	< 0.00200				-				10/4/2012 1744h
MB-SPLP-21369	Arsenic	mg/L	SW6020A	< 0.00200				-				10/4/2012 1744h
MB-SPLP-21369	Barium	mg/L	SW6020A	< 0.0100				-				10/4/2012 1744h
MB-SPLP-21369	Beryllium	mg/L	SW6020A	< 0.00200				-				10/4/2012 1744h
MB-SPLP-21369	Cadmium	mg/L	SW6020A	< 0.000500				-				10/4/2012 1744h
MB-SPLP-21369	Copper	mg/L	SW6020A	< 0.00200				-				10/4/2012 1744h
MB-SPLP-21369	Lead	mg/L	SW6020A	< 0.0100				-				10/4/2012 1744h
MB-SPLP-21369	Manganese	mg/L	SW6020A	< 0.00200				-				10/4/2012 1744h
MB-SPLP-21369	Nickel	mg/L	SW6020A	< 0.00200				-				10/4/2012 1744h

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: ME
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB-SPLP-21369	Selenium	mg/L	SW6020A	< 0.00200				-				10/4/2012 1744h
MB-SPLP-21369	Silver	mg/L	SW6020A	< 0.00200				-				10/4/2012 1744h
MB-SPLP-21369	Thallium	mg/L	SW6020A	< 0.00200				-				10/4/2012 1744h
MB-SPLP-21369	Zinc	mg/L	SW6020A	< 0.100				-				10/4/2012 1744h
MB-21387	Mercury	mg/L	SW7470A	< 0.00100				-				10/2/2012 1104h
MB-SPLP-21369	Mercury	mg/L	SW7470A	< 0.00100				-				10/2/2012 1126h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: ME
QC Type: MS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
1209452-001AMS	Calcium	mg/L	SW6010C	21.7	20.00	2.814	94.4	75-125				10/11/2012 1413h
1209452-001AMS	Sodium	mg/L	SW6010C	20.3	20.00	0.3574	99.9	75-125				10/11/2012 1413h
1209452-003AMS	Boron	mg/L	SW6010C	2.09	2.000	0	104	75-125				10/10/2012 1459h
1209452-003AMS	Chromium	mg/L	SW6010C	0.396	0.4000	0	99.0	75-125				10/10/2012 1459h
1209452-003AMS	Iron	mg/L	SW6010C	3.09	2.000	1.178	95.7	75-125				10/10/2012 1459h
1209452-003AMS	Magnesium	mg/L	SW6010C	20.3	20.00	0.1813	101	75-125				10/10/2012 1459h
1209452-003AMS	Molybdenum	mg/L	SW6010C	0.409	0.4000	0	102	75-125				10/10/2012 1459h
1209452-003AMS	Potassium	mg/L	SW6010C	20.8	20.00	0	104	75-125				10/10/2012 1459h
1209452-003AMS	Strontium	mg/L	SW6010C	0.406	0.4000	0.005999	100	75-125				10/10/2012 1459h
1209452-003AMS	Tin	mg/L	SW6010C	2.01	2.000	0	100	75-125				10/10/2012 1459h
1209452-003AMS	Vanadium	mg/L	SW6010C	0.400	0.4000	0	99.9	75-125				10/10/2012 1459h
1209452-001AMS	Antimony	mg/L	SW6020A	0.221	0.2000	0.0001890	110	75-125				10/4/2012 1830h
1209452-001AMS	Arsenic	mg/L	SW6020A	0.223	0.2000	0.0002160	112	75-125				10/4/2012 1830h
1209452-001AMS	Barium	mg/L	SW6020A	0.245	0.2000	0.04131	102	75-125				10/4/2012 1830h
1209452-001AMS	Beryllium	mg/L	SW6020A	0.188	0.2000	0	93.8	75-125				10/4/2012 1830h
1209452-001AMS	Cadmium	mg/L	SW6020A	0.207	0.2000	0.0001210	104	75-125				10/4/2012 1830h
1209452-001AMS	Copper	mg/L	SW6020A	0.218	0.2000	0.001466	108	75-125				10/4/2012 1830h
1209452-001AMS	Lead	mg/L	SW6020A	0.207	0.2000	0.0003300	103	75-125				10/4/2012 1830h
1209452-001AMS	Manganese	mg/L	SW6020A	0.868	0.2000	0.6838	92.3	75-125				10/4/2012 1830h
1209452-001AMS	Nickel	mg/L	SW6020A	0.233	0.2000	0.02773	102	75-125				10/4/2012 1830h
1209452-001AMS	Selenium	mg/L	SW6020A	0.204	0.2000	0.0009600	101	75-125				10/4/2012 1830h
1209452-001AMS	Silver	mg/L	SW6020A	0.205	0.2000	0	102	75-125				10/4/2012 1830h
1209452-001AMS	Thallium	mg/L	SW6020A	0.191	0.2000	0.00005500	95.3	75-125				10/4/2012 1830h

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Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: ME
QC Type: MS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
1209452-001AMS	Zinc	mg/L	SW6020A	1.09	1.000	0.07212	101	75-125				10/4/2012 1830h
1209452-001AMS	Mercury	mg/L	SW7470A	0.00309	0.003330	0	92.8	80-120				10/2/2012 1113h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: ME
QC Type: MSD

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
1209452-001AMSD	Calcium	mg/L	SW6010C	21.2	20.00	2.814	92.2	75-125	2.06	20		10/11/2012 1417h
1209452-001AMSD	Sodium	mg/L	SW6010C	19.9	20.00	0.3574	97.9	75-125	1.94	20		10/11/2012 1417h
1209452-003AMSD	Boron	mg/L	SW6010C	2.07	2.000	0	104	75-125	0.587	20		10/10/2012 1503h
1209452-003AMSD	Chromium	mg/L	SW6010C	0.401	0.4000	0	100	75-125	1.27	20		10/10/2012 1503h
1209452-003AMSD	Iron	mg/L	SW6010C	3.10	2.000	1.178	96.1	75-125	0.299	20		10/10/2012 1503h
1209452-003AMSD	Magnesium	mg/L	SW6010C	20.2	20.00	0.1813	100	75-125	0.683	20		10/10/2012 1503h
1209452-003AMSD	Molybdenum	mg/L	SW6010C	0.398	0.4000	0	99.5	75-125	2.59	20		10/10/2012 1503h
1209452-003AMSD	Potassium	mg/L	SW6010C	20.7	20.00	0	103	75-125	0.448	20		10/10/2012 1503h
1209452-003AMSD	Strontium	mg/L	SW6010C	0.404	0.4000	0.005999	99.5	75-125	0.546	20		10/10/2012 1503h
1209452-003AMSD	Tin	mg/L	SW6010C	1.98	2.000	0	99.2	75-125	1.28	20		10/10/2012 1503h
1209452-003AMSD	Vanadium	mg/L	SW6010C	0.395	0.4000	0	98.8	75-125	1.15	20		10/10/2012 1503h
1209452-001AMSD	Antimony	mg/L	SW6020A	0.221	0.2000	0.0001890	111	75-125	0.275	20		10/4/2012 1839h
1209452-001AMSD	Arsenic	mg/L	SW6020A	0.223	0.2000	0.0002160	111	75-125	0.133	20		10/4/2012 1839h
1209452-001AMSD	Barium	mg/L	SW6020A	0.247	0.2000	0.04131	103	75-125	1.06	20		10/4/2012 1839h
1209452-001AMSD	Beryllium	mg/L	SW6020A	0.191	0.2000	0	95.6	75-125	1.88	20		10/4/2012 1839h
1209452-001AMSD	Cadmium	mg/L	SW6020A	0.208	0.2000	0.0001210	104	75-125	0.119	20		10/4/2012 1839h
1209452-001AMSD	Copper	mg/L	SW6020A	0.217	0.2000	0.001466	108	75-125	0.393	20		10/4/2012 1839h
1209452-001AMSD	Lead	mg/L	SW6020A	0.202	0.2000	0.0003300	101	75-125	2.45	20		10/4/2012 1839h
1209452-001AMSD	Manganese	mg/L	SW6020A	0.897	0.2000	0.6838	107	75-125	3.23	20		10/4/2012 1839h
1209452-001AMSD	Nickel	mg/L	SW6020A	0.235	0.2000	0.02773	104	75-125	0.991	20		10/4/2012 1839h
1209452-001AMSD	Selenium	mg/L	SW6020A	0.209	0.2000	0.0009600	104	75-125	2.57	20		10/4/2012 1839h
1209452-001AMSD	Silver	mg/L	SW6020A	0.207	0.2000	0	103	75-125	1.09	20		10/4/2012 1839h
1209452-001AMSD	Thallium	mg/L	SW6020A	0.194	0.2000	0.00005500	97.1	75-125	1.82	20		10/4/2012 1839h

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: ME
QC Type: MSD

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
1209452-001AMSD	Zinc	mg/L	SW6020A	1.09	1.000	0.07212	102	75-125	0.621	20		10/4/2012 1839h
1209452-001AMSD	Mercury	mg/L	SW7470A	0.00312	0.003330	0	93.7	80-120	0.966	20		10/2/2012 1115h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: WC
QC Type: DUP

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
1209452-002ADUP	Conductivity	µmhos/cm	SW9050A	169		169.0		-	0	10	&	10/1/2012 610h
1209452-008ADUP	Conductivity	µmhos/cm	SW9050A	330		332.0		-	0.604	10	&	10/2/2012 710h
1209452-001ADUP	pH @ 25° C	pH Units	SW9040C	6.24		6.270		-	0.48	10		10/1/2012 1630h
1209452-003ADUP	pH @ 25° C	pH Units	SW9040C	5.89		5.890		-	0	10		10/1/2012 1630h
1209452-005ADUP	pH @ 25° C	pH Units	SW9040C	4.51		4.510		-	0	10		10/1/2012 1630h
1209452-007ADUP	pH @ 25° C	pH Units	SW9040C	3.61		3.600		-	0.277	10		10/1/2012 1630h
1209452-002ADUP	pH @ 25° C	pH Units	SW9045D	4.88		4.900		-	0.409	10	H	9/28/2012 1720h
1209452-008ADUP	pH @ 25° C	pH Units	SW9045D	4.25		4.240		-	0.236	10	H	10/1/2012 1625h
1209452-001ADUP	Total Dissolved Solids	mg/L	SM2540C	16.0		14.00		-	13.3	5	#	10/2/2012 1215h

 # - High RPD due to low analyte concentration. In this range, high RPDs are expected.
H - Sample was received outside of the holding time.
& - Analysis is performed on a 1:1 DI water extract for soils.

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: WC
QC Type: LCS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
LCS-R45676	Alkalinity (as CaCO3)	mg/L	SM2320B	51,900	50,000	0	104	90-110				10/2/2012 952h
LCS-R45697	Chloride	mg/L	SM4500-Cl-E	25.3	25.00	0	101	90-110				10/1/2012 1822h
LCS-R45625	Conductivity	µmhos/cm	SW9050A	992	1,000	0	99.2	98-102				10/1/2012 610h
LCS-R45666	Conductivity	µmhos/cm	SW9050A	1,010	1,000	0	101	98-102				10/2/2012 710h
LCS-R45731	Oil & Grease	mg/L	E1664A	38.9	40.00	0	97.3	78-114				10/2/2012 1351h
LCS-R45766	Total Recoverable Petroleum Hydrocarbons	mg/L	E1664A-SGT	15.5	20.00	0	77.5	64-132				10/3/2012 1501h
LCS-R45659	pH @ 25° C	pH Units	SW9040C	9.02	9.000	0	100	98-102				10/1/2012 1630h
LCS-R45605	pH @ 25° C	pH Units	SW9045D	8.96	9.000	0	99.6	98-102				9/28/2012 1720h
LCS-R45658	pH @ 25° C	pH Units	SW9045D	8.98	9.000	0	99.8	98-102				10/1/2012 1625h
LCS-R45667	Sulfate	mg/L	SM4500-SO4-E	996	1,000	0	99.6	90-110				10/2/2012 600h
LCS-R45719	Total Dissolved Solids	mg/L	SM2540C	198	205.0	0	96.6	80-120				10/2/2012 1215h
LCS-R45767	Total Organic Carbon	mg/L	SM5310B	10.1	10.00	0	101	90-110				10/3/2012 1535h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: WC
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB-R45676	Alkalinity (as CaCO3)	mg/L	SM2320B	< 10.0				-				10/2/2012 952h
MB-SPLP-21369	Alkalinity (as CaCO3)	mg/L	SM2320B	< 10.0				-				10/2/2012 952h
MB-R45697	Chloride	mg/L	SM4500-Cl-E	< 5.00				-				10/1/2012 1821h
MB-SPLP-21369	Chloride	mg/L	SM4500-Cl-E	< 5.00				-				10/1/2012 1823h
MB-R45625	Conductivity	µmhos/cm	SW9050A	< 10.0				-				10/1/2012 610h
MB-R45666	Conductivity	µmhos/cm	SW9050A	< 10.0				-				10/2/2012 710h
MB-R45731	Oil & Grease	mg/L	E1664A	< 3.00				-				10/2/2012 1351h
MB-SPLP-21369	Oil & Grease	mg/L	E1664A	< 3.00				-				10/2/2012 1351h
MB-R45766	Total Recoverable Petroleum Hydrocarbons	mg/L	E1664A-SGT	< 3.00				-				10/3/2012 1501h
MB-SPLP-21369	Total Recoverable Petroleum Hydrocarbons	mg/L	E1664A-SGT	< 3.00				-				10/3/2012 1501h
MB-R45667	Sulfate	mg/L	SM4500-SO4-E	< 5.00				-				10/2/2012 600h
MB-SPLP-21369	Sulfate	mg/L	SM4500-SO4-E	< 5.00				-				10/2/2012 600h
MB-R45719	Total Dissolved Solids	mg/L	SM2540C	< 10.0				-				10/2/2012 1215h
MB-SPLP-21369	Total Dissolved Solids	mg/L	SM2540C	< 10.0				-				10/2/2012 1215h
MB-R45767	Total Organic Carbon	mg/L	SM5310B	< 1.00				-				10/3/2012 1512h
MB-SPLP-21369	Total Organic Carbon	mg/L	SM5310B	1.01				-				10/3/2012 1815h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: WC
QC Type: MS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
1209452-007AMS	Alkalinity (as CaCO3)	mg/L	SM2320B	49.2	50.00	0	98.4	80-120				10/2/2012 952h
1209452-001AMS	Sulfate	mg/L	SM4500-SO4-E	29.7	20.00	11.21	92.5	80-120				10/2/2012 600h
1209452-001AMS	Total Organic Carbon	mg/L	SM5310B	11.3	5.000	6.687	92.7	80-120				10/3/2012 1621h

Analysis performed on an SPLP extract by method 1312.

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: WC
QC Type: MSD

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
1209452-007AMSD	Alkalinity (as CaCO3)	mg/L	SM2320B	51.0	50.00	0	102	80-120	3.59	10		10/2/2012 952h
1209452-001AMSD	Sulfate	mg/L	SM4500-SO4-E	28.6	20.00	11.21	87.1	80-120	3.74	10		10/2/2012 600h
1209452-001AMSD	Total Organic Carbon	mg/L	SM5310B	11.3	5.000	6.687	92.5	80-120	0.0998	20		10/3/2012 1644h

Analysis performed on an SPLP extract by method 1312.

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: WC
QC Type: QCS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
QCS-R45731	Oil & Grease	mg/L	E1664A	44.1	40.00	1.900	106	78-114				10/2/2012 1351h
QCS-R45766	Total Recoverable Petroleum Hydrocarbons	mg/L	E1664A-SGT	15.9	20.00	0	79.5	64-132				10/3/2012 1501h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: WC
QC Type: QCSD

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
QCSD-R45731	Oil & Grease	mg/L	E1664A	44.3	40.00	1.900	106	78-114	0.452	18		10/2/2012 1351h
QCSD-R45766	Total Recoverable Petroleum Hydrocarbons	mg/L	E1664A-SGT	18.8	20.00	0	94.0	64-132	16.7	34		10/3/2012 1501h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: GC
QC Type: LCS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
LCS-21396	Diesel Range Organics (DRO) (C10-C28)	mg/L	SW8015D	1.51	2.000	0	75.5	48-118				10/2/2012 1409h
LCS-21396	Surr: 4-Bromofluorobenzene	%REC	SW8015D	0.158	0.4000		39.5	18-95				10/2/2012 1409h

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: GC
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB-21396	Diesel Range Organics (DRO) (C10-C28)	mg/L	SW8015D	< 0.500				-				10/2/2012 1350h
MB-21396	Surr: 4-Bromofluorobenzene	%REC	SW8015D	0.126	0.4000		31.4	18-95				10/2/2012 1350h
MB-SPLP-21369	Diesel Range Organics (DRO) (C10-C28)	mg/L	SW8015D	< 0.500				-				10/2/2012 1624h
MB-SPLP-21369	Surr: 4-Bromofluorobenzene	%REC	SW8015D	0.151	0.4000		37.7	18-95				10/2/2012 1624h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: GC
QC Type: MS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
1209452-001AMS	Diesel Range Organics (DRO) (C10-C28)	mg/L	SW8015D	2.21	2.000	0.6755	76.6	60-161				10/2/2012 1448h
1209452-001AMS	Surr: 4-Bromofluorobenzene	%REC	SW8015D	0.180	0.4000		45.0	10-190				10/2/2012 1448h

Analysis performed on an SPLP extract by method 1312.

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: GC
QC Type: MSD

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
1209452-001AMSD	Diesel Range Organics (DRO) (C10-C28)	mg/L	SW8015D	2.10	2.000	0.6755	71.1	60-161	5.12	25		10/2/2012 1507h
1209452-001AMSD	Surr: 4-Bromofluorobenzene	%REC	SW8015D	0.164	0.4000		40.9	10-190				10/2/2012 1507h

Analysis performed on an SPLP extract by method 1312.

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: MSVOA
QC Type: LCS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
LCS VOC 100212A	1,1,1-Trichloroethane	mg/L	SW8260C	0.0271	0.02000	0	136	49.9-140				10/2/2012 703h
LCS VOC 100212A	1,1-Dichloroethene	mg/L	SW8260C	0.0266	0.02000	0	133	46-171				10/2/2012 703h
LCS VOC 100212A	1,2-Dichlorobenzene	mg/L	SW8260C	0.0205	0.02000	0	103	67-135				10/2/2012 703h
LCS VOC 100212A	1,2-Dichloroethane	mg/L	SW8260C	0.0250	0.02000	0	125	60-137				10/2/2012 703h
LCS VOC 100212A	1,2-Dichloropropane	mg/L	SW8260C	0.0198	0.02000	0	99.0	59-135				10/2/2012 703h
LCS VOC 100212A	Benzene	mg/L	SW8260C	0.0214	0.02000	0	107	62-127				10/2/2012 703h
LCS VOC 100212A	Chlorobenzene	mg/L	SW8260C	0.0208	0.02000	0	104	63-140				10/2/2012 703h
LCS VOC 100212A	Chloroform	mg/L	SW8260C	0.0241	0.02000	0	120	67-132				10/2/2012 703h
LCS VOC 100212A	Ethylbenzene	mg/L	SW8260C	0.0218	0.02000	0	109	55-133				10/2/2012 703h
LCS VOC 100212A	Isopropylbenzene	mg/L	SW8260C	0.0207	0.02000	0	104	60-147				10/2/2012 703h
LCS VOC 100212A	Methyl tert-butyl ether	mg/L	SW8260C	0.0282	0.02000	0	141	37-189				10/2/2012 703h
LCS VOC 100212A	Methylene chloride	mg/L	SW8260C	0.0248	0.02000	0	124	32-185				10/2/2012 703h
LCS VOC 100212A	Naphthalene	mg/L	SW8260C	0.0125	0.02000	0	62.4	28-136				10/2/2012 703h
LCS VOC 100212A	Tetrahydrofuran	mg/L	SW8260C	0.0146	0.02000	0	73.0	43-146				10/2/2012 703h
LCS VOC 100212A	Toluene	mg/L	SW8260C	0.0209	0.02000	0	105	64-128				10/2/2012 703h
LCS VOC 100212A	Trichloroethene	mg/L	SW8260C	0.0226	0.02000	0	113	54-152				10/2/2012 703h
LCS VOC 100212A	Xylenes, Total	mg/L	SW8260C	0.0656	0.06000	0	109	52-134				10/2/2012 703h
LCS VOC 100212A	Surr: 1,2-Dichloroethane-d4	%REC	SW8260C	0.0619	0.05000		124	76-138				10/2/2012 703h
LCS VOC 100212A	Surr: 4-Bromofluorobenzene	%REC	SW8260C	0.0489	0.05000		97.8	77-121				10/2/2012 703h
LCS VOC 100212A	Surr: Dibromofluoromethane	%REC	SW8260C	0.0569	0.05000		114	67-128				10/2/2012 703h
LCS VOC 100212A	Surr: Toluene-d8	%REC	SW8260C	0.0475	0.05000		95.0	81-135				10/2/2012 703h

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Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: MSVOA
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB VOC 100212A	1,1,1,2-Tetrachloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,1,1-Trichloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,1,2,2-Tetrachloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,1,2-Trichloro-1,2,2-trifluoroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,1,2-Trichloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,1-Dichloropropene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,1-Dichloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,1-Dichloroethene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,2,3-Trichlorobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,2,3-Trichloropropane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,2,3-Trimethylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,2,4-Trichlorobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,2,4-Trimethylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,2-Dibromo-3-chloropropane	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	1,2-Dibromoethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,2-Dichlorobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,2-Dichloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,2-Dichloropropane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,3,5-Trimethylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,3-Dichlorobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,3-Dichloropropane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	1,4-Dichlorobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: MSVOA
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB VOC 100212A	1,4-Dioxane	mg/L	SW8260C	< 0.0500				-				10/2/2012 741h
MB VOC 100212A	2,2-Dichloropropane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	2-Butanone	mg/L	SW8260C	< 0.0100				-				10/2/2012 741h
MB VOC 100212A	2-Chloroethyl vinyl ether	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	2-Chlorotoluene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	2-Hexanone	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	2-Nitropropane	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	4-Chlorotoluene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	4-Isopropyltoluene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	4-Methyl-2-pentanone	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	Acetone	mg/L	SW8260C	< 0.0100				-				10/2/2012 741h
MB VOC 100212A	Acetonitrile	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	Acrolein	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	Acrylonitrile	mg/L	SW8260C	< 0.0100				-				10/2/2012 741h
MB VOC 100212A	Allyl chloride	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	Benzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Benzyl chloride	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	Bis(2-chloroisopropyl) ether	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	Bromobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Bromochloromethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Bromodichloromethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Bromoform	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Bromomethane	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
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Dept: MSVOA
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB VOC 100212A	Butyl acetate	mg/L	SW8260C	< 0.0100				-				10/2/2012 741h
MB VOC 100212A	Carbon disulfide	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Carbon tetrachloride	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Chlorobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Chloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Chloroform	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Chloromethane	mg/L	SW8260C	< 0.00300				-				10/2/2012 741h
MB VOC 100212A	Chloroprene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	cis-1,2-Dichloroethene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	cis-1,3-Dichloropropene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Cyclohexane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Cyclohexanone	mg/L	SW8260C	< 0.0500				-				10/2/2012 741h
MB VOC 100212A	Dibromochloromethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Dibromomethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Dichlorodifluoromethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Ethyl acetate	mg/L	SW8260C	< 0.0100				-				10/2/2012 741h
MB VOC 100212A	Ethyl ether	mg/L	SW8260C	< 0.0100				-				10/2/2012 741h
MB VOC 100212A	Ethyl methacrylate	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Ethylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Hexachlorobutadiene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Iodomethane	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	Isobutyl alcohol	mg/L	SW8260C	< 0.100				-				10/2/2012 741h
MB VOC 100212A	Isopropyl acetate	mg/L	SW8260C	< 0.0100				-				10/2/2012 741h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: MSVOA
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB VOC 100212A	Isopropyl alcohol	mg/L	SW8260C	< 0.0400				-				10/2/2012 741h
MB VOC 100212A	Isopropylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	m,p-Xylene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Methacrylonitrile	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	Methyl Acetate	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	Methyl methacrylate	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	Methyl tert-butyl ether	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Methylcyclohexane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Methylene chloride	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	n-Amyl acetate	mg/L	SW8260C	< 0.0100				-				10/2/2012 741h
MB VOC 100212A	Naphthalene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	n-Butyl alcohol	mg/L	SW8260C	< 0.100				-				10/2/2012 741h
MB VOC 100212A	n-Butylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	n-Hexane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	n-Octane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	n-Propylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	o-Xylene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Pentachloroethane	mg/L	SW8260C	< 0.00500				-				10/2/2012 741h
MB VOC 100212A	Propionitrile	mg/L	SW8260C	< 0.0250				-				10/2/2012 741h
MB VOC 100212A	Propyl acetate	mg/L	SW8260C	< 0.0100				-				10/2/2012 741h
MB VOC 100212A	sec-Butylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Styrene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	tert-Butyl alcohol	mg/L	SW8260C	< 0.0200				-				10/2/2012 741h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: MSVOA
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB VOC 100212A	tert-Butylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Tetrachloroethene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Tetrahydrofuran	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Toluene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	TPH C11-C15 (DRO)	mg/L	SW8260C	< 0.0200				-				10/2/2012 741h
MB VOC 100212A	TPH C6-C10 (GRO)	mg/L	SW8260C	< 0.0200				-				10/2/2012 741h
MB VOC 100212A	trans-1,2-Dichloroethene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	trans-1,3-Dichloropropene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	trans-1,4-Dichloro-2-butene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Trichloroethene	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Trichlorofluoromethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Vinyl acetate	mg/L	SW8260C	< 0.0100				-				10/2/2012 741h
MB VOC 100212A	Vinyl chloride	mg/L	SW8260C	< 0.00100				-				10/2/2012 741h
MB VOC 100212A	Xylenes, Total	mg/L	SW8260C	< 0.00200				-				10/2/2012 741h
MB VOC 100212A	Surr: 1,2-Dichloroethane-d4	%REC	SW8260C	0.0620	0.05000		124	76-138				10/2/2012 741h
MB VOC 100212A	Surr: 4-Bromofluorobenzene	%REC	SW8260C	0.0557	0.05000		111	77-121				10/2/2012 741h
MB VOC 100212A	Surr: Dibromofluoromethane	%REC	SW8260C	0.0559	0.05000		112	67-128				10/2/2012 741h
MB VOC 100212A	Surr: Toluene-d8	%REC	SW8260C	0.0496	0.05000		99.2	81-135				10/2/2012 741h
MB-SPLP-21377	1,1,1,2-Tetrachloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,1,1-Trichloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,1,2,2-Tetrachloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,1,2-Trichloro-1,2,2-trifluoroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: MSVOA
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB-SPLP-21377	1,1,2-Trichloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,1-Dichloropropene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,1-Dichloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,1-Dichloroethene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,2,3-Trichlorobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,2,3-Trichloropropane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,2,3-Trimethylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,2,4-Trichlorobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,2,4-Trimethylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,2-Dibromo-3-chloropropane	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	1,2-Dibromoethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,2-Dichlorobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,2-Dichloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,2-Dichloropropane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,3,5-Trimethylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,3-Dichlorobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,3-Dichloropropane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,4-Dichlorobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	1,4-Dioxane	mg/L	SW8260C	< 0.0500				-				10/2/2012 1051h
MB-SPLP-21377	2,2-Dichloropropane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	2-Butanone	mg/L	SW8260C	< 0.0100				-				10/2/2012 1051h
MB-SPLP-21377	2-Chloroethyl vinyl ether	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	2-Chlorotoluene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: MSVOA
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB-SPLP-21377	2-Hexanone	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	2-Nitropropane	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	4-Chlorotoluene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	4-Isopropyltoluene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	4-Methyl-2-pentanone	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	Acetone	mg/L	SW8260C	< 0.0100				-				10/2/2012 1051h
MB-SPLP-21377	Acetonitrile	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	Acrolein	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	Acrylonitrile	mg/L	SW8260C	< 0.0100				-				10/2/2012 1051h
MB-SPLP-21377	Allyl chloride	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	Benzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Benzyl chloride	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	Bis(2-chloroisopropyl) ether	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	Bromobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Bromochloromethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Bromodichloromethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Bromoform	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Bromomethane	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	Butyl acetate	mg/L	SW8260C	< 0.0100				-				10/2/2012 1051h
MB-SPLP-21377	Carbon disulfide	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Carbon tetrachloride	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Chlorobenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Chloroethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: MSVOA
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB-SPLP-21377	Chloroform	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Chloromethane	mg/L	SW8260C	< 0.00300				-				10/2/2012 1051h
MB-SPLP-21377	Chloroprene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	cis-1,2-Dichloroethene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	cis-1,3-Dichloropropene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Cyclohexane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Cyclohexanone	mg/L	SW8260C	< 0.0500				-				10/2/2012 1051h
MB-SPLP-21377	Dibromochloromethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Dibromomethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Dichlorodifluoromethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Ethyl acetate	mg/L	SW8260C	< 0.0100				-				10/2/2012 1051h
MB-SPLP-21377	Ethyl ether	mg/L	SW8260C	< 0.0100				-				10/2/2012 1051h
MB-SPLP-21377	Ethyl methacrylate	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Ethylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Hexachlorobutadiene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Iodomethane	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	Isobutyl alcohol	mg/L	SW8260C	< 0.100				-				10/2/2012 1051h
MB-SPLP-21377	Isopropyl acetate	mg/L	SW8260C	< 0.0100				-				10/2/2012 1051h
MB-SPLP-21377	Isopropyl alcohol	mg/L	SW8260C	< 0.0400				-				10/2/2012 1051h
MB-SPLP-21377	Isopropylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	m,p-Xylene	mg/L	SW8260C	0.00781				-				10/2/2012 1051h
MB-SPLP-21377	Methacrylonitrile	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	Methyl Acetate	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: MSVOA
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB-SPLP-21377	Methyl methacrylate	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	Methyl tert-butyl ether	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Methylcyclohexane	mg/L	SW8260C	0.00434				-				10/2/2012 1051h
MB-SPLP-21377	Methylene chloride	mg/L	SW8260C	0.00365				-				10/2/2012 1051h
MB-SPLP-21377	n-Amyl acetate	mg/L	SW8260C	< 0.0100				-				10/2/2012 1051h
MB-SPLP-21377	Naphthalene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	n-Butyl alcohol	mg/L	SW8260C	< 0.100				-				10/2/2012 1051h
MB-SPLP-21377	n-Butylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	n-Hexane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	n-Octane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	n-Propylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	o-Xylene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Pentachloroethane	mg/L	SW8260C	< 0.00500				-				10/2/2012 1051h
MB-SPLP-21377	Propionitrile	mg/L	SW8260C	< 0.0250				-				10/2/2012 1051h
MB-SPLP-21377	Propyl acetate	mg/L	SW8260C	< 0.0100				-				10/2/2012 1051h
MB-SPLP-21377	sec-Butylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Styrene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	tert-Butyl alcohol	mg/L	SW8260C	< 0.0200				-				10/2/2012 1051h
MB-SPLP-21377	tert-Butylbenzene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Tetrachloroethene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Tetrahydrofuran	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Toluene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	TPH C11-C15 (DRO)	mg/L	SW8260C	< 0.0200				-				10/2/2012 1051h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: MSVOA
QC Type: MBLK

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
MB-SPLP-21377	TPH C6-C10 (GRO)	mg/L	SW8260C	< 0.0200				-				10/2/2012 1051h
MB-SPLP-21377	trans-1,2-Dichloroethene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	trans-1,3-Dichloropropene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	trans-1,4-Dichloro-2-butene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Trichloroethene	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Trichlorofluoromethane	mg/L	SW8260C	< 0.00200				-				10/2/2012 1051h
MB-SPLP-21377	Vinyl acetate	mg/L	SW8260C	< 0.0100				-				10/2/2012 1051h
MB-SPLP-21377	Vinyl chloride	mg/L	SW8260C	< 0.00100				-				10/2/2012 1051h
MB-SPLP-21377	Xylenes, Total	mg/L	SW8260C	0.00915				-				10/2/2012 1051h
MB-SPLP-21377	Surr: 1,2-Dichloroethane-d4	%REC	SW8260C	0.0636	0.05000		127	76-138				10/2/2012 1051h
MB-SPLP-21377	Surr: 4-Bromofluorobenzene	%REC	SW8260C	0.0561	0.05000		112	77-121				10/2/2012 1051h
MB-SPLP-21377	Surr: Dibromofluoromethane	%REC	SW8260C	0.0577	0.05000		115	67-128				10/2/2012 1051h
MB-SPLP-21377	Surr: Toluene-d8	%REC	SW8260C	0.0504	0.05000		101	81-135				10/2/2012 1051h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: MSVOA
QC Type: MS

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
1209495-035AMS	1,1,1-Trichloroethane	mg/L	SW8260C	4.90	4.000	0	122	67-147				10/2/2012 819h
1209495-035AMS	1,1-Dichloroethene	mg/L	SW8260C	4.63	4.000	0	116	51-152				10/2/2012 819h
1209495-035AMS	1,2-Dichlorobenzene	mg/L	SW8260C	3.86	4.000	0	96.4	70-130				10/2/2012 819h
1209495-035AMS	1,2-Dichloroethane	mg/L	SW8260C	4.77	4.000	0	119	39-162				10/2/2012 819h
1209495-035AMS	1,2-Dichloropropane	mg/L	SW8260C	3.67	4.000	0	91.8	59-135				10/2/2012 819h
1209495-035AMS	Benzene	mg/L	SW8260C	3.89	4.000	0	97.4	66-145				10/2/2012 819h
1209495-035AMS	Chlorobenzene	mg/L	SW8260C	3.84	4.000	0	96.0	63-140				10/2/2012 819h
1209495-035AMS	Chloroform	mg/L	SW8260C	4.52	4.000	0	113	50-146				10/2/2012 819h
1209495-035AMS	Ethylbenzene	mg/L	SW8260C	6.74	4.000	2.744	99.9	69-133				10/2/2012 819h
1209495-035AMS	Isopropylbenzene	mg/L	SW8260C	3.80	4.000	0	95.1	60-147				10/2/2012 819h
1209495-035AMS	Methyl tert-butyl ether	mg/L	SW8260C	5.51	4.000	0	138	37-189				10/2/2012 819h
1209495-035AMS	Methylene chloride	mg/L	SW8260C	4.66	4.000	0	116	30-192				10/2/2012 819h
1209495-035AMS	Naphthalene	mg/L	SW8260C	2.67	4.000	0	66.8	41-131				10/2/2012 819h
1209495-035AMS	Tetrahydrofuran	mg/L	SW8260C	3.34	4.000	0	83.4	43-146				10/2/2012 819h
1209495-035AMS	Toluene	mg/L	SW8260C	3.90	4.000	0	97.6	18-192				10/2/2012 819h
1209495-035AMS	Trichloroethene	mg/L	SW8260C	4.14	4.000	0	103	61-153				10/2/2012 819h
1209495-035AMS	Xylenes, Total	mg/L	SW8260C	21.4	12.00	8.988	103	42-167				10/2/2012 819h
1209495-035AMS	Surr: 1,2-Dichloroethane-d4	%REC	SW8260C	12.2	10.00		122	72-151				10/2/2012 819h
1209495-035AMS	Surr: 4-Bromofluorobenzene	%REC	SW8260C	9.70	10.00		97.0	80-128				10/2/2012 819h
1209495-035AMS	Surr: Dibromofluoromethane	%REC	SW8260C	11.1	10.00		111	80-124				10/2/2012 819h
1209495-035AMS	Surr: Toluene-d8	%REC	SW8260C	9.26	10.00		92.6	77-129				10/2/2012 819h

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QC SUMMARY REPORT

Client: JBR Environmental Consultants, Inc.
Lab Set ID: 1209452
Project: American Oil Sands

Contact: Jon Schulman
Dept: MSVOA
QC Type: MSD

Sample ID	Analyte	Units	Method	Result	Amount Spiked	Original Amount	%REC	Limits	%RPD	RPD Limit	Qual	Date Analyzed
1209495-035AMSD	1,1,1-Trichloroethane	mg/L	SW8260C	5.22	4.000	0	130	67-147	6.37	25		10/2/2012 838h
1209495-035AMSD	1,1-Dichloroethene	mg/L	SW8260C	4.94	4.000	0	123	51-152	6.44	25		10/2/2012 838h
1209495-035AMSD	1,2-Dichlorobenzene	mg/L	SW8260C	3.99	4.000	0	99.6	70-130	3.26	25		10/2/2012 838h
1209495-035AMSD	1,2-Dichloroethane	mg/L	SW8260C	4.89	4.000	0	122	39-162	2.44	25		10/2/2012 838h
1209495-035AMSD	1,2-Dichloropropane	mg/L	SW8260C	3.79	4.000	0	94.8	59-135	3.32	25		10/2/2012 838h
1209495-035AMSD	Benzene	mg/L	SW8260C	4.06	4.000	0	102	66-145	4.27	25		10/2/2012 838h
1209495-035AMSD	Chlorobenzene	mg/L	SW8260C	4.04	4.000	0	101	63-140	4.97	25		10/2/2012 838h
1209495-035AMSD	Chloroform	mg/L	SW8260C	4.63	4.000	0	116	50-146	2.27	25		10/2/2012 838h
1209495-035AMSD	Ethylbenzene	mg/L	SW8260C	7.30	4.000	2.744	114	69-133	8.03	25		10/2/2012 838h
1209495-035AMSD	Isopropylbenzene	mg/L	SW8260C	4.18	4.000	0	105	60-147	9.47	25		10/2/2012 838h
1209495-035AMSD	Methyl tert-butyl ether	mg/L	SW8260C	5.66	4.000	0	141	37-189	2.61	25		10/2/2012 838h
1209495-035AMSD	Methylene chloride	mg/L	SW8260C	4.84	4.000	0	121	30-192	3.87	25		10/2/2012 838h
1209495-035AMSD	Naphthalene	mg/L	SW8260C	2.90	4.000	0	72.5	41-131	8.18	25		10/2/2012 838h
1209495-035AMSD	Tetrahydrofuran	mg/L	SW8260C	3.63	4.000	0	90.7	43-146	8.33	25		10/2/2012 838h
1209495-035AMSD	Toluene	mg/L	SW8260C	4.22	4.000	0	106	18-192	7.93	25		10/2/2012 838h
1209495-035AMSD	Trichloroethene	mg/L	SW8260C	4.34	4.000	0	108	61-153	4.67	25		10/2/2012 838h
1209495-035AMSD	Xylenes, Total	mg/L	SW8260C	22.9	12.00	8.988	116	42-167	6.76	25		10/2/2012 838h
1209495-035AMSD	Surr: 1,2-Dichloroethane-d4	%REC	SW8260C	12.3	10.00		123	72-151				10/2/2012 838h
1209495-035AMSD	Surr: 4-Bromofluorobenzene	%REC	SW8260C	9.97	10.00		99.7	80-128				10/2/2012 838h
1209495-035AMSD	Surr: Dibromofluoromethane	%REC	SW8260C	11.2	10.00		112	80-124				10/2/2012 838h
1209495-035AMSD	Surr: Toluene-d8	%REC	SW8260C	9.67	10.00		96.7	77-129				10/2/2012 838h

American West Analytical Laboratories

REVISED
10/5/12 MH
updated to QC 2.

UL

WORK ORDER Summary

Work Order: 1209452
Page 1 of 3 10/12/2012

Client: JBR Environmental Consultants, Inc.
Client ID: JBR400
Contact: Jon Schulman
Project: American Oil Sands
QC Level: LEVEL II
WO Type: Standard
Comments: All analysis to be performed on the SPLP extract, for samples #1, #3, #5, #7. For samples #2, #4, #6, #8 run on a 1:1. Footnote report, pH received outside of hold. Email 3 people: John Schulman, Linda Matthews, and Will Gibbs.;

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1209452-001A	U-001A	9/25/2012 0945h	9/26/2012 1100h	10/12/2012	Leachate	1312LM-PR	☐	SPLP	1
						1312ZHE-PR	☐	SPLP	
						3005A-SPLP-PR	☐	SPLP	
						3510-TPH-PR	☐	SPLP	
						6010C-SPLP	☑	SPLP	
	SEL Analytes: B CA CR FE LI MG MO K NA SR SN V								
						6020-SPLP	☑	SPLP	
	SEL Analytes: SB AS BA BE CD CU PB MN NI SE AG TL ZN								
						8015-W-TPH(1L)	☑	SPLP	
						8260-W-SPLP	☑	SPLP	
						ALK-W-2320B	☑	SPLP	
	SEL Analytes: ALK								
						CL-W-4500CLE	☐	SPLP	
						HG-SPLP-7470A	☐	SPLP	
						HG-SPLP-PR	☐	SPLP	
						OGB-W-1664A	☐	SPLP	
						OGF-W-1664SGT	☐	SPLP	
						PH-9040C	☐	SPLP	
						SO4-W-4500SO4E	☐	SPLP	
						TDS-W-2540C	☐	SPLP	
						TOC-W-5310B	☐	SPLP	
1209452-002A	U-001B				Solid	COND-S-9050A	☐	df / wc	
						PH-9045D	☐	df / wc	
						SAR-S	☐	df / wc	
						SOIL-PR	☐	df / wc	
1209452-003A	U-002A	9/25/2012 1055h			Leachate	1312LM-PR	☐	SPLP	
						1312ZHE-PR	☐	SPLP	
						3005A-SPLP-PR	☐	SPLP	
						3510-TPH-PR	☐	SPLP	

FOR LABORATORY USE ONLY [fill out on page 1]: %M ☑ RT ☑ CN ☑ TAT ☑ QC ☑ HOK AL HOK DB HOK MH HOK___

WORK ORDER Summary

Client: JBR Environmental Consultants, Inc.

Work Order: **1209452**
Page 2 of 3   10/12/2012

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1209452-003A	U-002A	9/25/2012 1055h	9/26/2012 1100h	10/12/2012	Leachate	6010C-SPLP	☑	SPLP	1
	SEL Analytes: B CA CR FE LI MG MO K NA SR SN V								
						6020-SPLP	☑	SPLP	
	SEL Analytes: SB AS BA BE CD CU PB MN NI SE AG TL ZN								
						8015-W-TPH(1L)	☑	SPLP	
						8260-W-SPLP	☑	SPLP	
						ALK-W-2320B	☑	SPLP	
	SEL Analytes: ALK								
						CL-W-4500CLE	☐	SPLP	
						HG-SPLP-7470A	☐	SPLP	
						HG-SPLP-PR	☐	SPLP	
						OGB-W-1664A	☐	SPLP	
						OGF-W-1664SGT	☐	SPLP	
						PH-9040C	☐	SPLP	
						SO4-W-4500SO4E	☐	SPLP	
						TDS-W-2540C	☐	SPLP	
						TOC-W-5310B	☐	SPLP	
1209452-004A	U-002B				Solid	COND-S-9050A	☐	df / wc	
						PH-9045D	☐	df / wc	
						SAR-S	☐	df / wc	
						SOIL-PR	☐	df / wc	
1209452-005A	U-003A	9/25/2012 1240h			Leachate	1312LM-PR	☐	SPLP	
						1312ZHE-PR	☐	SPLP	
						3005A-SPLP-PR	☐	SPLP	
						3510-TPH-PR	☐	SPLP	
						6010C-SPLP	☑	SPLP	
	SEL Analytes: B CA CR FE LI MG MO K NA SR SN V								
						6020-SPLP	☑	SPLP	
	SEL Analytes: SB AS BA BE CD CU PB MN NI SE AG TL ZN								
						8015-W-TPH(1L)	☑	SPLP	
						8260-W-SPLP	☑	SPLP	
						ALK-W-2320B	☑	SPLP	
	SEL Analytes: ALK								
						CL-W-4500CLE	☐	SPLP	
						HG-SPLP-7470A	☐	SPLP	
						HG-SPLP-PR	☐	SPLP	

FOR L[illegible]ATORY USE ONLY [fill out on page 1]: %M ☐ RT ☐ CN ☐ TAT ☐ QC ☐ HOK_ _ _ _ HOK_ _ _ _ HOK_ _ _ _ HOK_ _ _ _

WORK ORDER Summary

Client: JBR Environmental Consultants, Inc.

Work Order: **1209452**

10/12/2012

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1209452-005A	U-003A	9/25/2012 1240h	9/26/2012 1100h	10/12/2012	Leachate	OGB-W-1664A	☐	SPLP	1
						OGF-W-1664SGT	☐	SPLP	
						PH-9040C	☐	SPLP	
						SO4-W-4500SO4E	☐	SPLP	
						TDS-W-2540C	☐	SPLP	
						TOC-W-5310B	☐	SPLP	
1209452-006A	U-003B				Solid	COND-S-9050A	☐	df / wc	
						PH-9045D	☐	df / wc	
						SAR-S	☐	df / wc	
						SOIL-PR	☐	df / wc	
1209452-007A	U-004A	9/25/2012			Leachate	1312LM-PR	☐	SPLP	
						1312ZHE-PR	☐	SPLP	
						3005A-SPLP-PR	☐	SPLP	
						3510-TPH-PR	☐	SPLP	
						6010C-SPLP	☑	SPLP	
	SEL Analytes: B CA CR FE LI MG MO K NA SR SN V								
						6020-SPLP	☑	SPLP	
	SEL Analytes: SB AS BA BE CD CU PB MN NI SE AG TL ZN								
						8015-W-TPH(1L)	☑	SPLP	
						8260-W-SPLP	☑	SPLP	
						ALK-W-2320B	☑	SPLP	
	SEL Analytes: ALK								
						CL-W-4500CLE	☐	SPLP	
						HG-SPLP-7470A	☐	SPLP	
						HG-SPLP-PR	☐	SPLP	
						OGB-W-1664A	☐	SPLP	
						OGF-W-1664SGT	☐	SPLP	
						PH-9040C	☐	SPLP	
						SO4-W-4500SO4E	☐	SPLP	
						TDS-W-2540C	☐	SPLP	
						TOC-W-5310B	☐	SPLP	
1209452-008A	U-004B				Solid	COND-S-9050A	☐	df / wc	
						PH-9045D	☐	df / wc	
						SAR-S	☐	df / wc	
						SOIL-PR	☐	df / wc	

FOR LABORATORY USE ONLY [fill out on page 1]: %M ☐ RT ☐ CN ☐ TAT ☐ QC ☐ HOK_ _ _ _ HOK_ _ _ _ HOK_ _ _ _ HOK_ _ _ _

JBR

120143 9

AMERICAN WEST ANALYTICAL LABORATORIES
463 West 3600 South
Salt Lake City, Utah 84115
(801) 263-8686
(888) 263-8686
Fax (801) 263-8687
Email:awal@awal-labs.com

CHAIN OF CUSTODY

Lab Sample Set # 1209452

Page ______ of ______

Turn Around Time (Circle One)
1 day 2 day 3 day 4 day 5 day Standard

Client American Oil Sands
Address
City State Zip
Phone 801-277-7888 Fax Jon
Contact Will Gibbs / ~~John~~ Schulman
E-mail wgibbs@Americansandsenergy.com
Project Name
Project Number/P.O.#
Sampler Name R.G. McGinnis 480-239-7700

	Sample ID	Date/Time Collected	Matrix	Number of Containers (Total)	Tests Required: see attached									
*1	U-001A	Sept25 9:45												
2	U-001B	" 9:45												
3	U-002A	" 10:55												
4	U-002B	" 10:55												
5	U-003A	" 12:40												
6	U-003B	" 12:40												
7	U-004A	Sept25												
8	U-004B	Sept25												

QC LEVEL
1 2* 2+
3 3+ 4

COMMENTS

Relinquished By: Signature	Date	Received By: Signature	Date
R.G. McGinnis	Sept25		
PRINT NAME R.G. McGinnis	Time 2:30pm	PRINT NAME	Time
Relinquished By: Signature	Date	Received By: Signature	Date
PRINT NAME	Time	PRINT NAME	Time
Relinquished By: Signature	Date	Received By: Signature	Date
PRINT NAME	Time	PRINT NAME	Time
Relinquished By: Signature	Date	Received By: Signature Elma Hayes	Date 9-26-12
PRINT NAME	Time	PRINT NAME Elma Hayes	Time 1100

Special Instructions:
metals list from previous set:
Ag, As, B, Ba, Be, Cd, Cr, Cu, Fe, Hg, Li, Pb, Mn, Mo, Ni, Sb, Se, Sr, Sn, Tl, V, Zn along with cations.

* per Jon Schulman. 10/5/12 MH

LABORATORY USE ONLY

SAMPLES WERE:
1 Shipped or hand delivered
Notes: Fed X
2 Ambient or Chilled
Notes:
3 Temperature 2.9
4 Received Broken/Leaking (Improperly Sealed)
Y N
Notes:
5 Properly Preserved
Y N
Checked at Bench
Y N
Notes:
6 Received Within Holding Times
Y N
Notes: pH rec. outside of hold.

COC Tape Was:
1 Present on Outer Package
Y N NA
2 Unbroken on Outer Package
Y N NA
3 Present on Sample
Y N NA
4 Unbroken on Sample
Y N NA

Discrepancies Between Sample Labels and COC Record?
Y N
Notes:

Parameters for Tailings Analyses

These are the analyses required for the tailings samples:

1) Use the Synthetic Precipitation Leachate Procedure (SPLP) extraction (EPA Method SW-846 1312)

#1

The leachate must be analyzed for the following:

- Residual solvents used in the bitumen extraction process (the actual, proprietary solvent that you will use or the closest available proxy),
- Benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN),
- Volatile organic compounds (VOCs),
- ~~Hazardous air pollutants (HAPs),~~
- Oil and grease,
- Total petroleum hydrocarbon-diesel range (TPH-DRO),
- Total petroleum hydrocarbon-gasoline range (TPH-GRO),
- Total recoverable petroleum hydrocarbon (TRPH),
- Total organic carbon (TOC),
- Total dissolved solids (TDS),
- pH,
- Metals, and – from previous set (1201439)
- Major ions (Na, Ca, K, Mg, Cl, SO_4, alkalinity).

2) Use either a saturated paste extract or a 1:1 (liquid:solid) extract: the extract should be analyzed for pH, conductivity and SAR.

2

Laboratory minimum detection limits must be equal to or less than Utah ground water standards or other applicable standards to enable meaningful comparisons with the laboratory analytical results. Some of these are for groundwater permitting, others are for air quality permitting, and others are for the engineers.

3) In addition to these chemical characteristics, Mine Engineers need to have physical tests performed. Eldon has a lab he uses in Cheyenne that he uses for these, so please send a five-gallon bucket or two of tailings sample to him. Those tests include the following:

Relative Density (ASTM D253 & D4254)
Direct Shear (ASTM D3080)
Sieve Analysis (ASTM C136 & C117)
Proctored Density

Aggregate-Soil Testing Summary

Inberg-Miller Engineers
350 Parsley Blvd
Cheyenne WY 82001
Ph: 307-635-6827
Fax: 307-635-2713
cheyenne@inberg-miller.com

INBERG-MILLER ENGINEERS
QUALITY SOLUTIONS THROUGH TEAMWORK

Client: Mine Engineers, Inc.
Address: 3901 South Industrial Rd.
Cheyenne, WY 82007

Attention: Eldon Strid

IME Project No: 16484-HM
Project Name: General Testing
Project Location:

Sample Location/ID: American Sands Energy - Utah

IME Sample No: 16484-2
Sampled By: Client
Sample Date:
Date Received in Lab: 12/19/2013
Type of Material:
Source: American Sands Energy - Utah
Sample Description: Light brown fine SAND

Report Date: 1/15/14
Reviewed By: MTJ

Particle Size Analysis
ASTM C117 & C136

Sieve	% Passing	Specification
2 1/2" (63.5mm)		
2" (50.8mm)		
1 1/2" (37.5mm)		
1" (25mm)		
3/4" (19mm)		
1/2" (12.5mm)		
3/8" (9.5mm)		
No. 4 (4.75mm)	100%	
No. 8 (2.36mm)	100%	
No. 16 (1.18mm)	99%	
No. 30 (600μm)	98%	
No. 40 (425μm)		
No. 50 (300μm)	87%	
No. 100 (150μm)	21%	
No. 200 (75μm)	9.6%	
0.020 mm (20μm)		

Atterberg Limits
ASTM D4318

Test	Result	Specification
Liquid Limit (%)		
Plastic Limit (%)		
Plasticity Index (%)		

Remarks:

Other Testing

Test	Result	Specifications /Notes	ASTM
Fineness Modulus:	0.95		C136
Moisture Content (%):	0.1%	(from sieve sample)	D2216
Relative Density (pcf)			D4254
Minimum Density	89.3		
Maximum Density	94.7		
Angle of Repose			
Moisture Content (%)			
0%	26.5°		
4%	33.8°		
6%	37.7°		
Specific Gravity	Fine /	Coarse	
Absorption %			C128/C127
Bulk (Dry)			C128/C127
Bulk (SSD)			C128/C127
Apparent			C128/C127

#1 Drill Hole ASEC - Nov. 2013 - Summary Log - from Himes Drilling Daily Reports - Crew/Brad Himes

Date	Summary Activities
20-11-2013	Loaded about 6500 gallons of water from town of Sunnyside hydrant, moved equipment to top of Bruin Point/verified drill hole location
21-11-2013	Drilled 9 7/8 inch diameter hole - 20'/set 7 inch diameter surface casing with 8 bags of bentonite seal/bed rock at 5'
	Drilled 6 inch diameter hole -300' (20-320') no noticeable water from 0-320'
22-11-2013	Drilled 6 inch diameter hole - 100' (320-420') required water/foam injection for drilling, hole wet at 400'@2 gpm - left site early because of cold/snow/wind, had to get fuel treatment-4'high drifts/had to chained up to get down off Bruin Point.
23-11-2013	No drilling as to cold/snow - had to have dozer clear road to rig and had to treat diesel fuel
24-11-2013	Drilled 6 inch diameter hole - 400' (420-820'), started coring 3x5 diameter hole - 20' (820-840') added foam for drilling, no more noticeable water, no noticeable gas
25-11-2013	Coring 3x5 inch diameter - 115' (840-955'), no more noticeable water, no noticeable gas
26-11-2013	Coring 3x5 inch diameter - 80' (955-1035'), total cored - 215'
	Started plugging hole with 3/4 hole plug- bentonite
27-11-2013	Completed plugging hole with 3/4 hole plug - 4 super sacks- up to within 6' of surface and then plugged the last 6' with 6 bags of concrete

Ø 9 7/8" 0 surface
20'
0-20'

9 7/8" diameter hole with 20' of 7" Ø surface casing / with bentonite seal - removed before plugging hole.

#1 Drill Hole ASEC - Nov. 2013
Summary Diagram - hole diameters drilled / core runs / recovery / water at 400'-420' - 2gpm / no noticable gas will drilling / no more noticable water.

Ø 6"

Hole plugged from bottom to within 6' of surface with 3/4 hole plug - bentonite and then Top 6' of hole plugged with 6 bags of Concrete.
4 Super sacks of 3/4 hole plug to plug hole from 1035 to 6'

Scale 1" = 100' Vertical
∴ no scale horizonally just notes on hole diameters used.
Drawn By: J. Strid
Date: 7 January 2014

400'

water @ 400' @ 2gpm by Daily Field Report
420' by Brad's Daily Report

no more water / no noticable gas noted by Brad's daily reports down to 955' & no report on last day - last 80' of core / plugging of hole.

820'

Ø 3X5

3X5 core for 215' core - 11 runs - 46 boxes of core

Run	Location	Recovered	Cored.	R	L	Rec	Cored
1	820-840'	20'	20'	7	935.0-955.0'	20.0'	20.0'
2	840-860'	20'	20'	8	955.0-975.0'	20.0'	20.0'
3	860-880'	19.5'	20'	9	975.0-995.0'	20.0'	20.0'
4	880-899.5'	17.2'	19.5'	10	995.0-1015.0	20.0'	20.0'
5	899.5'-915.0	20.0	20.0	11	1015.0-1035.0	20.0'	20.0'
6	915.0-935.0	20.0	20.0		Total	215.3'	215.0

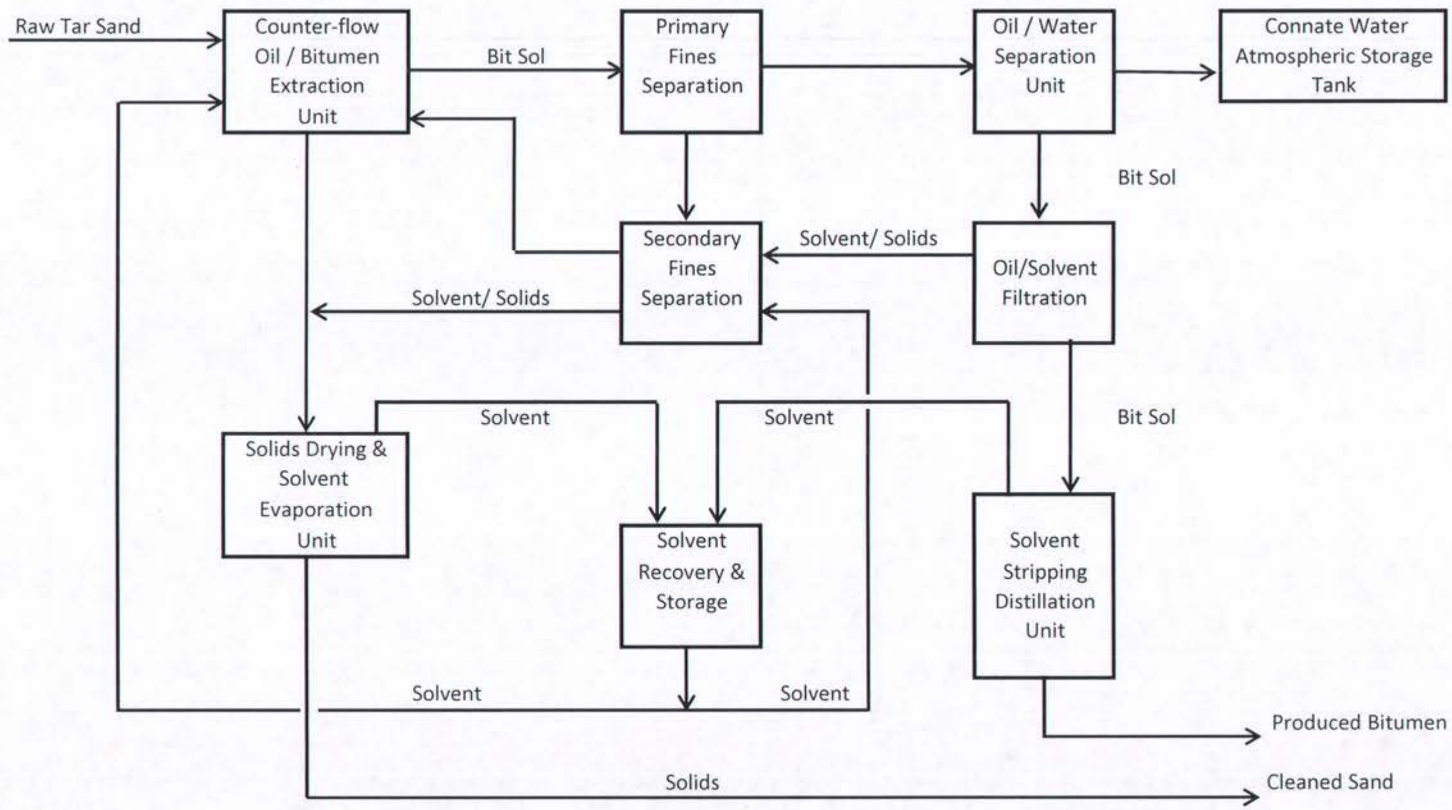
1035'

Coring Photographs

(Photographs on CD in the back of this report:

Appendix G → 2_Drill Hole Data → 3_Core Pictures)

PROCESS FLOW SEQUENCE - PROCESS FOR EXTRACTION OF OIL & BITUMEN FROM TAR SANDS



Production Schedule

Year		12	13	14	15	Closure	Total
Material Type	**Des**						
Mined							
Ore	Fro						1.70
Ore	Fro	3.70	3.70	3.70	3.70		54.20
Sorted Waste	Rer	0.74	0.74	0.74	0.74		10.36
Processed							
Ore Transported to Plant	Aft	2.96	2.96	2.96	2.96		43.44
Tailings	Pro	2.96	2.96	2.96	2.96		43.44
Disposed							
Sorted Waste	Pla						2.21
Sorted Waste	Use						0.55
Sorted Waste	Use		0.12	0.10	0.08	0.14	0.95
Sorted Waste	Hau	0.74	0.62	0.64	0.66		6.58
Tailings	Pla						13.84
Tailings	Hau	2.96	2.96	2.96	2.96		29.60

STATE OF UTAH -- DIVISION OF WATER RIGHTS -- DATA PRINT OUT for 90-15

WATER RIGHT: 90-15 APPLICATION/CLAIM NO.: CERT. NO.:

==
OWNERSHIP***
==

NAME: Magnificent Seven L.L.C.
ADDR: c/o GREG JENSEN
111 E CLARK ST
ALBERTA LEA, MN 56007
INTEREST: 34.5%
REMARKS: a Utah Limited Liability Company

NAME: Penta Creek L.L.C.
ADDR: c/o GREG JENSEN
111 E CLARK ST
ALBERTA LEA, MN 56007
INTEREST: 65.5%
REMARKS: a Utah Limited Liability Company

==
DATES, ETC.***
==

LAND OWNED BY APPLICANT? Yes COUNTY TAX ID#:

FILED:	PRIORITY: / /1880	PUB BEGAN:	PUB ENDED:	NEWSPAPER:	
ProtestEnd:	PROTESTED: [No]	HEARNG HLD:	SE ACTION: [ ]	ActionDate:	PROOF DUE:
EXTENSION:	ELEC/PROOF:[ ]	ELEC/PROOF:	CERT/WUC:	LAP, ETC:	LAPS LETTER:
RUSH LETTR:	RENOVATE:	RECON REQ:	TYPE: [ ]		

PD BOOK: [90-] | MAP: [436] | PUB DATE:

Type of Right: Diligence Claim Source of Info: Proposed Determination Status:

==
LOCATION OF WATER RIGHT***
==

FLOW: 0.1 cfs

SOURCE: Unnamed Spring

COUNTY: Carbon COMMON DESCRIPTION:

POINT OF DIVERSION:
(1)Stockwatering directly on spring located at S 660 ft. W 660 ft. from NE corner, Sec 02, T14S, R14E, SLBM.
COMMENT: Administratively updated by State Engineer.

==
USES OF WATER RIGHT******** ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family
==
SUPPLEMENTAL GROUP NO. 613625.
....
STOCKWATER: 50.0000 Stock Units PERIOD OF USE: 01/01 TO 12/31

==
PLACE OF USE for STOCKWATERING**
==

	NORTH-WEST¼	NORTH-EAST¼	SOUTH-WEST¼	SOUTH-EAST¼
	NW NE SW SE	NW NE SW SE	NW NE SW SE	NW NE SW SE
Sec 02 T 14S R 14E SLBM	* : : : *	* : X: : *	* : : : *	* : : : *

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

STATE OF UTAH -- DIVISION OF WATER RIGHTS -- DATA PRINT OUT for 91-3054

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 02/18/2014 Page 1

WATER RIGHT: 91-3054 APPLICATION/CLAIM NO.: CERT. NO.:

OWNERSHIP

NAME: Hunt Oil Company
ADDR: 1900 North Akard Street
Dallas, TX 75201-2300
INTEREST: 25%%

NAME: Meany Land & Exploration Inc
ADDR: 1660 Lincoln Street, Suite 2515
Denver CO 80264
INTEREST: 75%

DATES, ETC.

LAND OWNED BY APPLICANT? Yes   COUNTY TAX ID#:
FILED: |PRIORITY: / /1869|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [ ]|ActionDate: |PROOF DUE:
EXTENSION: |ELEC/PROOF:[ ]|ELEC/PROOF: |CERT/WUC: 10/28/1970|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]

PD BOOK: [91-5]|MAP: [58]|PUB DATE:

Type of Right: Diligence Claim   Source of Info: Proposed Determination   Status: Water User's Claim

LOCATION OF WATER RIGHT

FLOW:

SOURCE: Range Creek

COUNTY: Carbon   COMMON DESCRIPTION:

POINT OF DIVERSION -- POINT TO POINT:
(1)Stockwatering directly on stream from a point at S 660 ft. E 660 ft. from NW corner, Sec 03, T14S, R14E, SLBM,
to a point at N 660 ft. W 660 ft. from S4 corner, Sec 02, T14S, R14E, SLBM.
COMMENT: Administratively updated by State Engineer.

USES OF WATER RIGHT******** ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family

SUPPLEMENTAL GROUP NO. 615821. Water Rights Appurtenant to the following use(s):
91-98(CERT),298(DIL),1635(DIL),1640(DIL),2245(WUC),2655(DIL),3006(WUC),3054(WUC),3169(DIL),3458(DIL),3459(DIL),3464(DIL)
3465(DIL),3519(WUC),3520(WUC),3521(DIL),3523(DIL),3526(DIL),3530(DIL),3532(DIL),3533(DIL),4947(PAC),4948(PAC)

STOCKWATER: Sole Supply: UNEVALUATED ELUs   Group Total: 900.0000   PERIOD OF USE: 01/01 TO 12/31

PLACE OF USE for STOCKWATERING

	NORTH-WEST NW	NE	SW	SE	NORTH-EAST NW	NE	SW	SE	SOUTH-WEST NW	NE	SW	SE	SOUTH-EAST NW	NE	SW	SE
Sec 02 T 14S R 14E SLBM												X				
Sec 03 T 14S R 14E SLBM	X															

E N D O F D A T A

Utah Division of Water Rights

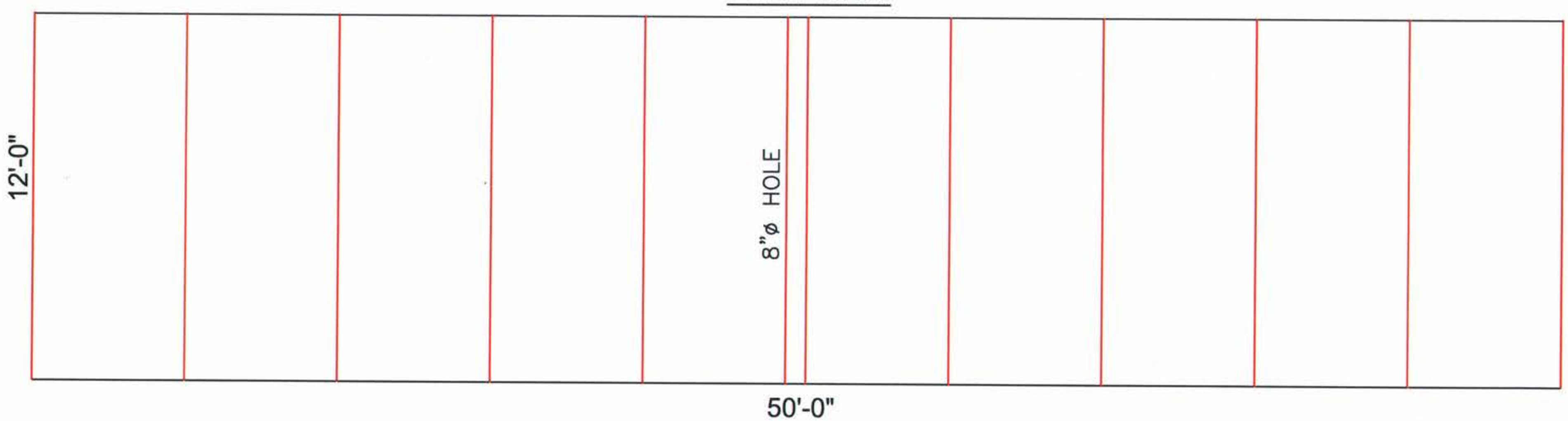
Select Related Information

```
    (WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 02/18/2014    Page 1
CHANGE: t88-91-1          WATER RIGHT: -  CERT. NO.:          COUNTY TAX ID#:      AMENDATORY? No
RIGHT EVIDENCED BY: 91-3054
CHANGES: Point of Diversion [ ], Place of Use [X], Nature of Use [X], Reservoir Storage [ ].
*----------------------------------------------------------------------------------------------------------*

NAME: Amoco Production Company
ADDR: Attn: Roger Marcus
      Amoco Building
      Denver CO 80202
INTEREST: 100%       REMARKS:
*----------------------------------------------------------------------------------------------------------*
FILED:       06/02/1988|PRIORITY:   06/02/1988|ADV BEGAN:          |ADV ENDED:              |NEWSPAPER:
ProtestEnd:            |PROTESTED:  [No      ]|HEARNG HLD:         |SE ACTION: [Approved]|ActionDate:06/03/1988|PROOF DUE:
EXTENSION:             |ELEC/PROOF:[         ]|ELEC/PROOF:         |CERT/WUC:               |LAP, ETC:  11/01/1988|LAPS LETTER:
RUSH LETTR:            |RENOVATE:             |RECON REQ:          |TYPE: [               ]
Status: Expired
***************************************************************  ***************************************************************
***********************H E R E T O F O R E**********************  ***********************H E R E A F T E R*********************
***************************************************************  ***************************************************************

|FLOW:   1.2 acre-feet                                           ||FLOW:   1.0 acre-feet                                                 |
|SOURCE: Stock Pond on Range Creek                               ||SOURCE: Stock Pond on Range Creek                                     |
|COUNTY: Carbon                                                  ||COUNTY: Carbon       COM DESC: 7 miles NE of Sunnyside                 |

|POINT(S) OF DIVERSION ------> MAP VIEWER***GOOGLE VIEW          ||SAME AS HERETOFORE                                                    |
|----------------------------------------------------------------||----------------------------------------------------------------------|
|Point to Point:                                                 ||Point to Point:                                                       |
|................................................................||......................................................................|
|Stockwatering directly on stream from a point in:               ||Stockwatering directly on stream from a point in:                     |
|    NW4NW4 Sec 03, T 14S, R 14E, SLBM                           ||    NW4NW4 Sec 03, T 14S, R 14E, SLBM                                 |
|  to a point in:                                                ||  to a point in:                                                      |
|    SE4SW4 Sec 02, T 14S, R 14E, SLBM                           ||    SE4SW4 Sec 02, T 14S, R 14E, SLBM                                 |
|   Comment:                                                     ||   Comment: Administratively updated by State Engineer.               |
|    Source: Stock Pond on Range Creek                           ||    Source: Stock Pond on Range Creek                                 |
|----------------------------------------------------------------||----------------------------------------------------------------------|

|PLACE OF USE ------>                                            ||CHANGED as follows:                                                   |
|----------------------------------------------------------------||----------------------------------------------------------------------|
|                           --NW¼--  --NE¼--  --SW¼--  --SE¼--   ||                             --NW¼--  --NE¼--  --SW¼--  --SE¼--       |
|                          |N N S S||N N S S||N N S S||N N S S|  ||                            |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|  ||                            |W E W E||W E W E||W E W E||W E W E|     |
|Sec 02 T 14S R 14E SLBM   * : : : ** : : : **X:X:X:X** : : : * ||Sec 02 T 14S R 14E SLBM     * : : : ** : : : ** : : :X** : : : *      |
|                                                                ||Sec 03 T 14S R 14E SLBM     *X: : : ** : : : ** : : : ** : : : *      |

|NATURE OF USE ------>                                           ||CHANGED as follows:                                                   |
|----------------------------------------------------------------||----------------------------------------------------------------------|
|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                          ||SUPPLEMENTAL to Other Water Rights: No                                |
|----------------------------------------------------------------||----------------------------------------------------------------------|
|Historical Uses to be Discontinued during the Implementation    ||                                                                      |
|of this Application:                                            ||                                                                      |
|................................................................||......................................................................|
|STK:     43.0000 ELUs.                     USED 04/15 - 10/31   ||                                                                      |
|................................................................||......................................................................|
|                                                                ||OTH: OIL EXPLORATION:  Exploration Drilling   USED 06/01 - 11/01      |
|                                                                ||                                                                      |
|----------------------------------------------------------------||----------------------------------------------------------------------|

|RESERVOIR STORAGE -->                                           ||SAME AS HERETOFORE                                                    |
|----------------------------------------------------------------||----------------------------------------------------------------------|
|Storage 01/01 to 12/31, in Settling Pond                        ||Storage 06/01 to 11/01, in Stock Pond                                 |
| with a maximum capacity of 0.700 acre-feet, located in:        || with a maximum capacity of 0.700 acre-feet, located in:              |
|                           --NW¼--  --NE¼--  --SW¼--  --SE¼--   ||                             --NW¼--  --NE¼--  --SW¼--  --SE¼--       |
|  Height of Dam:     10 ft |N N S S||N N S S||N N S S||N N S S|  ||  Height of Dam:     10 ft   |N N S S||N N S S||N N S S||N N S S|     |
|  Area Inundat    0.200 acs|W E W E||W E W E||W E W E||W E W E|  ||  Area Inundat    0.200 acs  |W E W E||W E W E||W E W E||W E W E|     |
|Sec 02 T 14S R 14E SLBM   * : : : ** : : : **X:X:X:X** : : : * ||Sec 02 T 14S R 14E SLBM     * : : : ** : : : **X:X:X:X** : : : *      |
|----------------------------------------------------------------||----------------------------------------------------------------------|
|----------------------------------------------------------------||----------------------------------------------------------------------|
|                                                                ||Small Dam Permit Required?: No                                        |

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

FIGURE 1

TYPICAL BURN CUT - ALL REGULAR HEADINGS & X-CUTS
MARCH 2012 SCALE: 1"=5'

PLAN VIEW



1- ⌖ CENTER HOLE - 8" DIAMITER
78- + DRILL HOLES - 2" DIAMITER

FACE VIEW

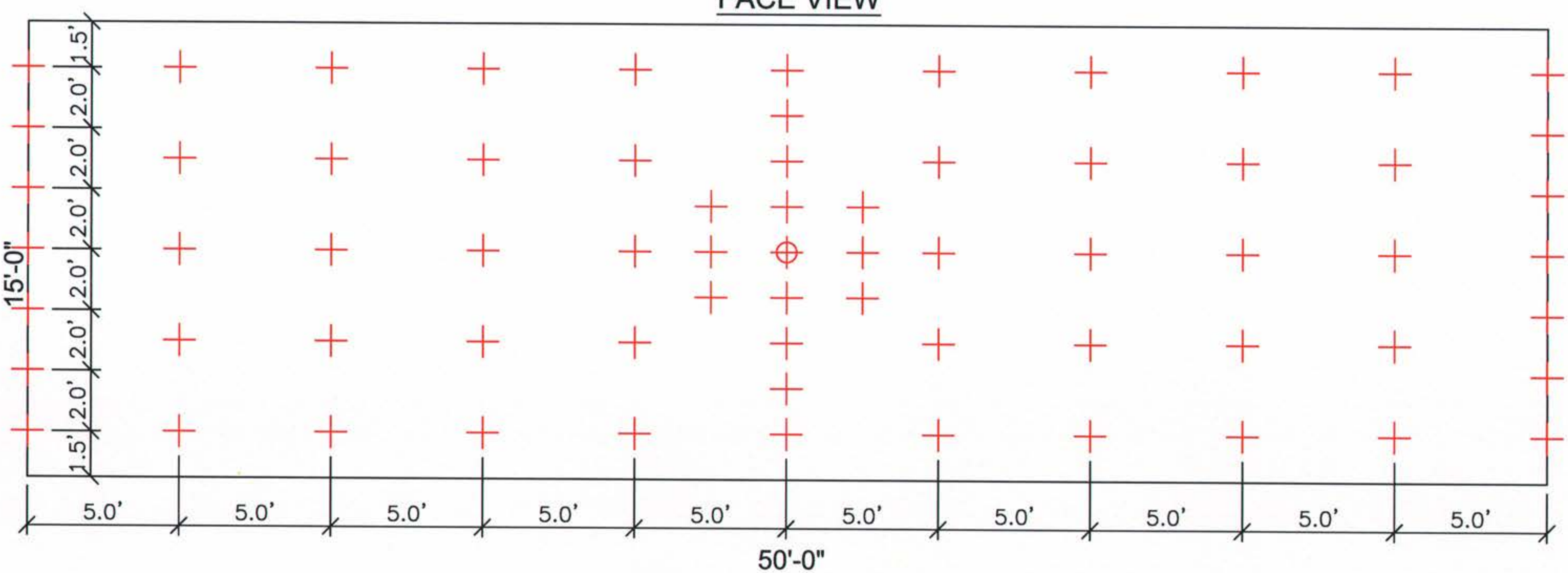


FIGURE 2

TYPICAL BENCH - PLAN VIEW, 45'-0" HIGH BENCH
19 MARCH 2012 SCALE: 1"=6'
ALL HOLES 3" DIAMETER, 72 HOLES / SHOT

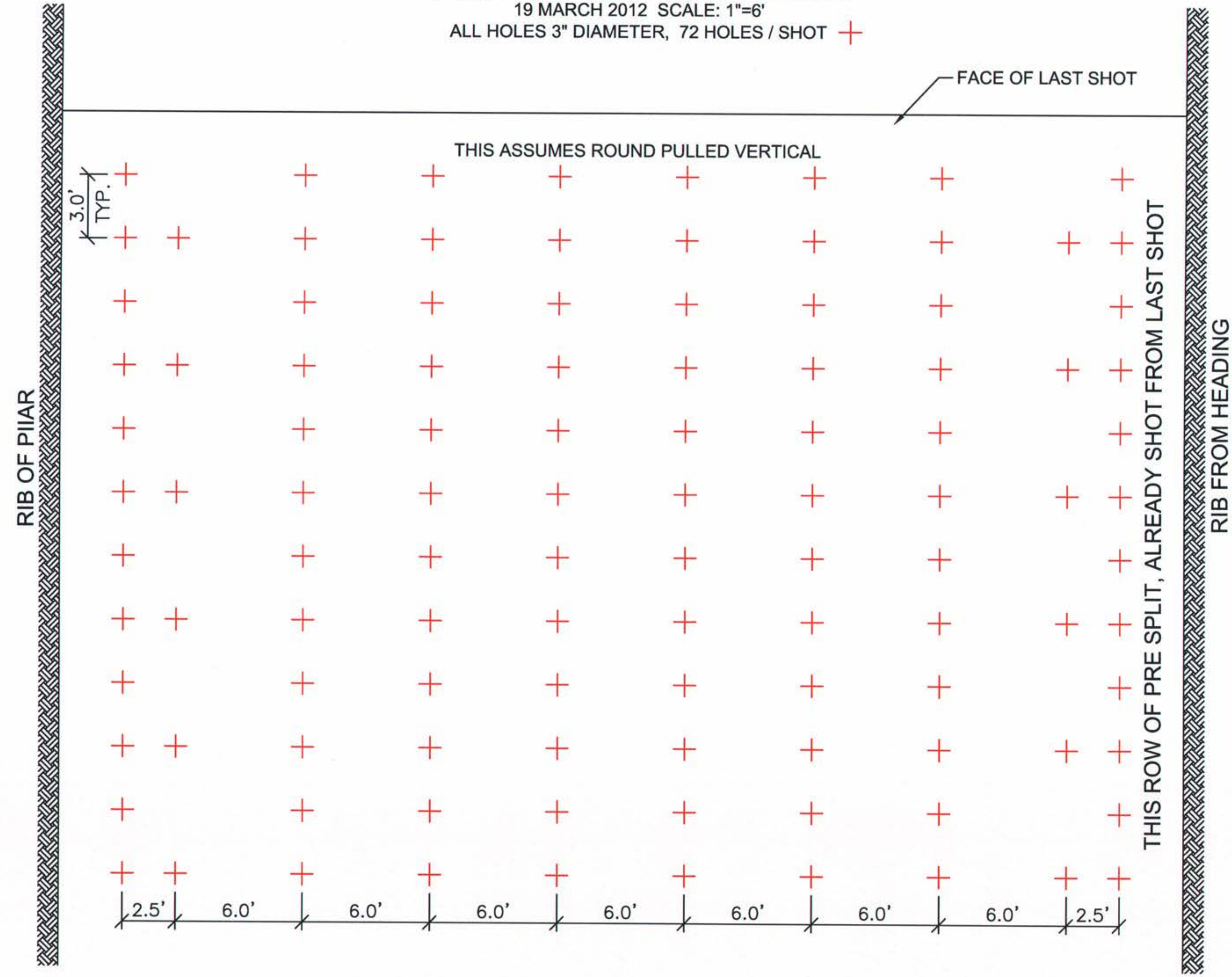
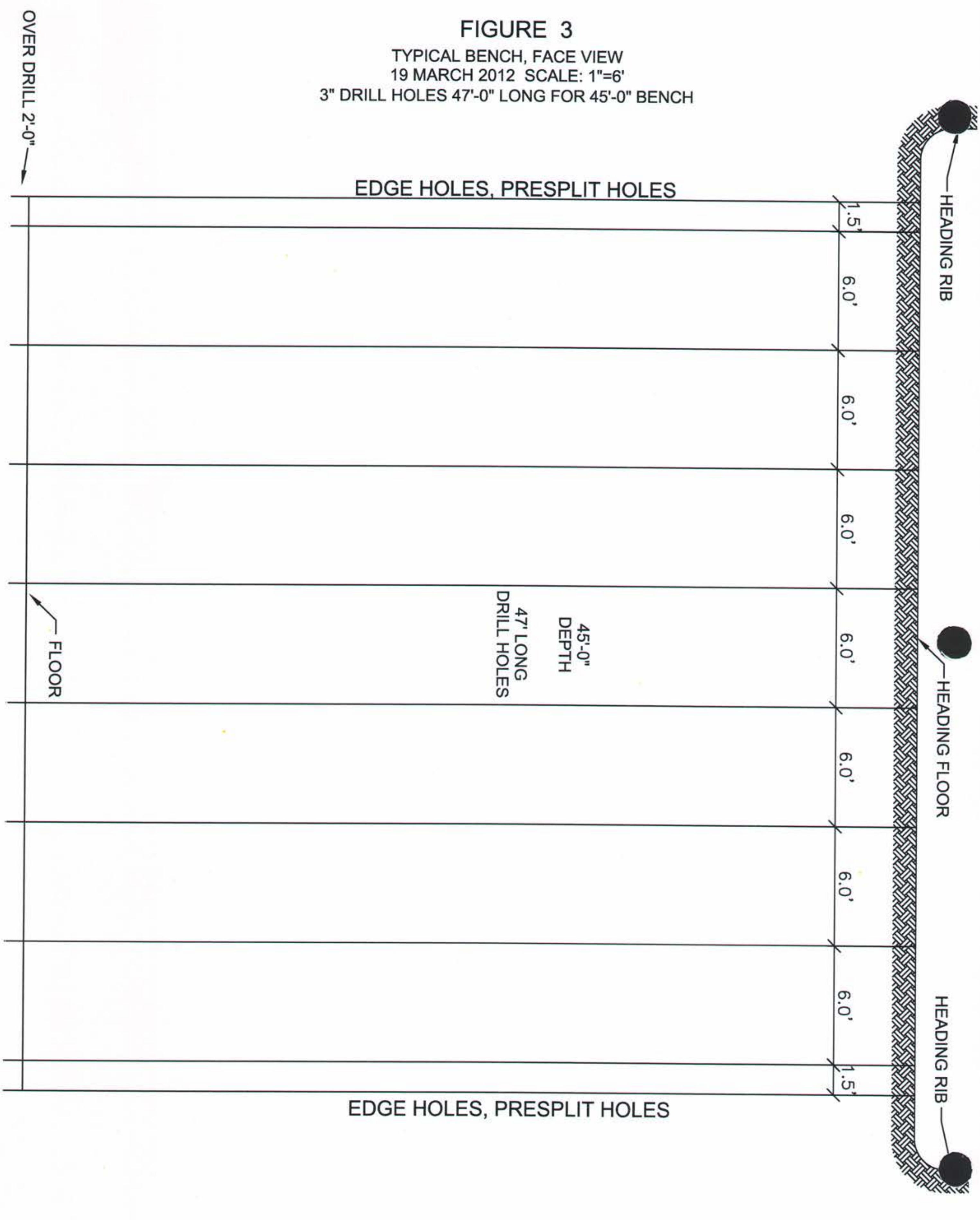
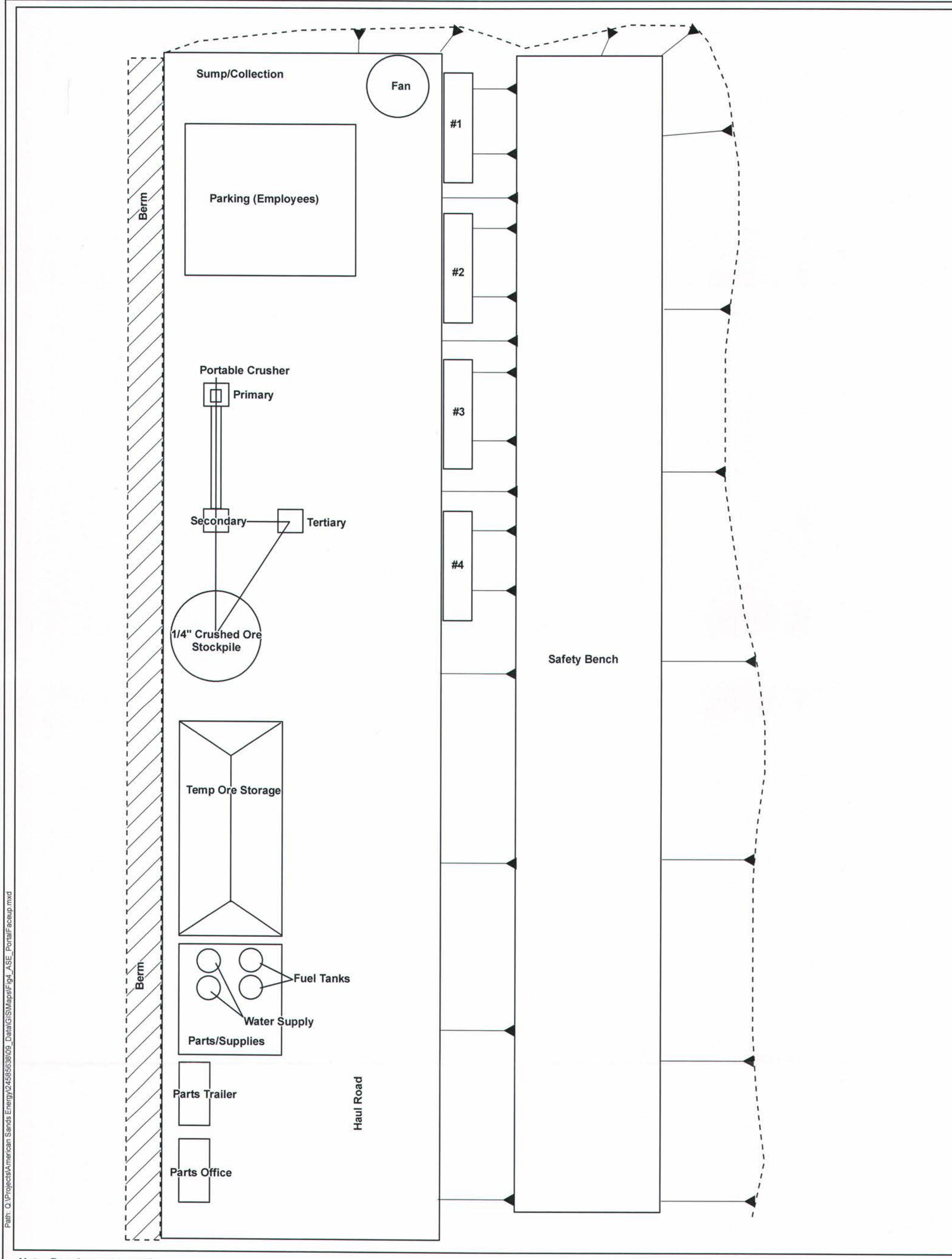


FIGURE 3

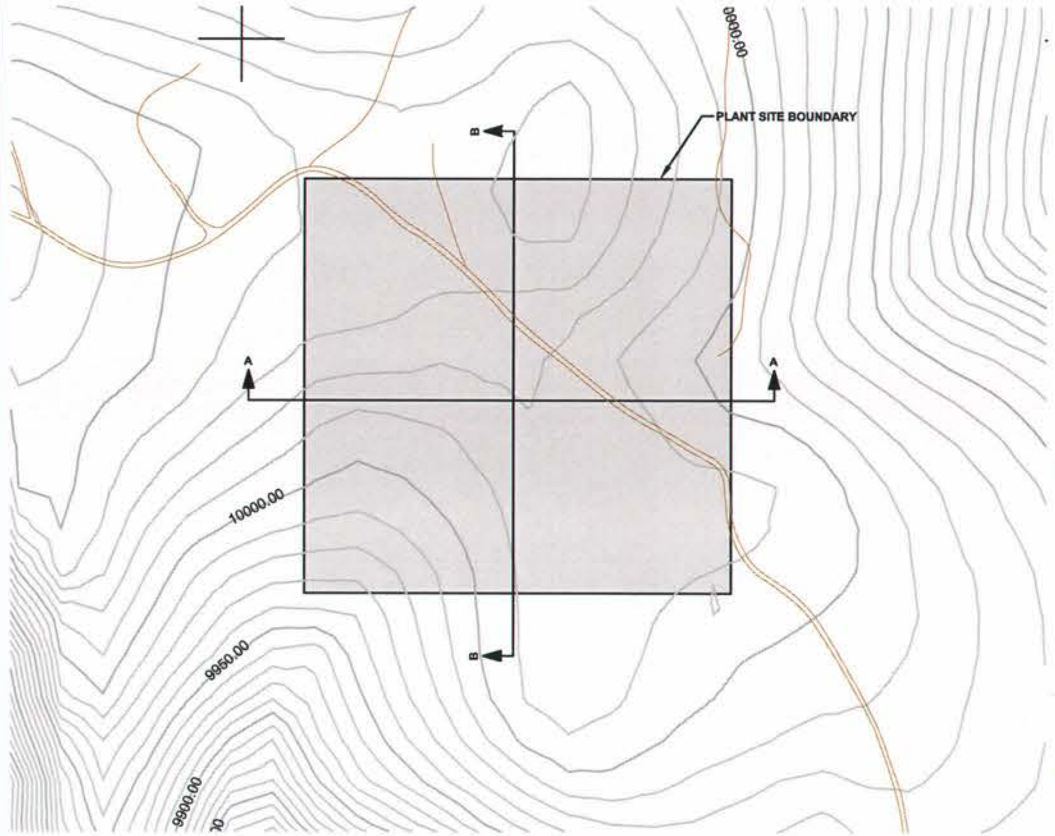
TYPICAL BENCH, FACE VIEW
19 MARCH 2012 SCALE: 1"=6'
3" DRILL HOLES 47'-0" LONG FOR 45'-0" BENCH





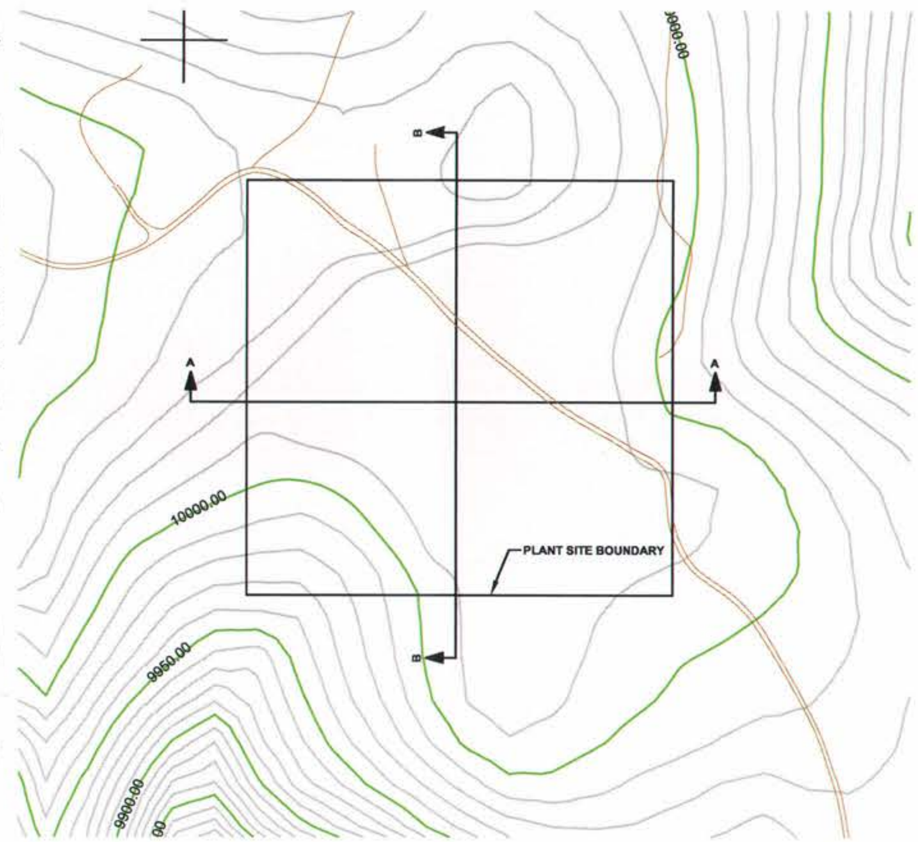
Note: Drawing not to scale.

Title:	Portal Face-up Yr 1	
Bruin Point Mine DOGM Permit Application	Proj No: 24585638	
	Figure: 4	
American Sands Energy Corp	Date: May 2014	
	URS	



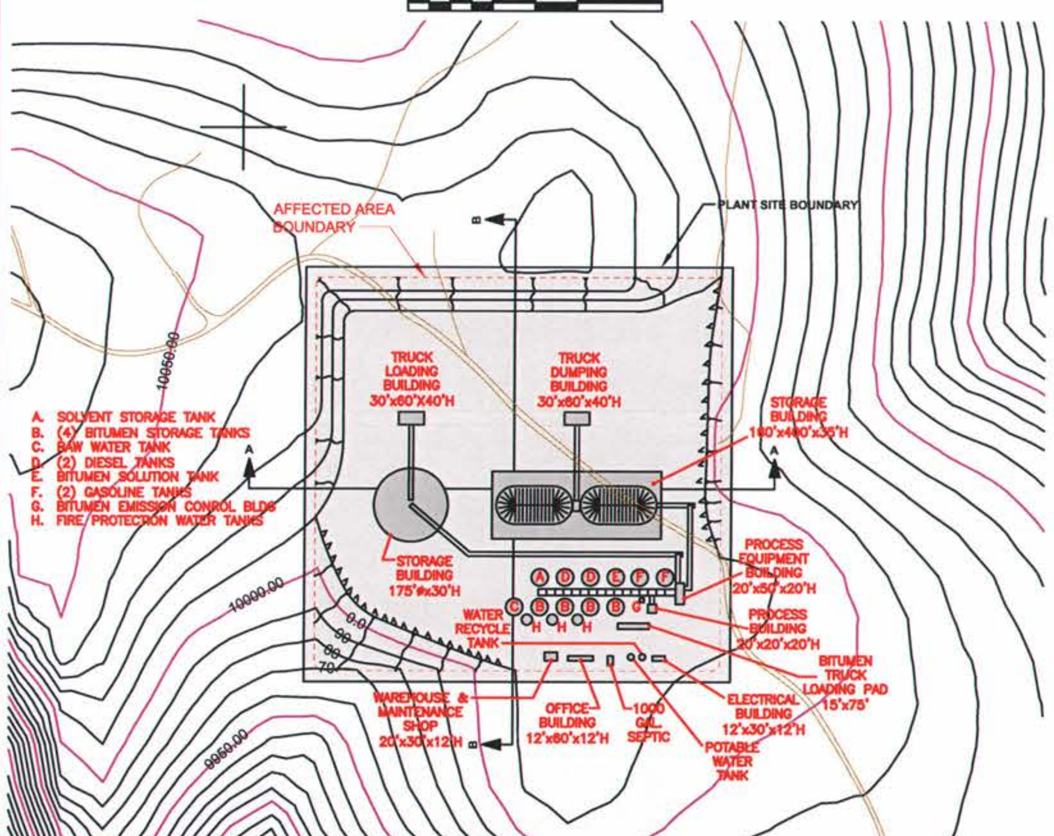
PLANT SITE
PRE-PLANT TOPO

200 FT 0 200 FT 1,000 FT



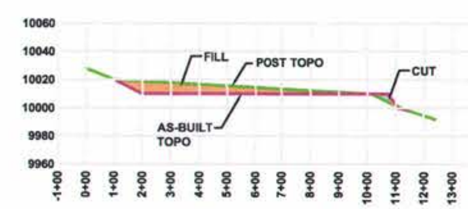
PLANT SITE
POST TOPO

200 FT 0 200 FT 1,000 FT



PLANT SITE
AS-BUILT TOPO

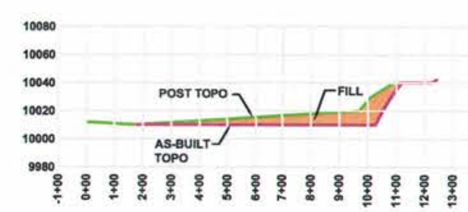
200 FT 0 200 FT 1,000 FT



SECTION A-A
POST - PLANT SITE TOPOGRAPHY

300 FT 0 300 FT 600 FT

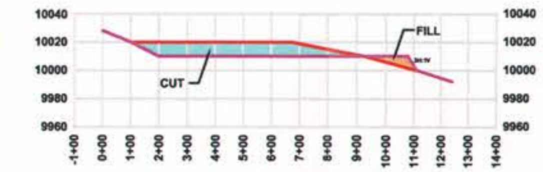
2H:1V MAXIMUM



SECTION B-B
POST - PLANT SITE TOPOGRAPHY

300 FT 0 300 FT 600 FT

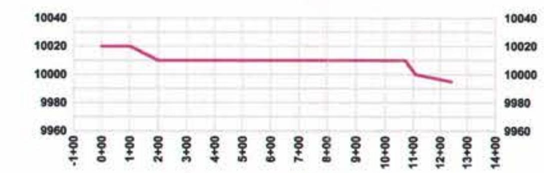
2H:1V MAXIMUM



SECTION A-A
PRE - PLANT SITE TOPOGRAPHY

300 FT 0 300 FT 600 FT

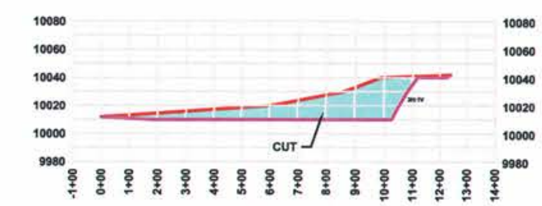
2H:1V MAXIMUM



SECTION A-A
AS-BUILT SITE TOPOGRAPHY

300 FT 0 300 FT 600 FT

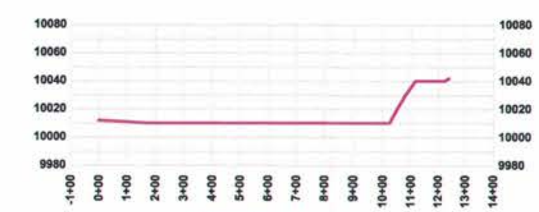
2H:1V MAXIMUM



SECTION B-B
PRE - PLANT SITE TOPOGRAPHY

300 FT 0 300 FT 600 FT

2H:1V MAXIMUM



SECTION B-B
AS-BUILT SITE TOPOGRAPHY

300 FT 0 300 FT 600 FT

2H:1V MAXIMUM

LEGEND

- EXISTING ROADS
- CONTAINMENT BERM
- AFFECTED AREA BOUNDARY
- MAJOR CONTOUR SPACING 50 FT

COORDINATE SYSTEM:

UT83-CF
UTAH STATE PLANES: NAD 83 DATUM,
CENTRAL ZONE, US FOOT.

SCALE ACCURATE WHEN PRINTED AT 24"x36"

No.	REVISION	DATE	BY	CHKD
5	SHOW FIRE WATER TANKS	01/30/15	J&L	EDS
4	UPDATED LEGEND / POST MAP	01/09/15	J&L	EDS
3	LABEL CORRECTIONS	12/23/14	J&L	EDS
2	ADDED LABELS	12/05/14	J&L	EDS
1	DESIGN	06/06/14	J&L	EDS

American Sands Energy Corp
American Sands Energy Corp.
201 South Main Street
Ste.#1800
Salt Lake City, UT 84111

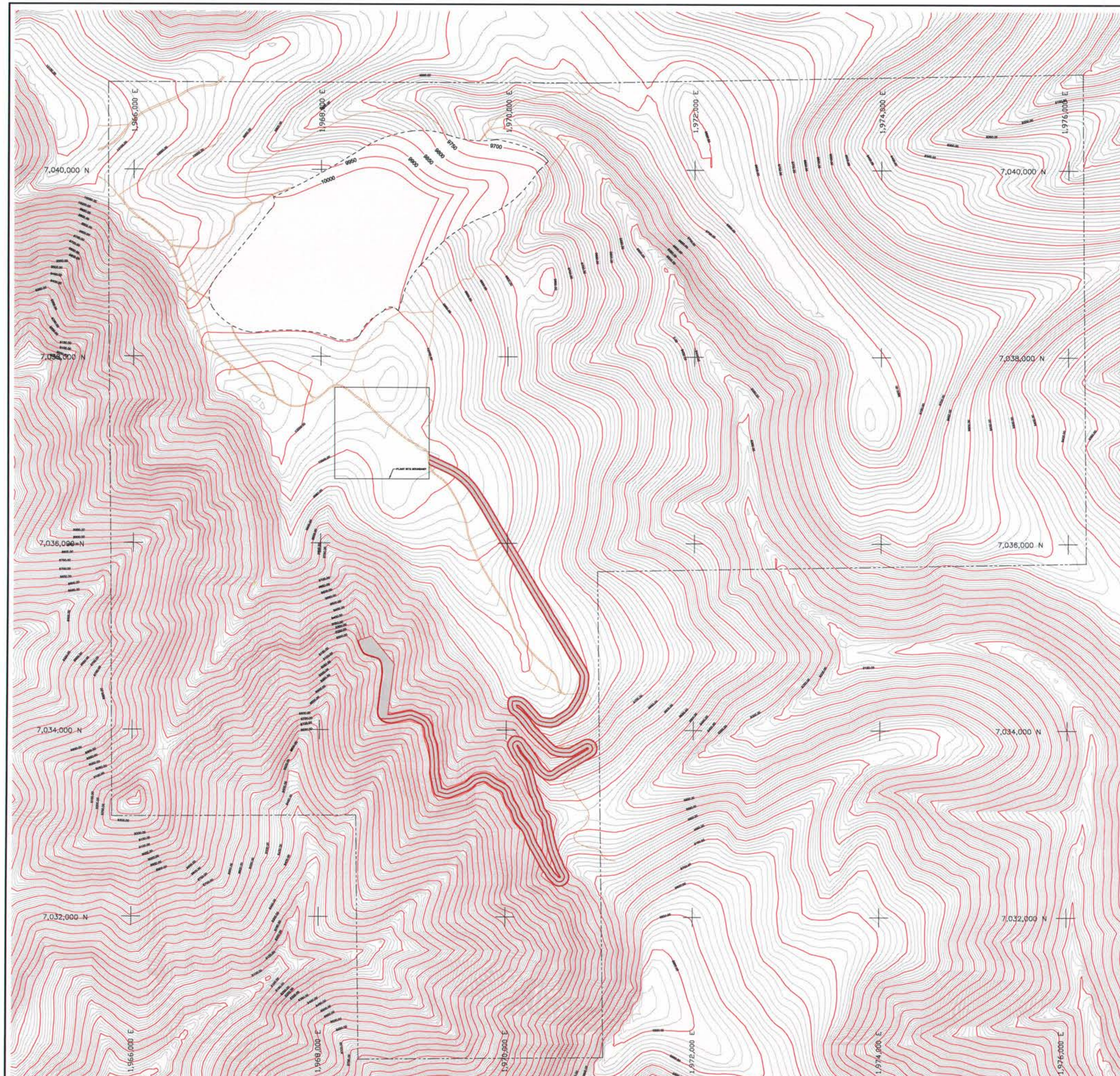
Title:

PLANT SITE–GRADING PLAN

Scale:	Date:	Design By:	Drawn By:	Approved By:
1"=200'	04/04/14	MEI	J&L	

MINE ENGINEERS, INC.
1901 South Industrial Road
Cheyenne, Wyoming 82007 USA
Phone: 307-638-8833 Fax: 307-638-0578

MAP 1



LEGEND

- LAND AFFECTED BOUNDARY
- EXISTING ROADS
- DRY TAILINGS IMPOUNDMENT
- MINE ROAD
- MAJOR CONTOUR SPACING 50 FT

COORDINATE SYSTEM:

UT83-CF
UTAH STATE PLANES: NAD 83 DATUM, CENTRAL ZONE, US FOOT.

N

400 FT 0 400 FT 800 FT

SCALE ACCURATE WHEN PRINTED AT 24"x36"

Professional Certification

No.	REVISION	DATE	BY	CHKD
4	UPDATE TAILINGS STOCKPILE	01/09/15	J&L	EDS
3	FINAL	10/02/14	J&L	EDS
2	GENERAL REVISION	09/02/14	J&L	EDS
1	PRLIMINARY	02/19/14	J&L	EDS

American Sands Energy Corp

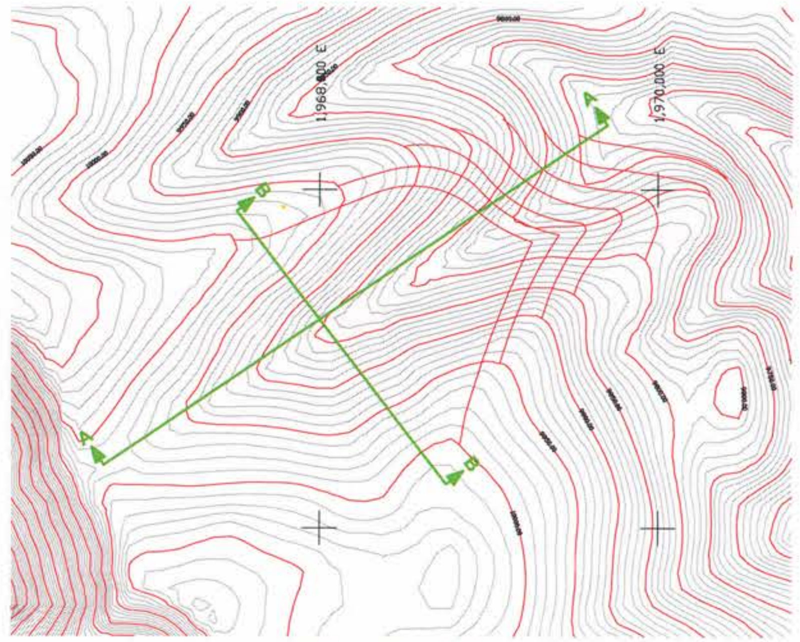
American Sands Energy Corp.
201 South Main Street
Ste.#1800
Salt Lake City, UT 84111

Title: DRY TAILINGS IMPOUNDMENT

Scale:	Date:	Design By:	Drawn By:	Approved By:
1"=400'	02/19/14	MD	J&L	EDS

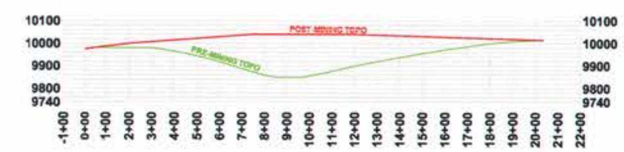
MINE ENGINEERS, INC.

MAP 2



PRE-MINING TOPO

400 FT 0 400 FT 800 FT



SECTION B-B

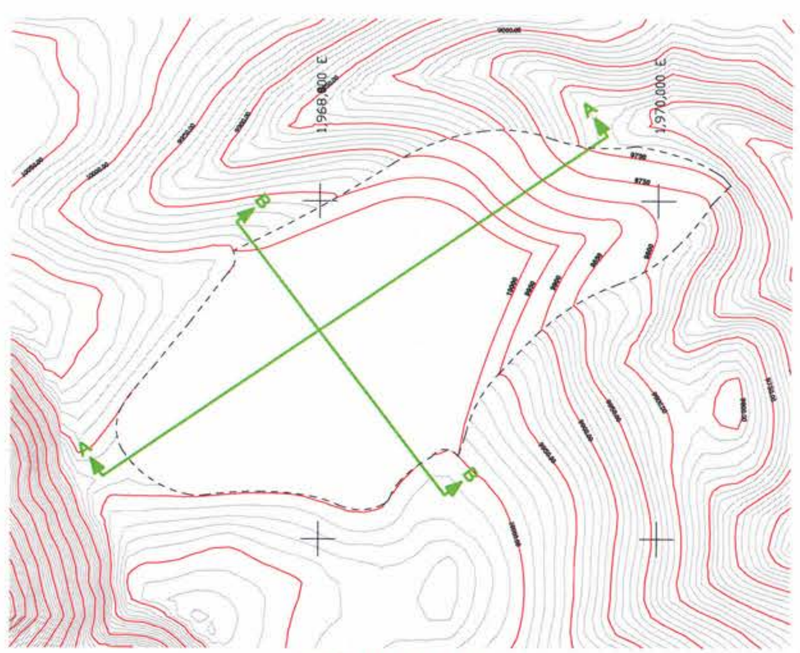
300 FT 0 300 FT 600 FT

2H:1V MAXIMUM

SECTION A-A

300 FT 0 300 FT 600 FT

2H:1V MAXIMUM



POST MINING TOPO

400 FT 0 400 FT 800 FT

LEGEND

EXISTING TRAILS

DRY TAILINGS IMPOUNDMENT

MAJOR CONTOUR SPACING 50 FT

NOTE: Base to be constructed at 4 feet thick and cover to be constructed at 4 feet thick with compacted clay material to specified permeability. Cover system includes 18 inches of topsoil/plant growth medium placed on the clay cover. Reference "Summary of Preliminary HELP Model Results, American Sands Energy - Bruin Point Mine" by URS, September, 2014.

COORDINATE SYSTEM:

UT83-CF
UTAH STATE PLANES: NAD 83 DATUM, CENTRAL ZONE, US FOOT.

N

SCALE ACCURATE WHEN PRINTED AT 24"x36"

Professional Certification

No.	REVISION	DATE	BY	CHKD
5	MODIFIED CONTOURS AND X-SECTIONS	01/27/15	J&L	EDS
4	MINOR GENERAL UPDATES	01/23/15	J&L	EDS
3	FINAL	10/16/14	J&L	EDS
2	MODIFIED X-SECTIONS	09/16/14	J&L	EDS
1	PRLIMINARY	02/19/14	J&L	EDS

American Sands Energy Corp

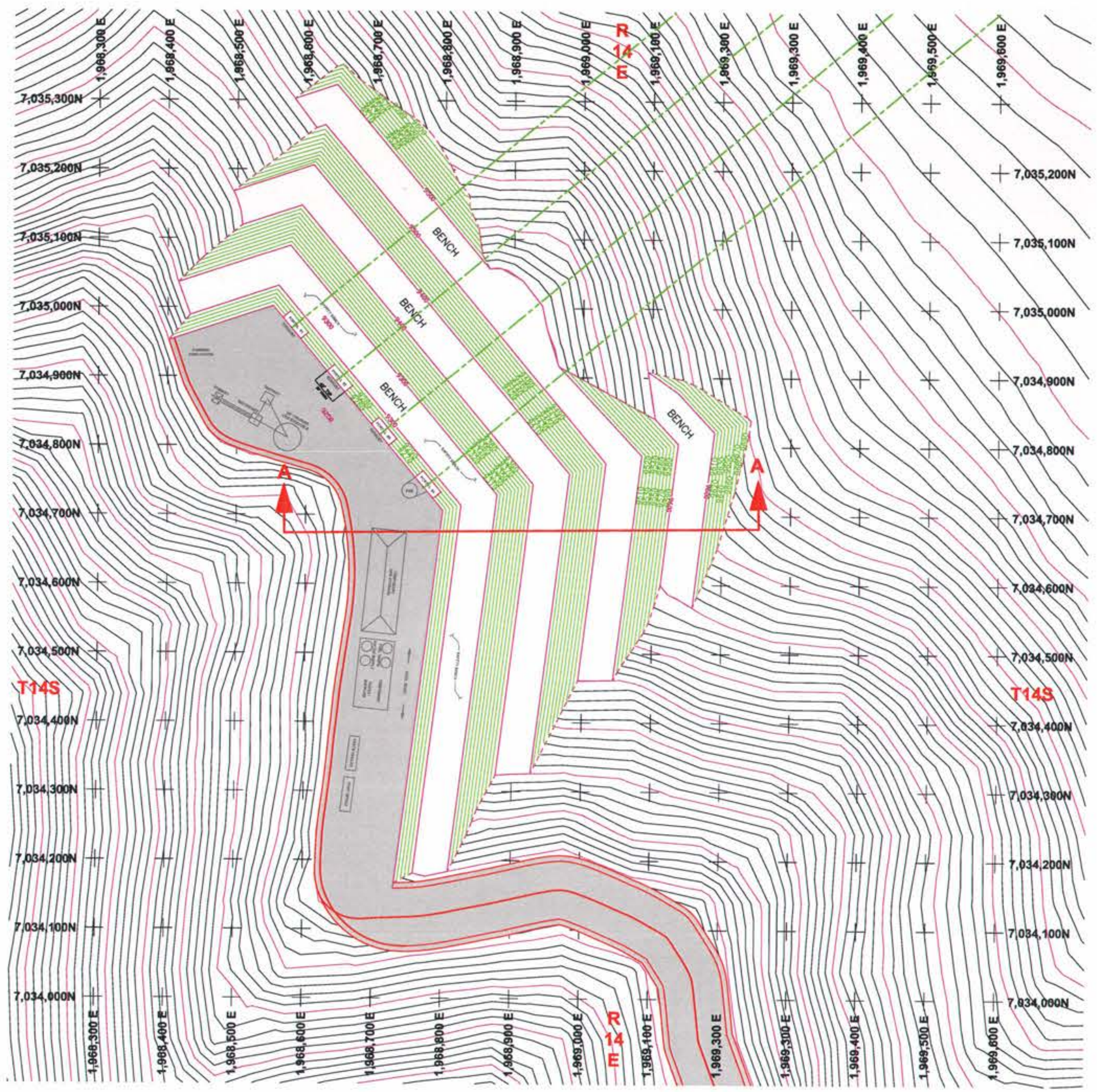
American Sands Energy Corp.
201 South Main Street
Ste.#1800
Salt Lake City, UT 84111

Title: TYPICAL CROSS SECTION DRY TAILINGS IMPOUNDMENT (COVER AND BASE)

Scale:	Date:	Design By:	Drawn By:	Approved By:
1"=400'	02/19/14	MEI	J&L	EDS

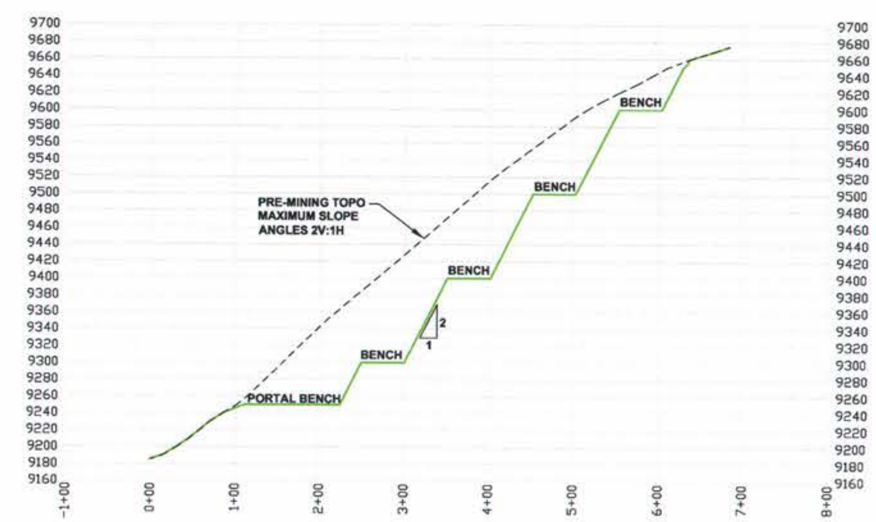
MINE ENGINEERS, INC.

MAP 3



AS-BUILT TOPO

100 FT 0 100 FT 200 FT



SECTION A-A

100 FT 0 100 FT 200 FT

LEGEND

- MINE ROAD
- CUT LINE
- PORTALS
- MAJOR CONTOUR SPACING 50 FT
- CONTOUR SPACING 10 FT

NOTES:
PRELIMINARY FEATURES LAYOUT FOR ENGINEERING AND DESIGN

COORDINATE SYSTEM:

UT83-CF
UTAH STATE PLANES: NAD 83 DATUM, CENTRAL ZONE, US FOOT.

SCALE ACCURATE WHEN PRINTED AT 24"x36"

No.	REVISION	DATE	BY	CHKD
5	GENERAL REVISIONS	01/23/15	J&L	EDS
4	ADDED CONTOURS / SECTION	01/16/15	J&L	EDS
3	ADDED NOTE	12/23/14	J&L	EDS
2	ADDED FEATURES	12/05/14	J&L	EDS
1	DESIGN	09/30/14	J&L	EDS

American Sands Energy Corp

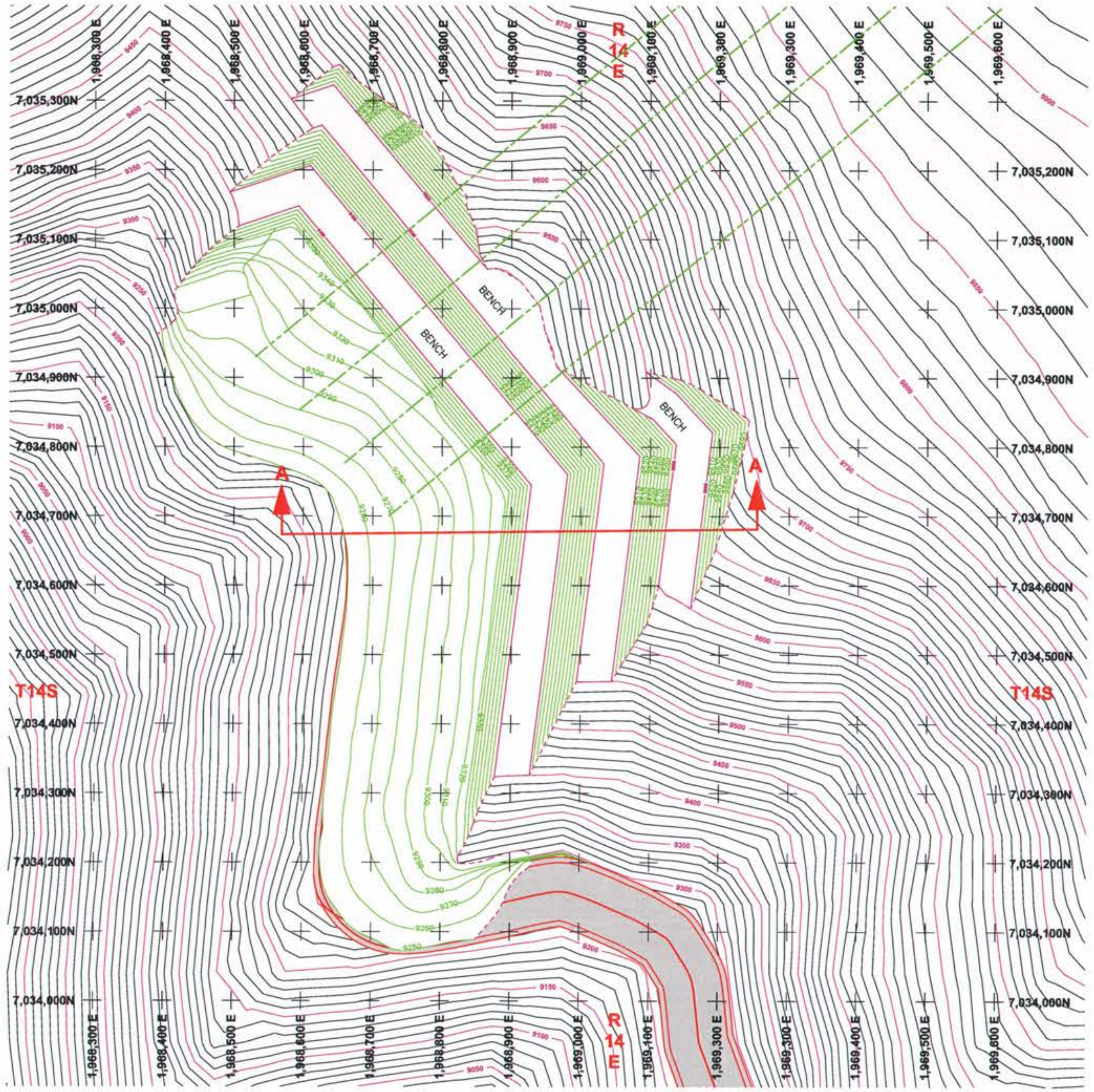
American Sands Energy Corp.
201 South Main Street
Ste.#1800
Salt Lake City, UT 84111

Title:
PORTAL TOPO

Scale:	Date:	Design By:	Drawn By:	Approved By:
1"=100'	09/30/14	MEI	J&L	

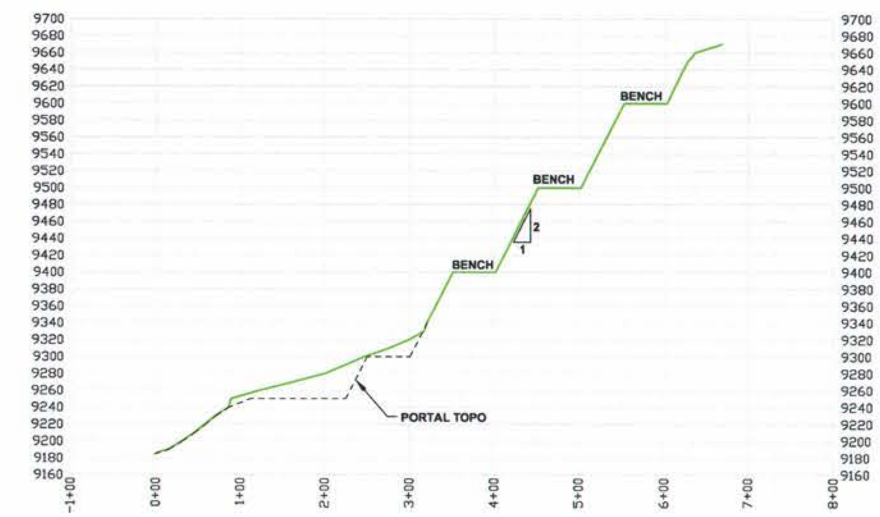
MINE ENGINEERS, INC.

MAP 4



POST-MINING (PORTAL CLOSURE) TOPO

100 FT 0 100 FT 100 FT



SECTION A-A

100 FT 0 100 FT 100 FT

LEGEND

MINE ROAD
CUT LINE
PORTALS
MAJOR CONTOUR SPACING 50 FT
CONTOUR SPACING 10 FT

COORDINATE SYSTEM:

UT83-CF
UTAH STATE PLANES: NAD 83 DATUM, CENTRAL ZONE, US FOOT.

N

SCALE ACCURATE WHEN PRINTED AT 24"x36"

Professional Certification

No.	REVISION	DATE	BY	CHKD
2	INCLUDED CONTOURS / X-SECTION	01/16/15	J&L	EDS
1	FINAL	10/02/14	J&L	EDS

American Sands Energy Corp

American Sands Energy Corp.
201 South Main Street
Ste.#1800
Salt Lake City, UT 84111

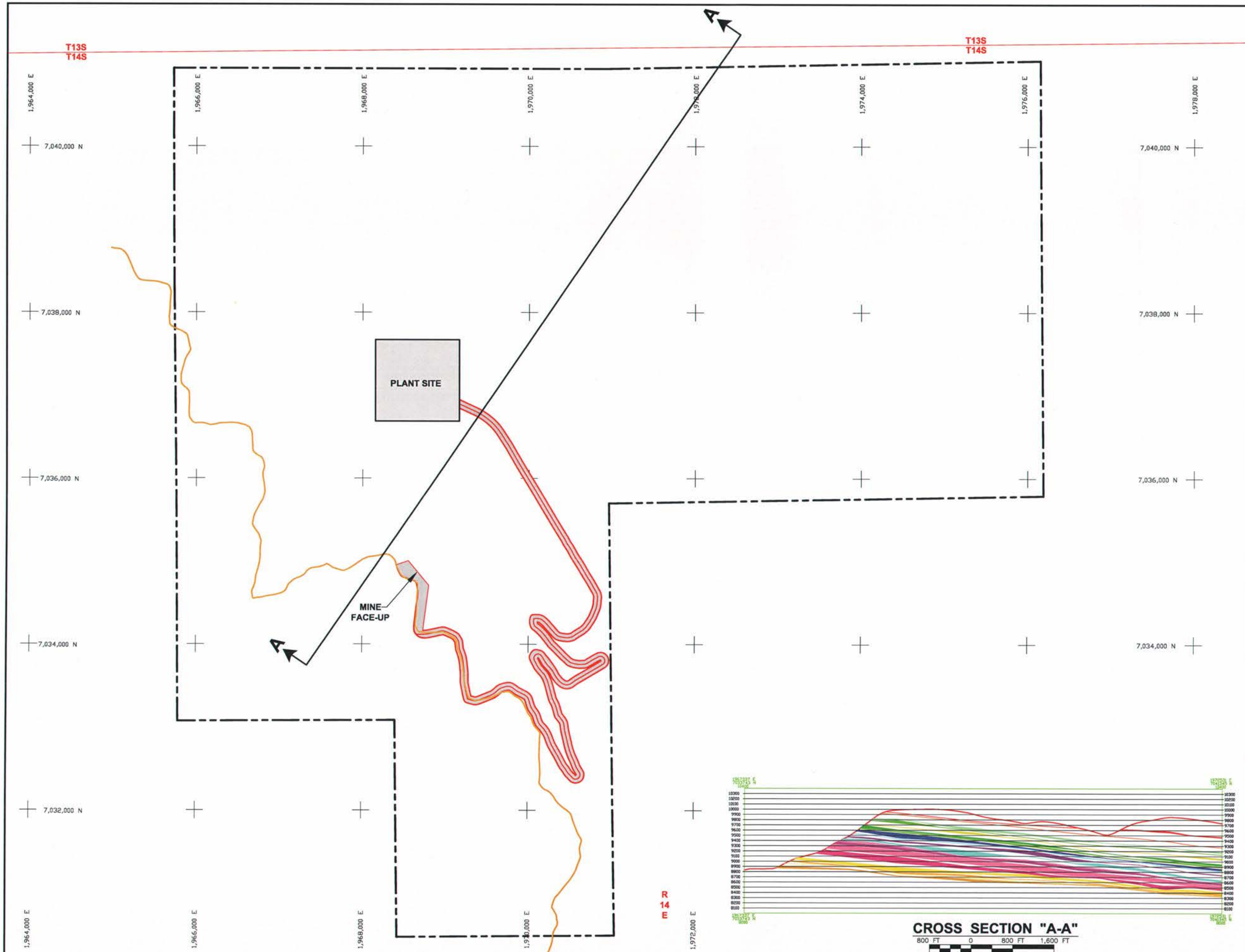
Title:

PORTAL CLOSURE

Scale:	Date:	Design By:	Drawn By:	Approved By:
1"=100'	09/30/14	MEI	J&L	

MINE ENGINEERS, INC.
3901 South Industrial Road
Cheyenne, Wyoming 82007 USA
Phone: 307-638-8833 Fax: 307-638-0578

MAP 5



LEGEND

LAND AFFECTED BOUNDARY
OUTCROP
MINE ROAD

ORE SEAMS
T10
T11
T21
T22
T23
T25
T26
T31
T32
T33
T35
T36A
T36B
T37
T38
T41
T42
T43
T45
SURFACE

COORDINATE SYSTEM:

UT83-CF
UTAH STATE PLANES: NAD 83 DATUM,
CENTRAL ZONE, US FOOT.

N

500 FT 0 500 FT 1,000 FT
SCALE ACCURATE WHEN PRINTED AT 24"x36"

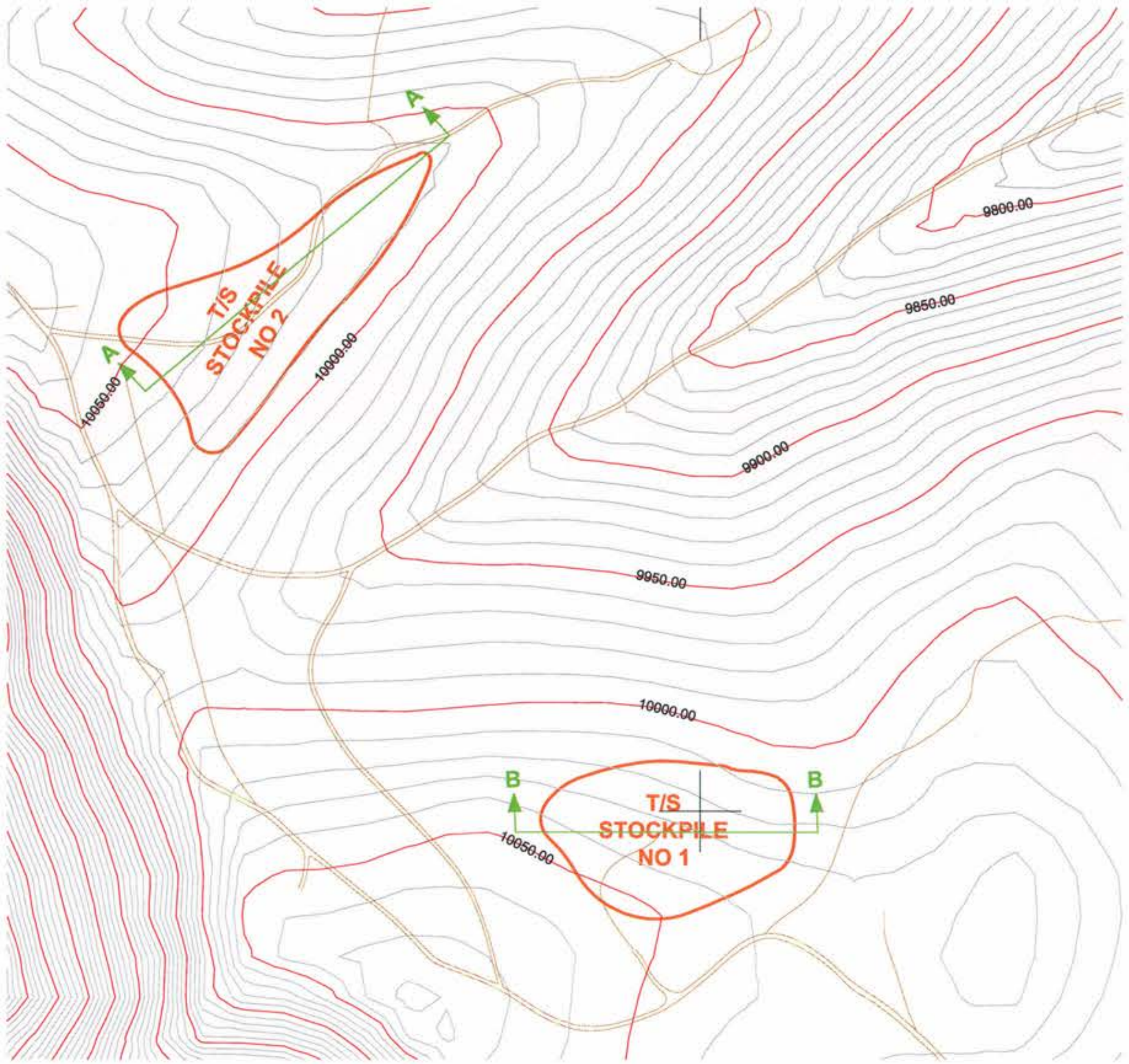
No.	REVISION	DATE	BY	CHKD
2	GENERAL REVISIONS	01/23/15	J&L	EDS
1	DESIGN	05/28/14	J&L	EDS

American Sands Energy Corp
American Sands Energy Corp.
201 South Main Street
Ste.#1800
Salt Lake City, UT 84111

Title: TYPICAL GEOLOGIC CROSS SECTION

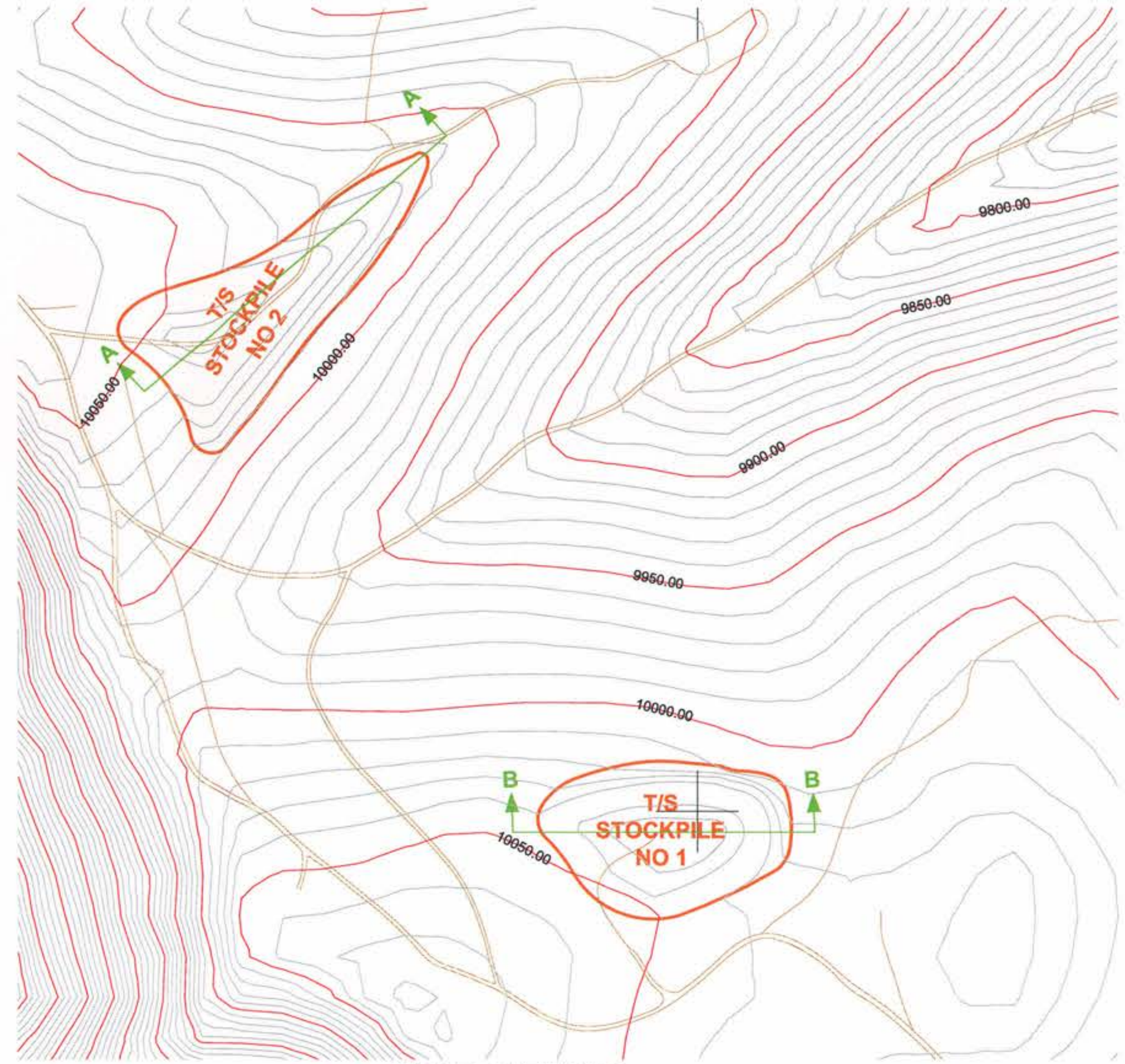
Scale:	Date:	Design By:	Drawn By:	Approved By:
1"=500'	04/04/14	MEI	J&L	

MINE ENGINEERS, INC.
MAP 6



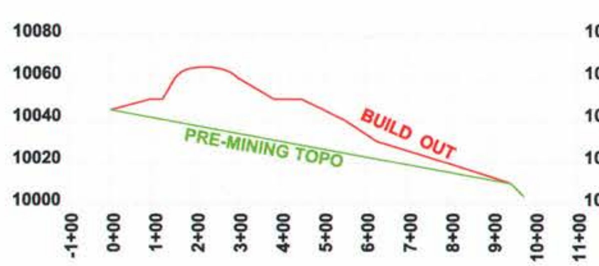
PRE-MINING TOPO

200 FT 0 200 FT 400 FT



BUILD-OUT TOPO

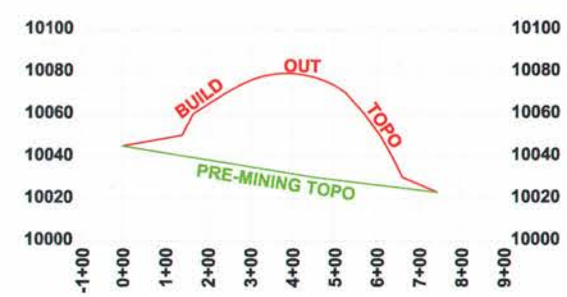
200 FT 0 200 FT 400 FT



SECTION A-A

200 FT 0 200 FT 400 FT

2H:1V MAXIMUM



SECTION B-B

200 FT 0 200 FT 400 FT

2H:1V MAXIMUM

LEGEND

EXISTING ROADS

TOPSOIL STOCKPILES

CONTOUR SPACING 50 FT

COORDINATE SYSTEM:

UT83-CF
UTAH STATE PLANES: NAD 83 DATUM,
CENTRAL ZONE, US FOOT.

N

SCALE ACCURATE WHEN PRINTED AT 24"x36"

No.	REVISION	DATE	BY	CHKD
2	UPDATE TITLE BLOCK	01/23/15	J&L	EDS
1	DESIGN	06/10/14	J&L	EDS

American Sands Energy Corp

American Sands Energy Corp.
201 South Main Street
Ste.#1800
Salt Lake City, UT 84111

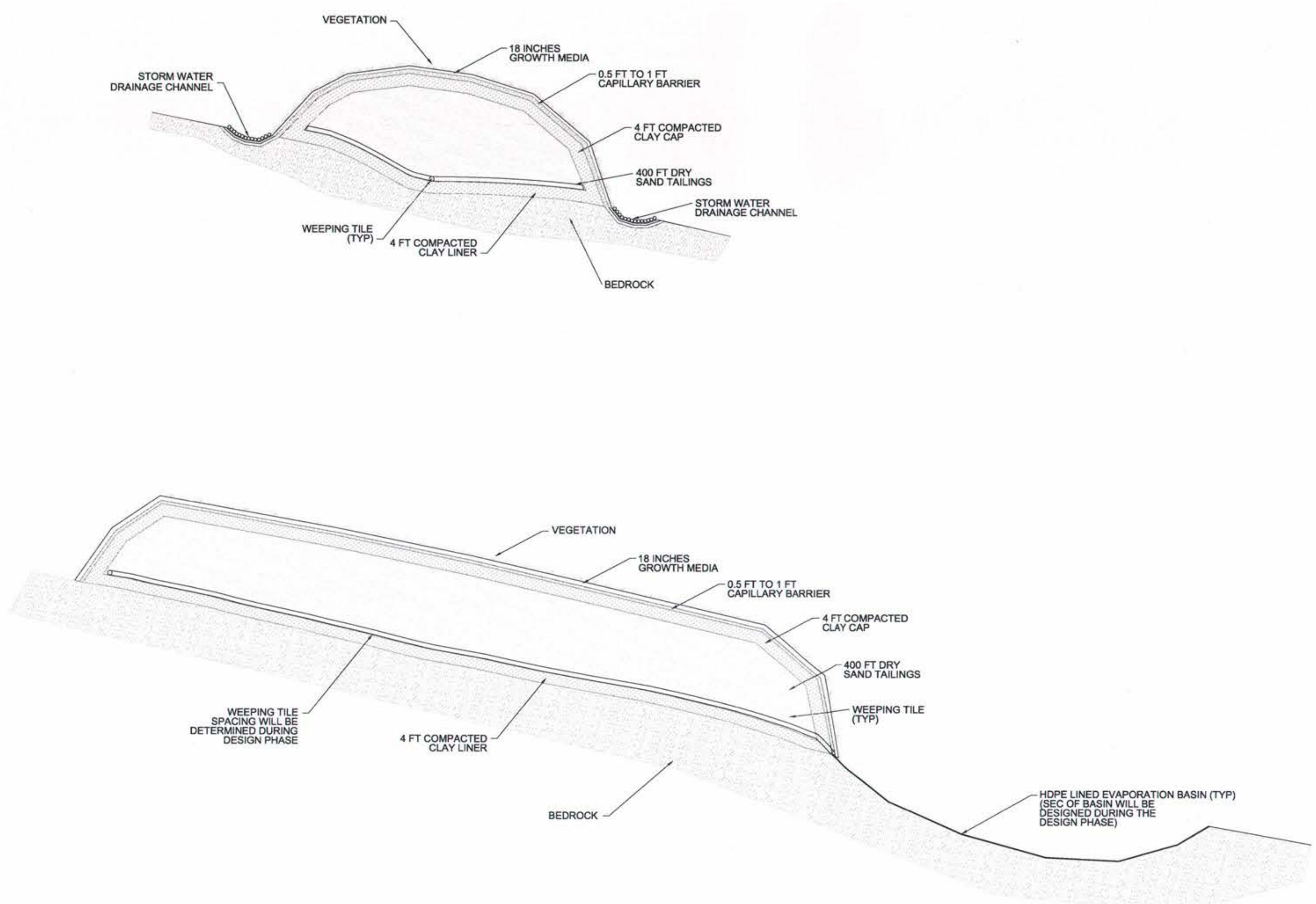
Title:

TOP SOIL–GRADING PLAN

Scale:	Date:	Design By:	Drawn By:	Approved By:
1"=200'	06/10/14	MEI	J&L	

MINE ENGINEERS, INC.
1901 South Industrial Road
Cheyenne, Wyoming 82007 USA
Phone: 307-638-8833 Fax: 307-638-0578

MAP 7



NEED TO REFERENCE
MAP 3

COORDINATE SYSTEM:

UT83-CF
UTAH STATE PLANES: NAD 83 DATUM, CENTRAL ZONE, US FOOT.

400 FT 0 400 FT 800 FT

SCALE ACCURATE WHEN PRINTED AT 36"x30"

No.	REVISION	DATE	BY	CHKD
2	MODIFIED TAILINGS COUNTOURS	01/27/15	J&L	EDS
1	PRLIMINARY	02/19/14	J&L	EDS

American Sands Energy Corp

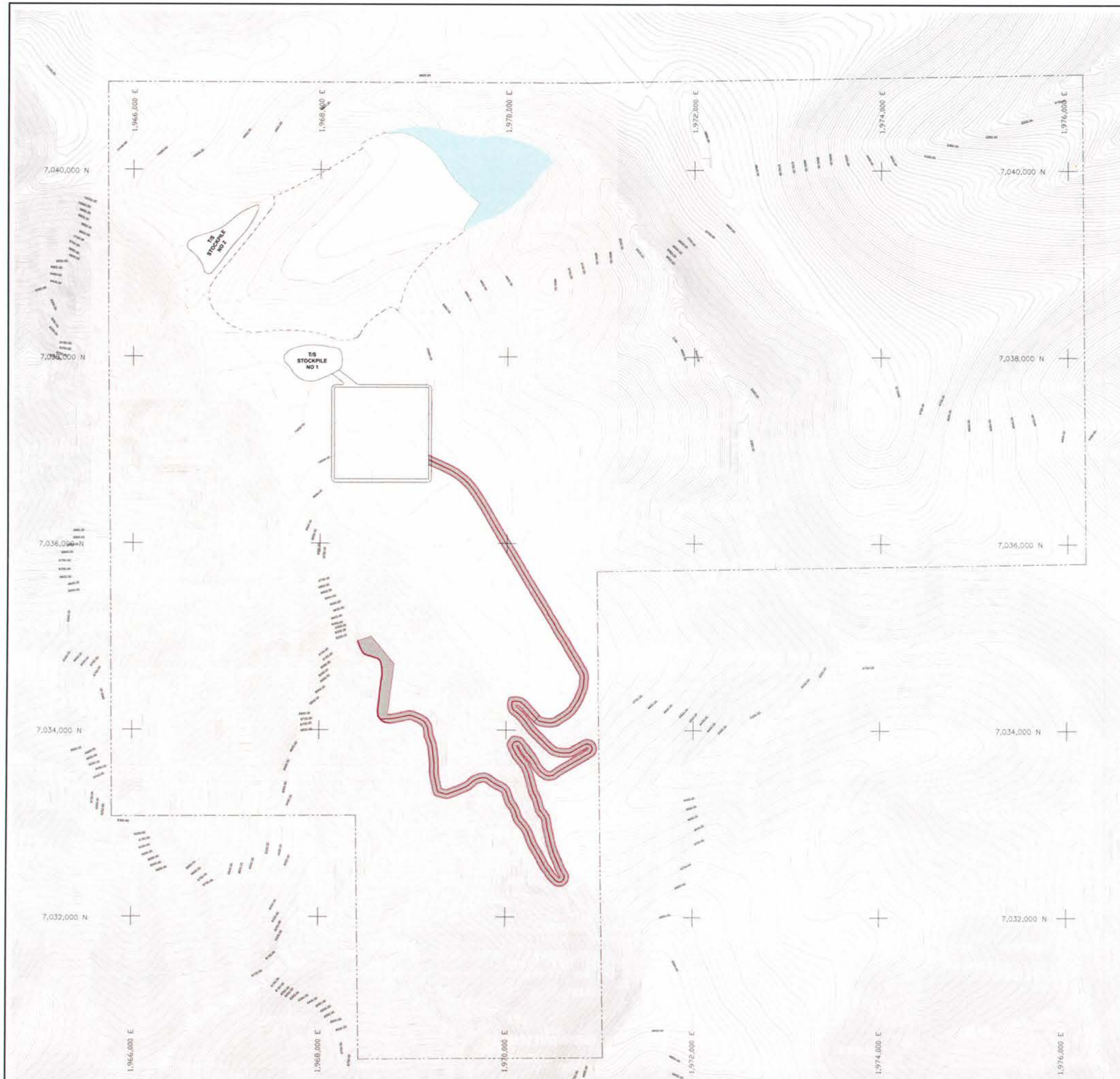
American Sands Energy Corp.
4760 S. Highland Dr., #341
Salt Lake City, UT 84117

Title: DRY TAILINGS TYPICAL SECTION XX

Scale:	Date:	Design By:	Drawn By:	Approved By:
N/A	02/19/14	MEI	J&L	EDS

MINE ENGINEERS, INC.

MAP . 8



LEGEND

- LAND AFFECTED BOUNDARY
- EXISTING ROADS
- DRY TAILINGS IMPOUNDMENT
- MINE ROAD
- ACTIVE
- COVERED

COORDINATE SYSTEM:

UT83-CF
UTAH STATE PLANES: NAD 83 DATUM,
CENTRAL ZONE, US FOOT.

SCALE ACCURATE WHEN PRINTED AT 36"x30"

No.	REVISION	DATE	BY	CHKD
2	MODIFIED TAILINGS COUNTOURS	01/27/15	J&L	EDS
1	PRLIMINARY	02/19/14	J&L	EDS

American Sands Energy Corp

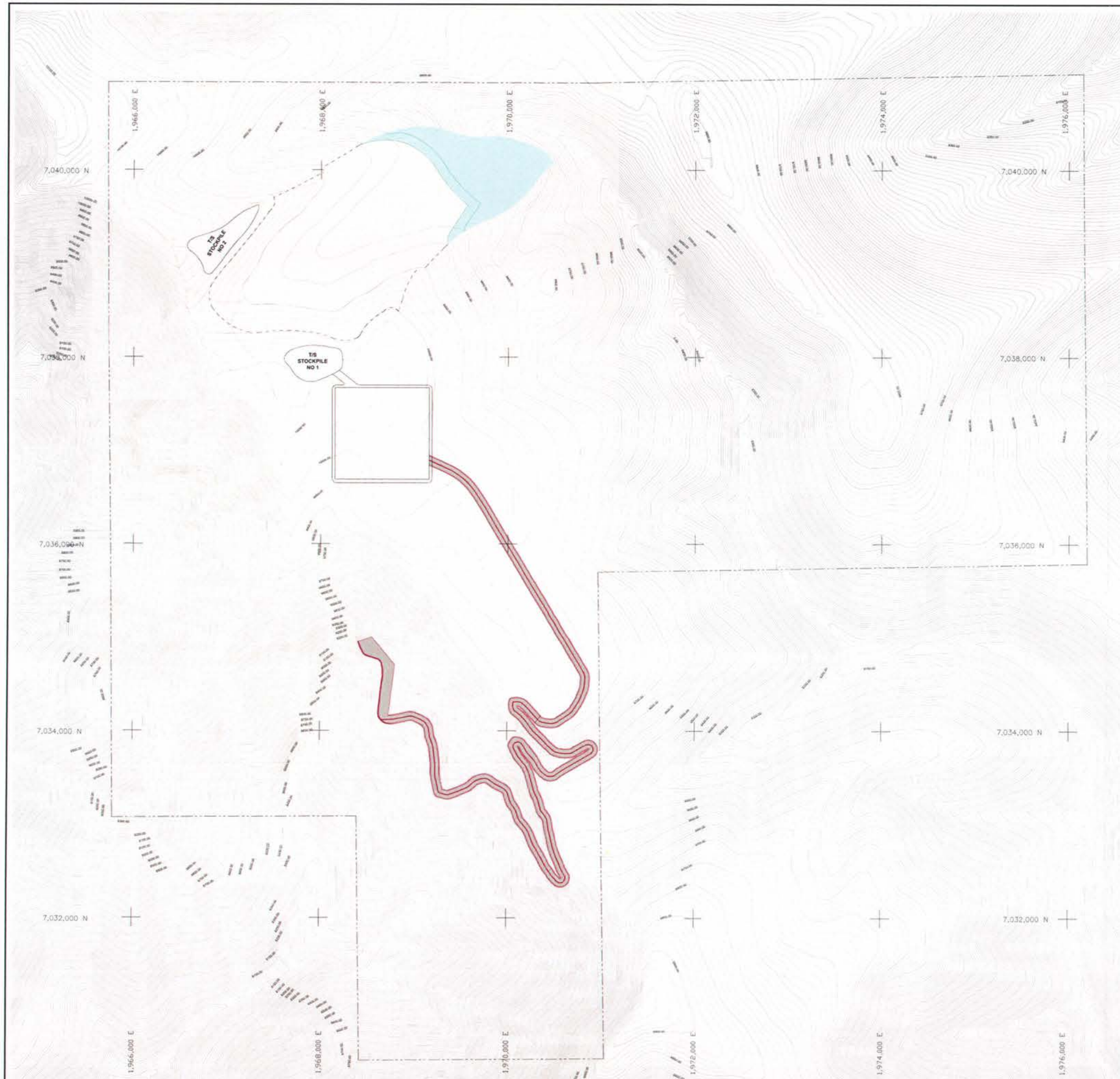
American Sands Energy Corp.
4760 S. Highland Dr., #341
Salt Lake City, UT 84117

Title: DRY TAILINGS IMPOUNDMENT STATUS END OF YEAR 1

Scale:	Date:	Design By:	Drawn By:	Approved By:
1"=400'	02/19/14	MD	J&L	EDS

MINE ENGINEERS, INC.

MAP . 1



LEGEND

- LAND AFFECTED BOUNDARY
- EXISTING ROADS
- DRY TAILINGS IMPOUNDMENT
- MINE ROAD
- ACTIVE
- COVERED

COORDINATE SYSTEM:

UT83-CF
UTAH STATE PLANES: NAD 83 DATUM,
CENTRAL ZONE, US FOOT.

400 FT 0 400 FT 800 FT

SCALE ACCURATE WHEN PRINTED AT 36"x30"

No.	REVISION	DATE	BY	CHKD
2	MODIFIED TAILINGS COUNTOURS	01/27/15	J&L	EDS
1	PRLIMINARY	02/19/14	J&L	EDS

American Sands Energy Corp

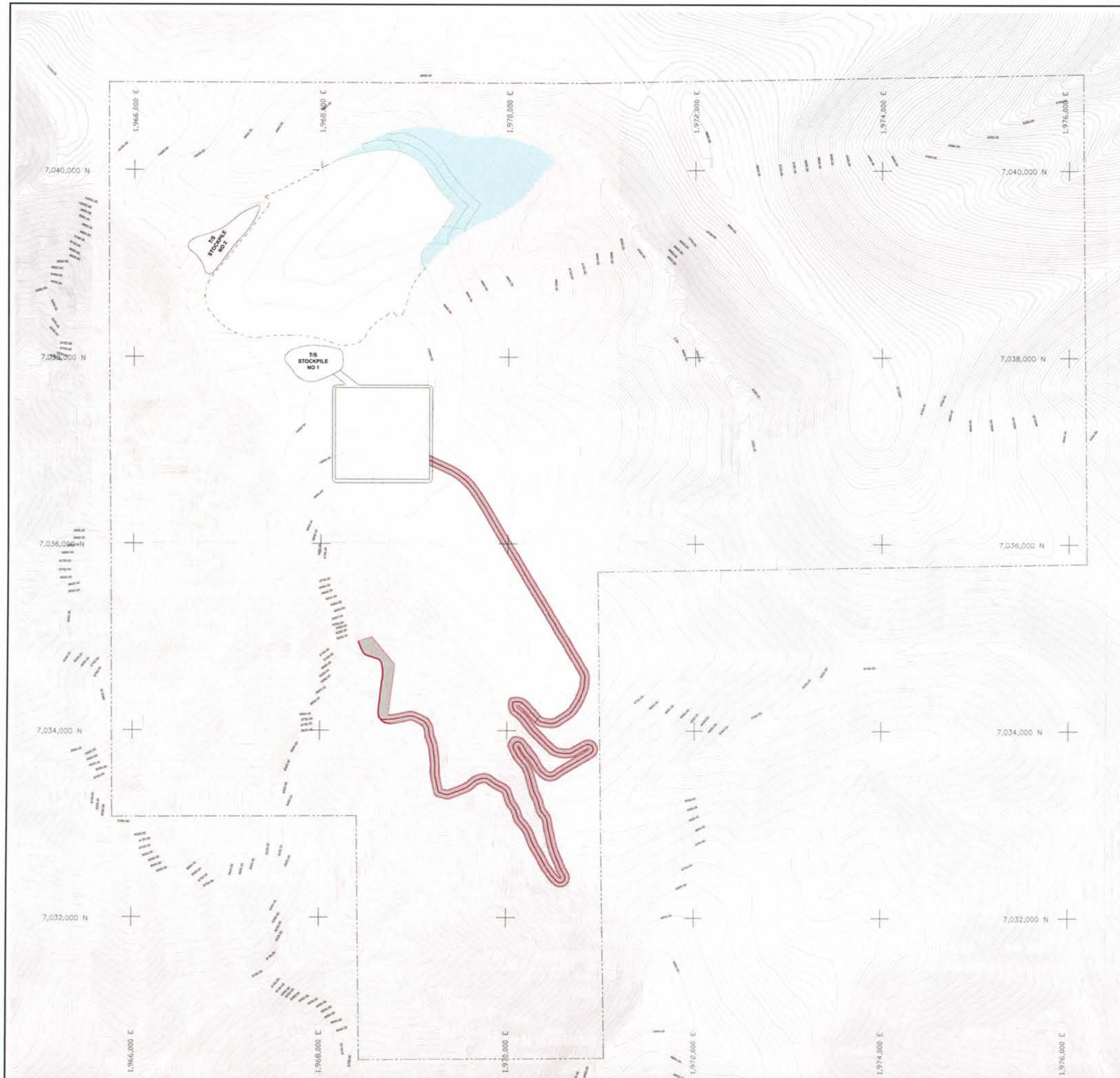
American Sands Energy Corp.
4760 S. Highland Dr., #341
Salt Lake City, UT 84117

Title: DRY TAILINGS IMPOUNDMENT STATUS END OF YEAR 2

Scale:	Date:	Design By:	Drawn By:	Approved By:
1"=400'	02/19/14	MEI	J&L	EDS

MINE ENGINEERS, INC.

MAP 2



LEGEND

- LAND AFFECTED BOUNDARY
- EXISTING ROADS
- DRY TAILINGS IMPOUNDMENT
- MINE ROAD
- ACTIVE
- COVERED

COORDINATE SYSTEM:

UT83-CF
UTAH STATE PLANES: NAD 83 DATUM, CENTRAL ZONE, US FOOT.

N

400 FT 0 400 FT 800 FT

SCALE ACCURATE WHEN PRINTED AT 36"x30"

No.	REVISION	DATE	BY	CHKD
2	MODIFIED TAILINGS COUNTOURS	01/27/15	J&L	EDS
1	PRLIMINARY	02/19/14	J&L	EDS

American Sands Energy Corp
American Sands Energy Corp.
4760 S. Highland Dr., #341
Salt Lake City, UT 84117

Title: DRY TAILINGS IMPOUNDMENT STATUS END OF YEAR 3

Scale:	Date:	Design By:	Drawn By:	Approved By:
1"=400'	02/19/14	MEI	J&L	EDS

MINE ENGINEERS, INC.

MAP 3

LEGEND

- LAND AFFECTED BOUNDARY
- EXISTING ROADS
- DRY TAILINGS IMPOUNDMENT
- MINE ROAD
- ACTIVE
- COVERED

COORDINATE SYSTEM:

UT83-CF
UTAH STATE PLANES: NAD 83 DATUM,
CENTRAL ZONE, US FOOT.

N

400 FT 0 400 FT 800 FT

SCALE ACCURATE WHEN PRINTED AT 36"x30"

No.	REVISION	DATE	BY	CHKD
2	MODIFIED TAILINGS COUNTOURS	01/27/15	J&L	EDS
1	PRLIMINARY	02/19/14	J&L	EDS

American Sands Energy Corp

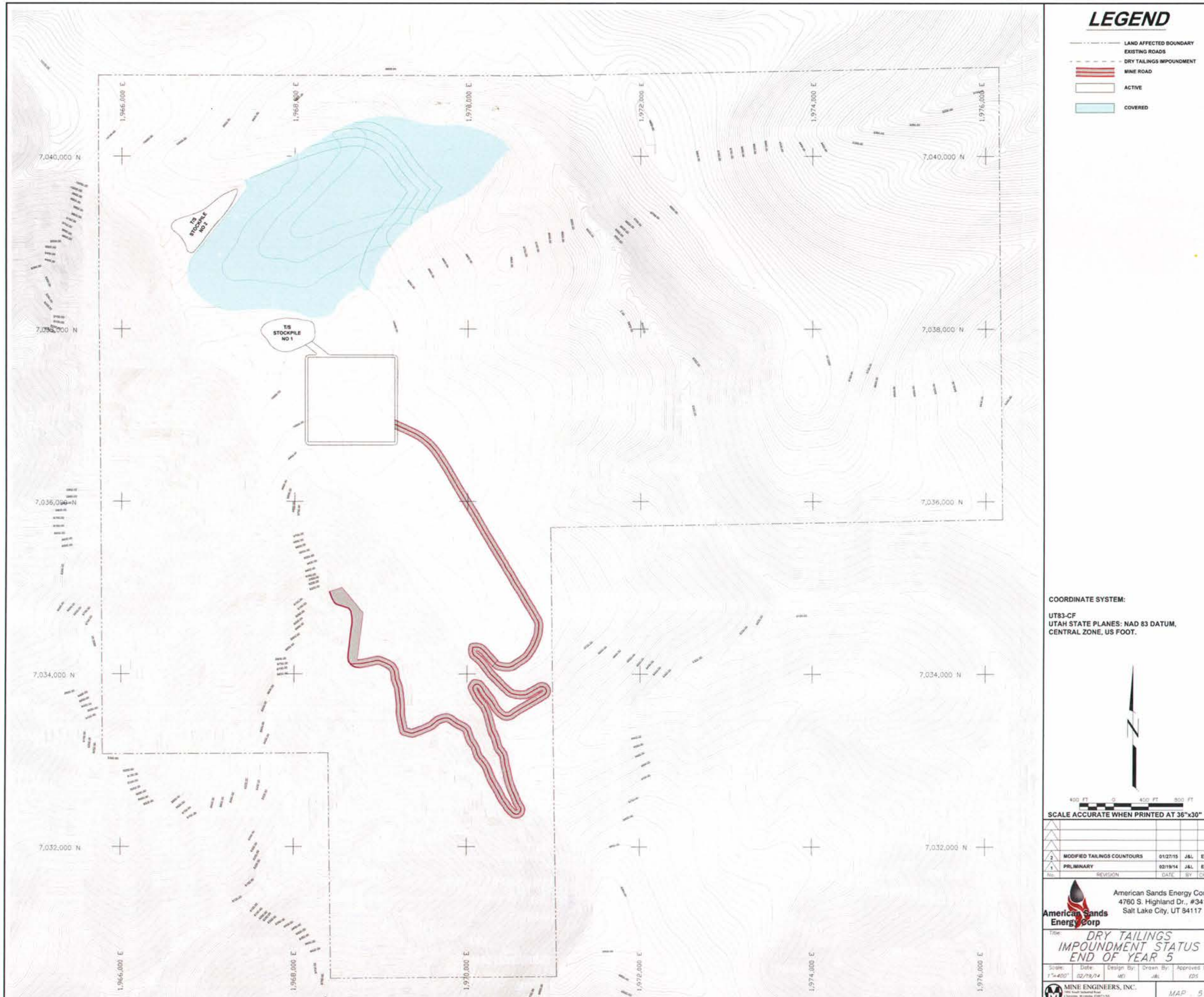
American Sands Energy Corp.
4760 S. Highland Dr., #341
Salt Lake City, UT 84117

Title: DRY TAILINGS IMPOUNDMENT STATUS END OF YEAR 4

Scale:	Date:	Design By:	Drawn By:	Approved By:
1"=400'	02/19/14	MEI	J&L	EDS

MINE ENGINEERS, INC.

MAP 4


LEGEND
LAND AFFECTED BOUNDARY
EXISTING ROADS
DRY TAILINGS IMPOUNDMENT
MINE ROAD
ACTIVE
COVERED
T/S STOCKPILE NO 2
T/S STOCKPILE NO 1
1,966,000 E
1,968,000 E
1,970,000 E
1,972,000 E
1,974,000 E
1,976,000 E
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7,038,000 N
7,036,000 N
7,034,000 N
7,032,000 N
COORDINATE SYSTEM:
UT83-CF
UTAH STATE PLANES: NAD 83 DATUM,
CENTRAL ZONE, US FOOT.
N
400 FT
0
400 FT
800 FT
SCALE ACCURATE WHEN PRINTED AT 36"x30"
2 MODIFIED TAILINGS COUNTOURS 01/27/15 J&L EDS
1 PRLIMINARY 02/19/14 J&L EDS
No. REVISION DATE BY CHKD
American Sands Energy Corp
American Sands Energy Corp.
4760 S. Highland Dr., #341
Salt Lake City, UT 84117
Title:
DRY TAILINGS
IMPOUNDMENT STATUS
END OF YEAR 5
Scale: 1"=400'
Date: 02/19/14
Design By: MD
Drawn By: J&L
Approved By: EDS
MINE ENGINEERS, INC.
MAP 5

URS

FINAL REPORT Revision 1

PRELIMINARY STABILITY AND HYDROLOGY ANALYSES

BRUIN POINT MINE

For

American Sands Energy Corp

Green River Resources Inc.
201 South Main 1800
Salt Lake City, UT 84111

February 4, 2015

Preliminary Stability and Hydrology Analyses
Bruin Point Utah

Prepared for:

American Sands Energy Corp

Green River Resources Inc.
201 South Main 1800
Salt Lake City, UT 84111

Prepared by:

URS Corporation
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URS Civil-Geotechnical Engineer

TABLE OF CONTENTS

FIGURES

APPENDICES

ACRONYMS

ASE	American Sands Energy Corporation
ASTM	American Society for Testing and Materials
BGS	Below Ground Surface
CFS	Cubic Feet per Second
CN	Curve Numbers
DEG	Degrees
DOGM	Utah Division of Oil, Gas and Mining
FT	Feet
GPS	Global Positioning System
HEC-HMS	Hydrologic Modeling System
KSF	Kips per Square Foot
LL	Liquid Limit
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NP	Non-Plastic
PCF	Pounds per Cubic Foot
P.G.	Professional Geologist
PGA	Peak Horizontal Ground Acceleration
PI	Plasticity Index
PL	Plastic Limit
PSF	Pounds per Square Foot
SCS	Soil Conservation Service
URS	URS Corporation
USCS	Unified Soil Classification System
USGS	United States Geological Survey

1.0 INTRODUCTION

1.1 Project Description

Green River Resources (GRR) is proposing to develop the Bruin Point Mine Site in the mountains east of Sunnyside, Utah. URS Corporation (URS) understands that if approved, development of the site will include the following surface features: construction of office space and associated parking, a warehouse and maintenance shop, a tank farm, an electrical building, a graded material processing area for associated covered ore stockpiles, topsoil stockpiles, permanent tailings stockpile, and underground mine portal.

URS understands that the Utah Division of Oil, Gas and Mining (DOGM) has requested additional design information regarding the Bruin Point Mine (Utah DOGM M&RP M/007/0040) to demonstrate that the proposed surface structures can be constructed to prevent harm to nearby natural resources.

Design criteria were prepared to address potential impacts to Range Creek and are supported by slope stability analyses and preliminary analyses of erosion control measures. These analyses are based on material properties measured during the field investigation and engineering judgment. The purpose of the design criteria and analyses are to demonstrate the technical feasibility of slope stability and erosion controls to be incorporated into facility design and allow DOGM approval of the Notice of Intent (NOI) (URS, 2014). Our scope of services is based on our understanding of the assumptions noted in this report and does not include any foundation investigation for buildings or structures.

1.2 Purpose, Authorization, and Work Scope

This report presents the results of work performed by URS. The purpose of this work was to gather subsurface information and develop geotechnical criteria for stockpiling of topsoil and mine tailings derived from the Bruin Point Mine, and to provide criteria for surface contact-water retention regarding the specific size, type, functionality, and purpose of the water retention facilities.

The scope of work performed was presented in our proposal dated July 8, 2014, and authorized on July 23, 2014. The scope of work, as completed, consisted of four tasks:

- Review documents provided to URS including mine layout, drainage plans, and proposed stockpile slopes.
- Investigate subsurface conditions by means of test pit excavations and perform laboratory testing of select soil specimens.
- Develop geotechnical and erosion control design criteria.
- Project Management including administrative tasks, client meetings, and reporting.

As part of its work, URS also developed and implemented a safe work plan prior to the beginning of field work which included a task-specific hazard analysis.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 General

Field investigations were performed at the site in two phases. The first phase consisted of a site visit for geological and hydrological reconnaissance and to assess the suitability of the site for drilling or excavation of test pits. The second phase consisted of excavating test pits to investigate subsurface materials.

The project area is in the Roan Cliffs and comprises 1,760 acres of private parcels located in Township 14 South, Range 14 East, Sections 2, 3, and 10, Salt Lake Meridian (Figure 1). The area is in mountainous terrain; elevations range from approximately 8,000 feet to over 10,150 feet at Bruin Point, near the northwest corner of the project area. Access to the site is gained through improved gravel roads to two large antenna arrays present at the site.

2.2 Field Investigation

2.2.1 Geological and Hydrological Reconnaissance

A site visit was performed at the site on July 31, 2014, by a URS Professional Geologist (P.G.) and hydrologist to observe general geologic and hydrologic conditions of the mine portal, processing plant, and topsoil/tailings stockpile areas. Major fractures were measured in the rock outcropping at the proposed mine portal area. The topography of the site is variable with some areas of steep rugged terrain and areas of gradual slopes on the plateau consisting of native clayey topsoil, moderate vegetation, and sandstone or limestone outcroppings.

Thin surface soils (0-4 ft [feet] thick) were observed at the surface of the plateau (Bruin Point). The Parachute Creek Member of the Green River Formation was observed exposed on the improved gravel roads and is covered with stress relief factures as shown in Photo 1. Relief fractures occur when compressional stress on underlying rocks is removed by the erosion of overlying rock layers (Wyrick and Borchers, 1981). The relief of stress on exposed material on valley/canyon walls and floors results in a predictable pattern of shallow, interconnected vertical and horizontal fractures.

Photo 1. Improved gravel road covered with stress relief fractures.

The mine portal area is located within the head waters of Bear Canyon on the Roan Cliffs. The proposed portal is located on steep rugged terrain (slopes between 30-50 degrees) approximately 800-900 feet below the top of the Plateau. There are no roads to the proposed mine portal area and access is by foot. Portal area is covered with thin layer (2-6 inches) of soil and vegetation debris mixture with steeper slopes (> 30°) barren of soil/vegetation debris. The area between the proposed mine portal to the top of the plateau contains loss rock and with high rock fall hazard.

The proposed mine portal area was not highly fractured with the majority of the fractures observed located in bitumen barren sandstone units. The fracture observed within the mine portal area has an orientation of 70° to 105° southeast with near vertical dip of 85-90° to the northeast as shown in Photo 2.

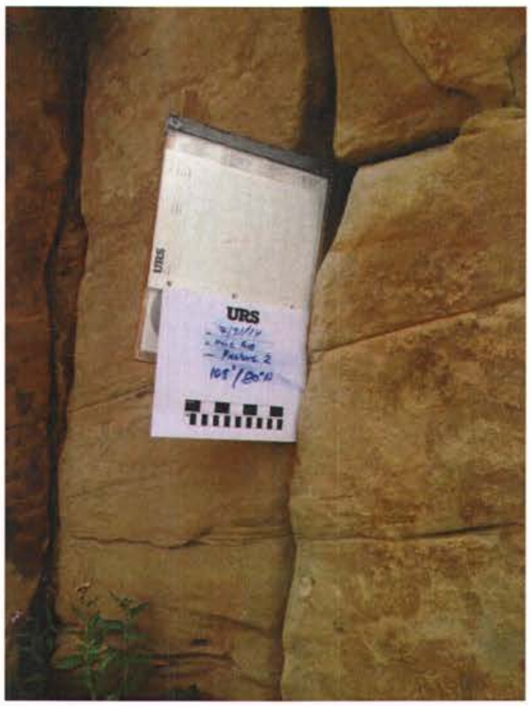


Photo 2. Fracture observed within mine portal area.

The high bitumen sandstone units within the mine portal area appear to contain stress relief exfoliation-like fractures as shown in Photo 3. These stress relief exfoliation-like fractures are likely related to the stress of the overburden units pressing downward and laterally releasing the stress outward away from the cliff face.

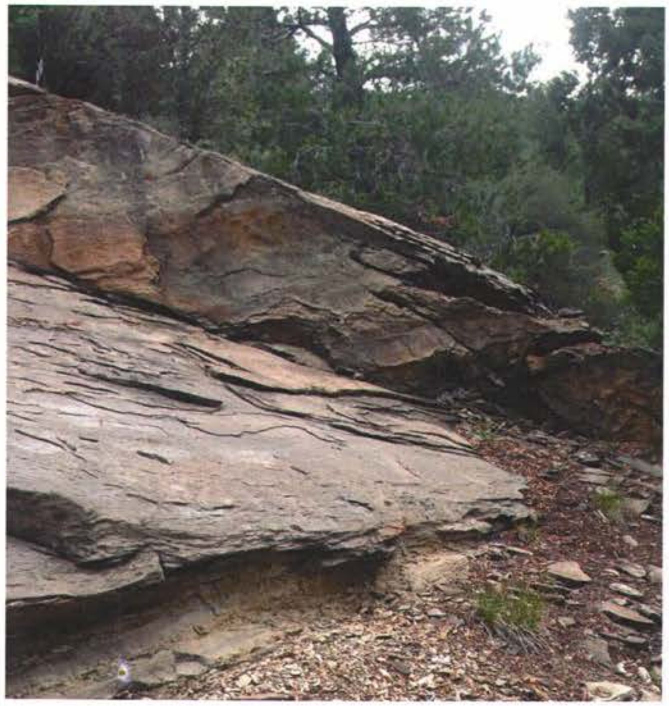


Photo 3. Stress relief exfoliation in high bitumen sandstone units.

The surface of the ore body (high bitumen containing sandstones) is covered with desiccation-like texture as shown in Photo 4. This texture is likely related to the dry/oxidation of the bitumen on the surface sub sequential differential erosion of the surface.

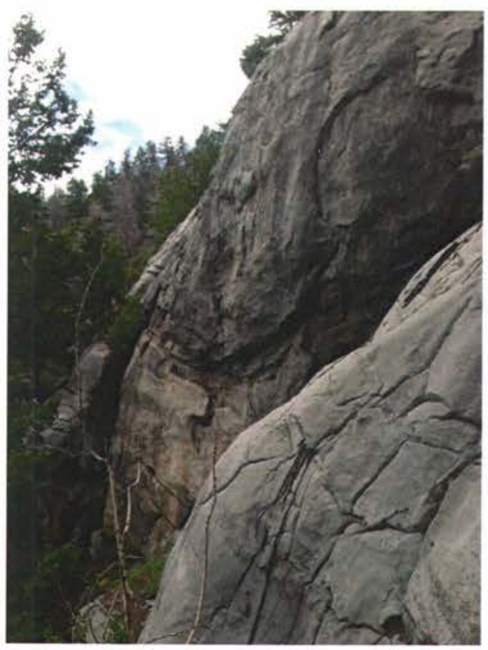


Photo 4. Surface of high-bitumen sandstone covered with desiccation-like texture.

2.2.2 Test Pit Excavations

Eight sites were selected (TH14-01 through TH14-08) at which test pit explorations were to be completed. One planned exploration test pit, identified as TH14-02 in Figure 2, was not performed because locked gates prevented access to the test pit location. However, based on the consistency of the surrounding test pits, the exclusion of TH14-02 was not significant. All test pits for this study were excavated using a Bobcat E45 compact excavator. A Garmin Rino650, hand-held Global Positioning System (GPS) equipment was used to locate test pit sites in the field. Where possible, the sites were collocated with historic drilling sites to reduce ground disturbance at the site. Associated equipment and excavation services were provided on August 11, 2014, by Direct Push Services, LLC, of Salt Lake City, Utah, under subcontract to URS. Each test pit was excavated to refusal, which was encountered at various depths as indicated on the Surface and Shallow Soil Sampling Logs (test pit logs) presented in Appendix A.

Test pit excavations were observed, logged, and sampled, by a URS field engineer. In general, samples were collected from the wall of the excavation by hand-digging/shovel use. Some samples were selectively collected from the excavator bucket where depth of excavation precluded entry for hand-sampling. The investigation locations are shown in Figure 2 and summarized in Table 1.

Table 1. Test Pit Location Summary

Test Pit ID	**Exploration Depth**[1] *(ft)*	**Northing** *(ft)*	**Easting** *(ft)*	**Surface Elevation** *(ft)*
TP14-1	2.4	7,039,763	1,967,721	9,982
TP14-2	N/A[2]	7,039,641	1,968,988	9,762
TP14-3	3.8	7,039,242	1,966,905	10,035
TP14-4	6	7,038,686	1,968,936	9,977
TP14-5	8	7,038,699	1,967,445	9,925
TP14-6	1.7	7,037,679	1,967,755	10,056
TP14-7	5.8	7,037,320	1,968,517	10,027
TP14-8	5.3	7,037,026	1,968,918	10,015

Notes: State Plane Coordinates (Utah Central NAD 83); ft = feet

1. The depth was measured from the ground surface.
2. The site was inaccessible and exploration was not performed; identified coordinates were proposed.

Groundwater was not encountered during test pit exploration.

2.3 Laboratory Testing

Laboratory testing was performed on select soil specimens obtained during the field investigation to assist in their classification as well as to evaluate engineering properties. Testing was performed by IGES of Salt Lake City, Utah, in general accordance with ASTM International (ASTM) standards. Laboratory tests included: fines content (ASTM D1140); Atterberg limits (ASTM D4318), and natural moisture content (ASTM D2216). Strength and permeability testing was performed in remolded samples. Laboratory test results sheets are presented in Appendix B.

2.3.1 Index Properties

The results of index tests performed in each test pit are summarized in Table 2, and also shown on the logs in Appendix A, and included in the Laboratory Test Results in Appendix B.

Table 2. Summary of Index Testing

Location	Approximate Depth BGS	USCS Classification[1]	Fines Content	LL	PI	Moisture Content
	(ft)	*(-)*	*(%)*	*(%)*	*(%)*	*(%)*
TH14-03	1	CH	82.0	57	31	16.4
TH14-04	1.5	SC	45.2	35	11	7.9
TH14-04	3	SC	26.1	37	14	13.1
TH14-05	3.75	CL	60.5	40	19	16.7
Tailings[2]	N/A	SP-SM	9.1	NP	NP	--
Partings[2]	N/A	SC	38.2	29	8	--

Notes: BGS = Below Ground Surface; USCS = Unified Soil Classification System; ft = feet; LL = Liquid Limit; PI = Plasticity Index; NP = Non-plastic

1. The classification was based on ASTM D2487.
2. The sample was provided to URS by ASE.

2.3.2 Direct Shear Testing

Strength testing was performed on remolded samples from test pit TH14-04 and on tailings and partings samples provided to URS by ASE. Strength testing consisted of a series of direct shear tests under drained conditions in general accordance to ASTM D3080. The results of the strength testing are also provided in Appendix B.

Direct shear testing was performed on a sample from testing pit TH14-04 at a moisture content (after conditioning) of approximately 16 percent and a target dry density of 105 pounds per cubic foot (pcf). A vertical confining stress of approximately 8 kips per square foot (ksf) was selected to simulate the weight of the stockpile embankment above the shear surface resulting in a one-point drained strength of 31 degrees.

Direct shear testing was performed on processed and moisture conditioned tailings sand obtained from ASE at a target dry density of 105 pcf. The vertical confining stresses of 4, 8, and 16 ksf, were selected to simulate the anticipated stress conditions in the field resulting in a measured drained strength of 33 degrees with a cohesion intercept of 129 pounds per square foot (psf).

Additionally, direct shear testing was performed on the partings sample obtained from ASE. The partings material is anticipated to be used as a liner material below the tailings stockpile and was provided in the form of a rock-core. The rock-core sample was modified by IGES to create field-form samples in two steps. Beginning with rock cores obtained from the target layer, the partings were crushed using a proctor hammer until all crushed rock particles were finer than the No. 4 sieve. The particles were then pulverized further using a cast iron mortar and pestle. After moisture conditioning the partings to 16 percent, samples were compacted to a dry density of 110 pcf. Shear testing was performed at confining pressures of 4, 8, and 16 ksf, to simulate anticipated stress conditions within the liner.

2.3.3 Permeability Testing

Permeability testing was performed on a single partings sample provided to URS by ASE in general accordance with ASTM D5084. The procedure for crushing, pulverizing, moisture conditioning, and compacting, the partings sample was performed in the same manner as described in Section 2.3.2. The results of the test provided an average hydraulic conductivity of 2.3×10^{-7} cm/s using a flexible wall permeameter. The results of this test are also provided in Appendix B.

3.0 SITE CONDITIONS

3.1 Regional Geologic Setting

The Bruin Point Mine is located in eastern Utah in the Book Cliff-Roan Plateau section of the Colorado Plateau physiographic province (Stokes, 1986) in rugged, mountainous terrain with steep slopes. The mine is located approximately 25 miles east of Price near the headwaters of Dry Creek and Range Creek at elevations between 9,200 and 10,200 feet above mean sea level.

The bitumen sand deposits at the mine site are within what is collectively known as the Sunnyside tar sands. The deposits occur in late Paleocene/early Eocene (circa 60-40 million years ago) rocks in the upper part of the Colton Formation and the lower part of the Green River Formation, both of Eocene age. Both are derived from deposition into Lake Uinta, a prehistoric lake that persisted for 15 million years in a large intermontane basin occupying the regions of the present-day Uinta and Piceance Basins. These units consist of interbedded, fine-grained shales and sandstones. Bitumen has migrated from the shale into the sand units.

The Green River Formation overlies the Colton Formation. This formation consists of freshwater marlstone, oil shale, limestone, siltstone, sandstone, tar sands, and shale. The contact between the Colton and Green River Formations is identified as the horizon where dominantly fluvial strata below give way to dominantly lacustrine strata above (Morrison Knudsen, 1984). The tar sands beds occurring in the lower part of the Green River are similar in origin and appearance to the tar sands beds of the Colton Formation.

Bitumen occurs chiefly in the sandstone beds of the Colton and lower part of the Green River Formations. The tar sands beds outcrop conspicuously along the west face of the Book Cliffs, locally known as Bruin Point near the headwaters of Range Creek. Tar sands outcrops are persistent for over nine miles along the west face of the Book Cliffs (Morrison Knudsen, 1984).

3.2 Specific Site Conditions

3.2.1 General

A site plan for the Bruin Pont Mine site showing the locations of test pit explorations is provided in Figure 2. Details of the field investigations performed at this site and laboratory test results are presented in Section 2.

3.2.2 Soil Conditions

In large part, the ground surface was observed in the test pit excavations to consist of approximately 1 foot of dark-colored topsoil containing roots, fibrous matter, and/or other organic components. The topsoil is generally unsuitable for engineering purposes. The surface is vegetated with grasses and sage, with patches of pine and aspen trees. The surficial soil (topsoil) is generally underlain by brown clayey sand (SC) or clay (CL, CH) with varying amounts of sand and increasing gravel and cobble content with depth. Cobbles encountered were generally observed to be less than 10 inches in diameter. The clayey soils are underlain by bedrock materials. See the test pit logs in Appendix A.

4.0 DESIGN CRITERIA

4.1 General

The project site is located at the headwaters of Range Creek. Range Creek is a natural water way, which flows into the Green and Colorado Rivers. The following design criteria are required and provided to outline the standard of care for protection of groundwater and surface water in Range Creek. The criteria are based on the slope stability analyses and preliminary hydrological assessments performed for the site and proposed surface structures. Design criteria are provided below for each of the primary surface structures.

All hydrological criteria provide below are based on consideration of the site as a zero discharge facility based on the 100-year preliminary storm event calculations provided herein, 150-foot disturbance zone around Range Creek, lining of all pond and drainage swales with properly compacted mine partings, a 3-foot minimum freeboard limit for all ponds, and regular maintenance.

4.2 Mine Portal

Geotechnical

- Orient portal openings parallel to strike and dip of predominant joints and fractures.
- Provide benching of upslope rock/soil face.
- Provide mesh and / or rock catchment above portals.
- Provide patterned rock bolting with cable mesh at portal face.

Hydrological

- Provide drainage berms and channels around the plant site to direct any surface water away from the site and contain on-site storm water and erosion. The berms will be constructed as described in Section 5.
- Direct process and on-site storm water to a retention pond.

4.3 Plant Site

The plant site will contain the process equipment for the bitumen extraction process along with an ore stockpile that will be covered.

Geotechnical

- Provide a clay liner of mine partings material that is adequately broken down and compacted according to the project specifications.
- Provide compacted gravel working surface above the clay liner.
- The slope angles of stockpiles formed with conveyor discharge will likely vary depending on the moisture content of the stockpiled material.
- Angle of repose data for ore produced at the mine are not available.

Hydrological

- Provide clay liner below the plant site to minimize infiltration of process and storm water into the bedrock and on-site soils.
- Provide drainage berms and channels around the plant site to direct any surface water away from the site and contain on-site storm water and erosion. Construct the berms as described in Section 5.
- Direct process and on-site storm water to a retention pond.

4.4 Topsoil Stockpiles

The surface soils at the site consist of topsoil underlain by a 1 to 7-foot layer of clayey soils. Topsoil and clayey soils are proposed to be stripped from the large tailings stockpile area and stockpiled separately. The clayey soils may later be mixed with clayey mine partings, and used as cover for the proposed tailings stockpile.

Geotechnical

- Screen topsoil and clayey surficial soils to remove cobble or large size rocks to facilitate compaction. Stockpile for later use of this material as cap or cover for the tailings stockpile. Mine partings materials may be mixed with topsoil and surficial clayey soils.
- Provide compaction of the clayey surficial soils using the compaction criteria provided in the project specifications. Topsoil will be placed under reduced compaction criteria as specified in the field because the compaction criteria outlined in the specifications will be difficult to implement in topsoil with high organic content.
- Construct compacted topsoil stockpiles at slopes no steeper than 2.25H:1V to meet appropriate factors of safety based on stability modeling discussed in the stability section of this report.
- Do not stockpile snow on, or near slopes.

Hydrological

- Provide drainage berms and channels around the stockpiles to direct any surface water away from the site and contain storm water and eroded soils within the site. The berms will be constructed as described in Section 5.
- Direct process and on-site storm water to a retention pond.

4.5 Tailings Stockpile

A permanent stockpile is proposed for long-term storage of tar sand tailings material. The tailings will be mechanically transported to the permanent tailings stockpile, moisture conditioned to achieve specified compaction criteria, and mechanically compacted using conventional compaction equipment. No hydraulic transportation or deposition of tailings will be performed. Strip surface soils below the stockpile as outlined below and a clay liner will be constructed before mechanical placement of tailings begins.

Geotechnical

- Strip topsoil and surficial clayey soils in sufficient quantity to provide a suitable cover or cap material during reclamation. This includes all surficial soils with significant organic matter (greater than approximately 5% organics by volume), debris, deleterious or loose material, or high-plasticity soils (LL>50).

- Provide compaction of the tailings stockpiles using the compaction criteria provided in the project specifications.
- Construct compacted tailings stockpiles at slopes no steeper than 2.25H:1V to meet appropriate factors of safety based on stability modeling discussed in the stability section of this report.
- Do not stockpile snow on, or near slopes.

Hydrological

- Provide clay liner below the tailings stockpile to prevent infiltration of process and storm water into bedrock. The liner will be constructed according to the requirements in the project specifications.
- Provide cap or cover for the tailings facility as soon as possible to reduce infiltration into the stockpile.
- Provide single or multiple retention basins to contain storm water that falls within the tailing stockpile. This water can be used as process water.
- Provide drainage berms and channels around the tailings stockpile to direct any surface water away from the site and contain on-site storm water and erosion. The berms will be constructed as described in Section 5.
- Provide check dams to reduce erosion potential. The check dams will be constructed as described in Section 5.
- Direct process and on-site storm water to a retention pond.

5.0 HYDROLOGY

5.1 Hydrology

The existing terrain at the site is mountainous with steep slopes and the area is subject to high intensity, high frequency storm events. The majority of the project is situated within the Range Creek Watershed and a lesser portion of the project lies within the Grassy Trail Creek Watershed (see Appendix C for the Watershed Map). During the previously noted July 31, 2014, site visit, the existing land cover terrain, soil type, and topographic features were verified. Precipitation for this area was acquired from National Oceanic and Atmospheric Administration (NOAA) Atlas 14 for the area east of Sunnyside, Utah, at the Bruin Point on Patmos Ridge (The exact location is 39.6343 latitude and -110.3391 longitude with an elevation of 10,073 feet). Precipitation for the 10- and 100-year storm events (over 24 hours) are 2.22 and 3.25 inches, respectively. The Soil Conservation Service (SCS) type II storm event was analyzed using Hydrologic Modeling-System (HEC-HMS) v4.0 for the 10- and 100-year events.

The amount of rainfall that contributes to runoff can be calculated based on empirical relationships referred to as runoff curve numbers (CN). The CN values are related to soil type, soil infiltration capacity, land use, and depth to the phreatic surface and were chosen for the site based on field observations, laboratory test data, and engineering judgment. The site can be characterized using three CN groups including areas as follows:

1. Minor disturbance including the topsoil stockpiles, road shoulders, staging areas, and other areas of infrequent access.
2. Significant disturbance such as roads, structures and the immediate mine portal access vicinity.
3. Tailings site exhibiting a high level of compaction with little interstitial space.

The site soils and tailings materials were available for visual inspection. The results of the hydrologic analysis are provided in Appendix C.

Retention basins are required at various locations around the site and will be sized with appropriate safety factors to contain all surface water and prevent any discharge off the site based on the 100-year storm event discussed above. Disturbance from this project will be considered as a minimum of one hundred fifty feet away from Range Creek.

To minimize any infiltration, the retention basins must be lined with mine partings or other form of equivalent protection. The basins will maintain minimum of 3 ft of freeboard and will be regularly maintained to ensure design capacity.

To capture and contain all runoff during the 100-year storm event, eight retention basins were designed based on preliminary calculations for the site and assuming a 72-hr (hour) holding time. Table 3 presents the preliminary Q100 volume and peak inflow for each basin. These eight basins are shown on Figure 3. The ultimate configuration and detailed design will require a cursory review from State of Utah Department of Dam Safety. A more detailed analysis will need to be completed to verify assumptions made in this analysis at the design level. Operational control will allow the placement of retention facilities to be strategically placed based on site layout and these basins may be split into multiple locations.

Table 3. Summary of Hydrologic Results

Basin	Location	Peak Inflow 100-YR *(cfs)*	Total Volume 100-YR *(acre-ft)*
1	Mine Portal	5.0	0.4
2-5	Haul Road	5.1	0.4
6	Plant Site West	22.6	1.9
7	Plant Site East	22.6	1.9
8	Tailings	89.0	18.7

Notes: cfs = cubic feet per second; ft = feet

5.2 Erosion Control

Water that falls within the project areas will be separated from rainfall outside the project area using earthen berms with clay lining or suitable geomembrane. The earthen berms were conceptually designed for both containment of drainage runoff within the project area and to divert offsite flow. The preliminary conceptual design of the berms did not consider the effects of significant erosion or slope failure of any kind. Final engineering design of berms and ditches should be performed during final design.

Construct 4-ft high, earthen berms of clean native or import soil around the perimeter of any disturbance to ensure all runoff within the project area is diverted to a retention pond. Construct the berms with a 2-ft wide flat top with 2H:1V side slopes and be lined with a clean 2-ft thick clay liner. As an alternative, the berms may also be lined with a geo-membrane of suitable thickness to minimize ripping or puncture. The berms will not be constructed of topsoil and will be free of organic material. Channels to divert surface water will be integrated into the perimeter berms to minimize infiltration.

The tailings material and other disturbed soils have a very high potential to be suspended in runoff and erode quickly. Construct check dams to block sediment transport down the face of the tailings stockpile. Construct check dams measuring 3-ft in height of suitable rock. Inspect routinely and maintain as needed to insure proper performance. After the life of project is complete, construct a cap over the tailings material.

6.0 SLOPE STABILITY ANALYSIS RESULTS

6.1 Slope Stability Analysis Results

6.1.1 General

Slope stability analyses were performed for the maximum cross sections of the topsoil and permanent tailings stockpiles at the Bruin Point Mine Site. Two orthogonal sections of the permanent tailings stockpile and four sections of the topsoil stockpiles were examined using limit-equilibrium analyses.

The limit-equilibrium computer program Slide, version 6.005 by Rocscience, Inc. of Toronto, Canada, and Spencer's method of slices were used for the analyses. Spencer's method satisfies all conditions of static equilibrium, including horizontal and vertical force imbalance and moment imbalance. Search routines available within the software package were used to define circular trial shear surfaces. Additional noncircular trial shear surfaces were also examined to locate critical shear surfaces.

Preliminary conceptual drawings of the tailings and topsoil stockpiles were provided to URS by ASE. These drawings included cross sections of each stockpile (identified as A-A and/or B-B for each stockpile). Additional cross sections were developed by URS to include more critical stability cases (identified as A-A' and/or B-B'). The slope stability cross section locations used in the analyses are shown in Figure 4. Some of the preliminary conceptual A-A and B-B stockpile cross sections showed discontinuities and localized slope variations that are not typical of stockpile construction. Thus, some interpretation and line smoothing was performed in stability model development.

At final completion, the proposed tailings stockpile will be on the order of 430-ft high, 3,600-ft long, and 2,000-ft wide. The north and south topsoil stockpiles will be approximately 30- and 50-ft high, respectively.

Temporary plant site stockpile configurations were not provided to URS. However, plant stockpiles are anticipated to consist of loose or uncompacted mine tailings or tar sand ore awaiting processing or transportation to permanent stockpiles. As such, stability can be considered based on the angle of repose. The angle of repose is defined as the largest possible angle of incline for a slope of loose material or soil, which can be maintained without sliding under the force of gravity. This slope depends only on material properties (moisture, particle size, etc.) and is not affected by vertical confining pressure. Furthermore, slope failures tend to consist of sliding surficial particles or material rather than a larger slump failure. The mine tailings angle of repose was measured under various moisture conditions as provided to URS and included in Appendix B; however, a sample or measurement of the tar sand ore angle of repose was not provided to URS.

The local phreatic surface was presumed to be located in bedrock below each stockpile as no groundwater was observed in the subsurface explorations. Therefore, it is not expected to impact the stability of each stockpile. Furthermore, anticipated rain/snowfall in the area and the free-draining nature of the stockpile materials is believed to preclude the possibility of significant moisture accumulation in, or beneath, the stockpile or liner material.

6.1.2 Material Strength Characterization

A material strength characterization was performed to estimate the unit weight and drained-strength parameters of each material considered in the modeling process. The unit weight, drained cohesion, and drained friction angle of the materials were obtained from values measured in laboratory tests. Because soils at the site are expected to be unsaturated and stockpile construction above the clay liner is expected to take years to be completed, drained-strength parameters were used in the analyses to consider long-term loading conditions with the stockpiles in-place. A summary of material strength properties used to develop the stability model is provided in Table 4. In the case of seismic stability, the strength parameters of the clay liner were reduced by approximately 20 percent to conservatively account for cyclical softening of the clay due to ground shaking. The strength parameters of the bedrock, native topsoil, and tailings sand, were not reduced.

The strength parameters for bedrock were assumed based on published geologic descriptions of rock types in the area (limestone, siltstone, mudstone, sandstone, and shale). This is a conservative assumption as bedrock strength is unlikely to be the determining factor in stockpile stability. A minimum setback distance from the edge of the plateau of 25 feet was calculated based on rock mass dipping planes measured at the site. However, it is likely that operation constraints will dictate a larger setback distance.

During field investigations, native topsoil samples were collected on which laboratory tests were later performed. Because only one sample was tested, the cohesion was back-calculated from the laboratory test data assuming a drained friction angle, ϕ', of 28 degrees.

Preliminary direct shear testing was performed on tailings sand and proposed clay-liner samples provided to URS by ASE. The laboratory test results were used to estimate drained-strength parameters for the tailings sand and clay liner; however, the proposed clay-liner strength parameters are contingent on achieving acceptable permeability using proposed production methods and also based on very limited testing. As such, additional testing and analyses should be performed to provide higher reliability of the final design. If another suitable material must be selected to achieve adequate liner permeability, these analyses may no longer be appropriate.

Table 4. Material Properties for Slope Stability Analyses

Material Description	Unit Weight *(pcf)*	Cohesion, c′ *(psf)*	Drained Friction Angle, ϕ' *(deg)*
Bedrock	140	5,000	30
Native Topsoil	120	600	28
Tailings Sand	120	130	33
Clay Liner (Crushed Mine Partings)	125	735 / 590[1]	30 / 24[1]

Notes: pcf = pounds per cubic foot; psf = pounds per square foot; deg = degrees

1. Strength parameters (c′ and ϕ') were reduced by 20% in seismic-case stability analyses.

6.1.3 Slope Stability Results

Slope stability was considered for general stability of stockpile materials for large continuous uniform slopes, and for the preliminary conceptual cross sections as provided by ASE and discussed in Section 6.1.1. Each case also considered seismic stability for a 2,475-year seismic event (2% probability of exceedance in 50 years). The associated peak horizontal ground acceleration, PGA, was determined to be 0.174g (USGS, 2014). Seismic cases were modeled using a pseudo-static analysis, where dynamic earthquake loading simulated using a static force equal to the soil weight multiplied by a seismic coefficient, k. For the seismic analyses, the pseudo-static seismic coefficient was calculated as half the PGA.

6.1.3.1 Stability Results for Required Slope Angles

For each stockpile material, cross sections were developed with various slope angles to identify a required acceptable slope for each stockpile. The required slopes determined from each of the general stability models and associated factors of safety, by stockpile type, are presented in Table 5. Source information for Table 5 is included in Appendix D, Figures D1 through D4. The slope constraints shown in Table 5 should be applied to existing and future drawings and cross sections. The general slope analysis and results in Table 5 supersede all other analyses. See Sections 4.4 and 4.5 for more information about required slope angles.

Table 5. General Slope Stability Results

Stockpile Description	Slope	Static Factor of Safety	Seismic Factor of Safety
Native Topsoil	2.25H:1V or flatter	1.55	1.26
Tailings Sand	2.25H:1V or flatter	1.51	1.22

Notes: Target Static Factor of Safety = 1.5; Target Seismic Factor of Safety = 1.2

6.1.3.2 Stability Results of Preliminary Conceptual Cross Sections

For each of the three stockpiles (2 native topsoil stockpiles; 1 tailings stockpile), slope stability analyses were performed based on preliminary conceptual cross sections provided by the client and additional cross sections developed by URS as discussed in Section 6.1.1. On average, the preliminary conceptual tailings and topsoil stockpile slopes are flatter than the acceptable slope 2.25H:1V. However, the preliminary conceptual drawings should be revised to reflect the required 2.25H:1V slopes during final design.

Because a clay liner is expected to be constructed beneath the tailings stockpile, a well-defined planar layer will exist between the tailings stockpile and the natural bedrock. The clay liner should be expected to provide adequate resistance against sliding of the entire stockpile and noncircular failure surfaces shearing along the liner interface. To examine this case, a thin 4-foot-thick clay layer was modeled beneath the tailings stockpile extending well beyond the head and toe of the stockpile. An automated search for failure surfaces, which intersect all or part of the clay liner beneath the stockpile, was performed.

The results for both static and seismic loading of the preliminary conceptual cross sections provided by the client are presented in Table 6. Source information for Table 6 is included in Appendix D, Figures D5 through D20.

Table 6. Slope Stability Results of Proposed Conceptual Cross Sections

Stockpile Description	Section	Static Factor of Safety	Seismic Factor of Safety
Topsoil Stockpile No. 1	B-B	>3.0	2.70
Topsoil Stockpile No. 1	B-B′	2.57	2.05
Topsoil Stockpile No. 2	A-A	>3.0	>3.0
Topsoil Stockpile No. 2	A-A′	>3.0	2.74
Tailings Stockpile	A-A	1.51	1.23
Tailing Stockpile (Liner)[1]	A-A	1.72	1.24
Tailings Stockpile	B-B	1.82	1.44
Tailing Stockpile (Liner)[1]	B-B	2.91	1.96

Notes: Target Static Factor of Safety = 1.5; Target Seismic Factor of Safety = 1.2

1. For these cases the shear surfaces were forced to pass through the liner at the base of the tailings stockpile. This resulted in higher factors of safety compared to shear surfaces evaluated higher up in the model. See Appendix D for more information.

6.2 Kinematic Analysis Results

6.2.1 General

A preliminary kinematic analysis of the predominate joints and fractures was performed based on observations collected in the field. The mine portal will be constructed in accordance with MSHA regulations and constructed in a way to prevent any rockfall.

6.2.2 Mine Portal Opening Orientation

The mine portal opening will be aligned parallel to the strike of the predominant joint set and the dip of the portal face will also be designed to parallel the predominant dip of the near-vertical fractures. Detailed drawings of the portal orientation were not available for review at the time of this report. The mine portal opening will be constructed in a way that meets MSHA standards.

Due to the exfoliation visible at the surface, pattern-rock bolting and cable mesh will be incorporated into the design of the portal face. Stabilization using shotcrete is not recommended because of the potential to building pore pressure behind the shotcrete over time.

6.2.3 Mine Portal Opening Protection

Mine portal protection is paramount for safe operations in the vicinity of the mine entrance. The mine portal will be prepared and developed by removal and stabilization of loose and fractured surface rock, with which may include the following:

- Benching of the upslope rock/soil face.
- Installation of high-resistance and high-capacity rockfall catchment fences and containment wire mesh positioned upslope of the mine portal.

7.0 CONCLUSION

The design criteria contained in this report are based on URS field investigations, preliminary stability and hydrologic analyses, and engineering judgment. The design criteria may be utilized to provide response to DOGM in support of approval of the NOI (URS, 2014). However, the engineering analyses provided herein are not adequate for final design and construction as they are based on initial data and preliminary design information.

7.1 LIMITATIONS

The recommendations contained in this report are based on the limited field investigation and laboratory testing agreed to in the project scope, and on our understanding of the proposed preliminary construction plans provided to us. There is an inherent potential for variability in the subsurface materials and conditions that exist between points investigated as well as in the properties of the materials themselves. It is not practical or possible to obtain a large enough sampling to eliminate the risk of variation. Logs of subsurface conditions, collected samples, and test results should be considered a limited sampling of existing materials that may not fully represent the actual range of conditions.

Additional engineering services are recommended to assist in design optimization for the project. These services should include additional investigation, sampling and testing to better characterize subsurface material and conditions and reduce the risk of significant variation. URS represents that its services are performed within the limitations prescribed by ASE, in a manner consistent with the level of care and skill ordinarily exercised by other professional consultants under similar circumstances. No other representation to the American Sands Energy Corp., expressed or implied, and no warranty or guarantee is included or intended. URS does not assume responsibility for the accuracy of project information provided by others.

This report may not contain sufficient information for purposes of other parties or for other uses. This information is not to be used for bidding purposes. The scope of work did not include an investigation of potential geoenvironmental hazards such as soil and/or groundwater contamination, or the potential for hazardous materials at the site.

8.0 REFERENCES

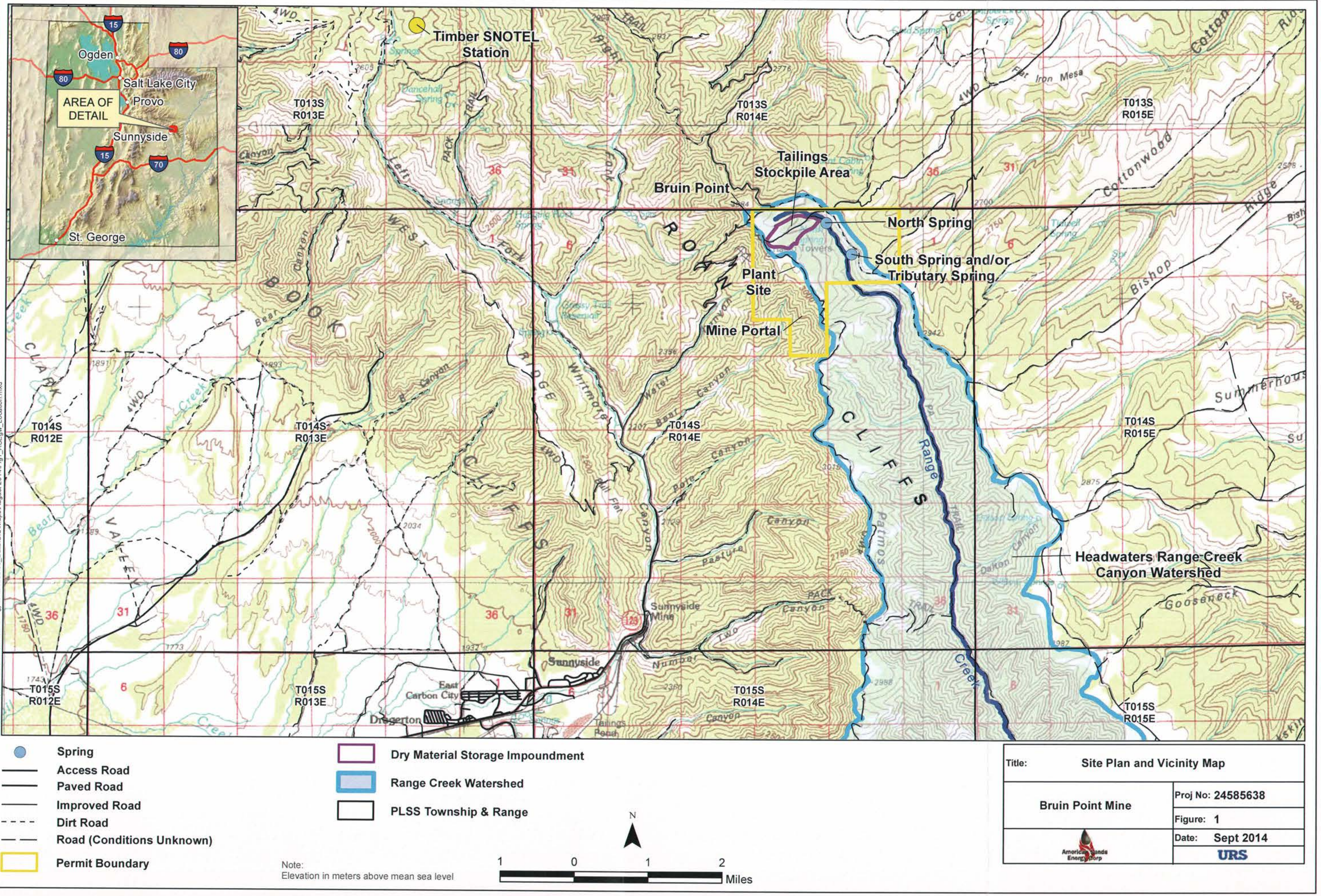
Morrison Knudsen. 1984. Sunnyside Tar Sands Project: 1983 Geologic Evaluation. Boise, Idaho.

Stokes, William Lee. 1986. Geology of Utah. 1st ed. Salt Lake City, Utah: Utah Museum of Natural History and Utah Geological and Mineral Survey.

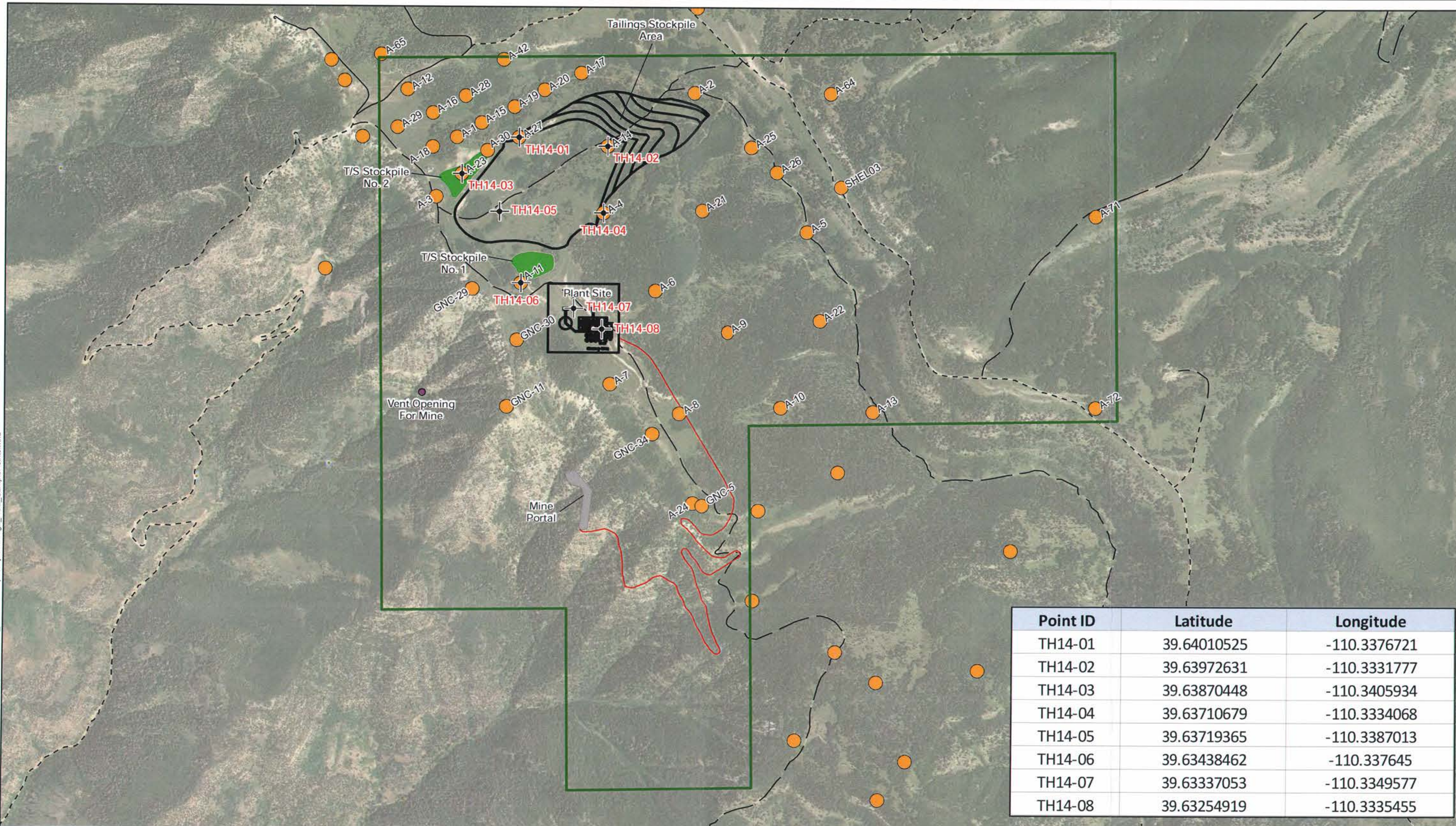
United States Geological Survey (USGS). 2014. "2008 Interactive Deaggregations." http://geohazards.usgs.gov/deaggint/2008/.

URS Corporation, and Mine Engineers, Inc. 2014. "Notice of Intention To Commence Large Mining Operations: Bruin Point Mine". Salt Lake City, Utah: American Sands Energy Corporation.

Wyrick, G.G., and J.W. Borchers. 1981. Hydrologic effects of stress-relief fracturing in an Appalachian Valley. US Geological Survey Water-Supply Paper 2177, US Government Printing Office.



Title:	Site Plan and Vicinity Map	
Bruin Point Mine	Proj No: 24585638	
	Figure: 1	
American Sands Energy Corp	Date: Sept 2014	URS



Point ID	Latitude	Longitude
TH14-01	39.64010525	-110.3376721
TH14-02	39.63972631	-110.3331777
TH14-03	39.63870448	-110.3405934
TH14-04	39.63710679	-110.3334068
TH14-05	39.63719365	-110.3387013
TH14-06	39.63438462	-110.337645
TH14-07	39.63337053	-110.3349577
TH14-08	39.63254919	-110.3335455

Title: Investigation Location Map

Bruin Point Mine

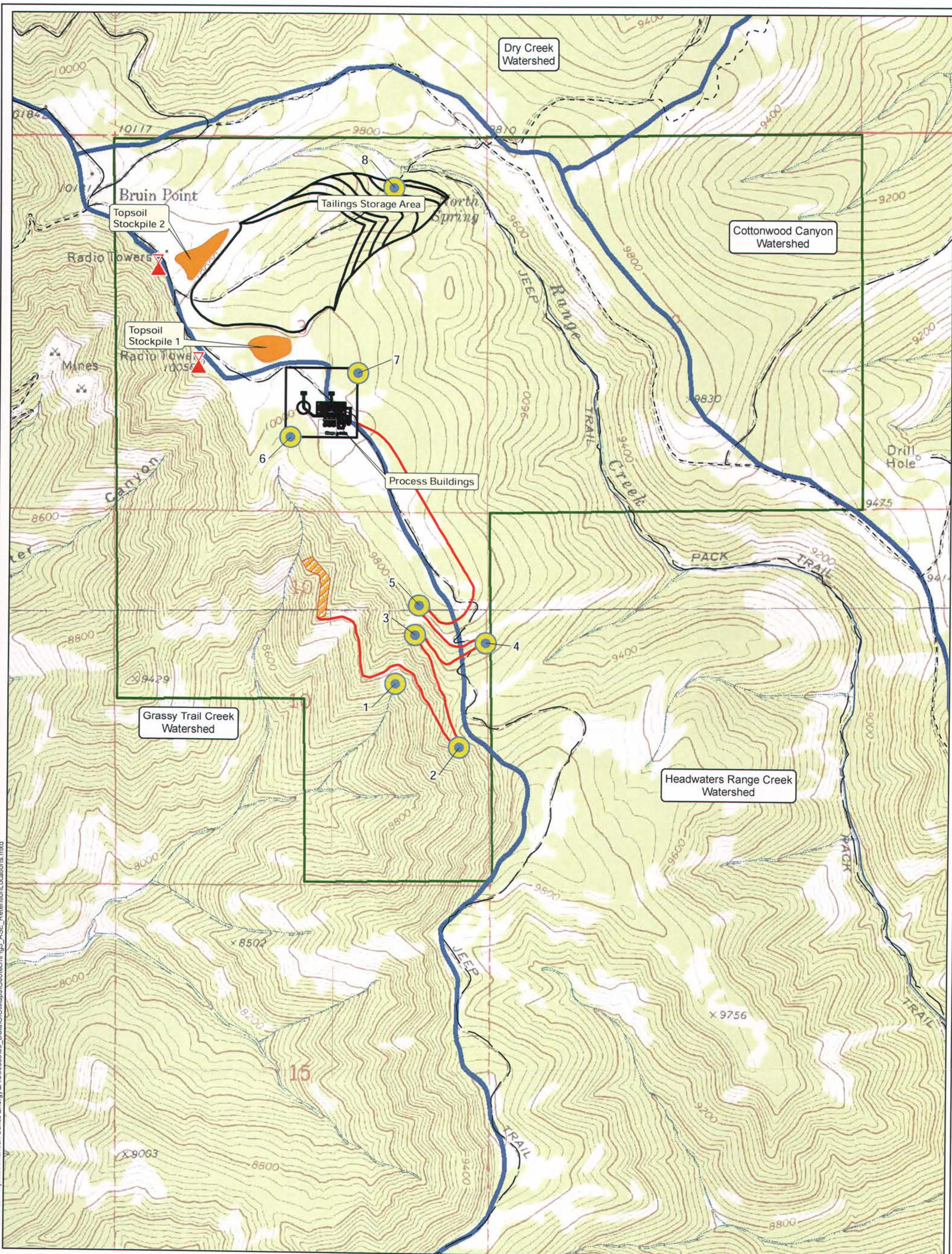
Proj No: 24585638

Figure: 2

Date: February 2015

American Sands Energy Corp

URS

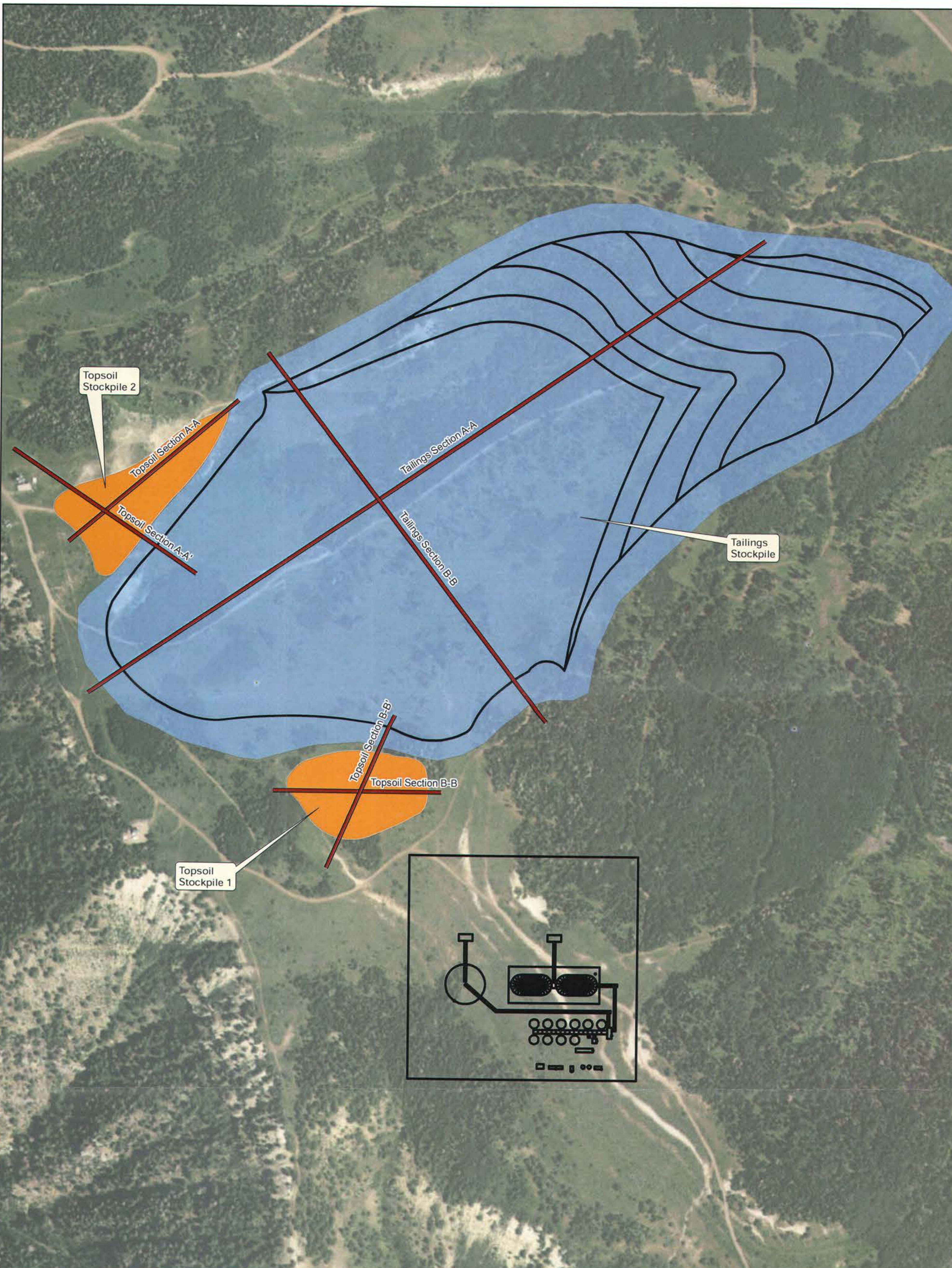


Affected Area
Mine Haul Road
Perennial Stream
Intermittent Stream
Watershed Boundary
Top Soil Removal
Portal Pad
Topsoil Stockpile
Improved Road
Dirt Road
Road (Conditions Unknown)
Radio Tower
Retention Basin

N

625 0 625 1,250 Feet

Title:	Mine Plan Map
Bruin Point Mine Retention Basin Locations	Proj No: 24585638
	Figure: 3
American Sands Energy Corp	Date: February 2015
	URS



Path: Q:\Projects\American Sands Energy\24585638\09_Data\GIS\Maps\Geotech\Cross Sections\SlopeStabilitySectionMap.mxd

Aerial Imagery Source: USDA NAIP 1-meter, 2011

Topsoil Stockpile

Tailings Stockpile

Slope Stabilitiy Cross-Section Line

0 400 800 Feet

N

Title: Slope Stability Cross-Section Map	
Bruin Point Mine	Proj No: 24585638
	Figure: 4
American Sands Energy Corp	Date: February 2015
	URS

Surface and Shallow Soil Sampling Log

URS

Log ID: TH14-01	
US State Plane, Utah Central, NAD 83	
Northing: 7,039,763 ft	
Easting: 1,967,721 ft	**Elevation:** 9,982 ft

General Information

Project Number: 24585638	**Project Name:** Bruin Point Mine	**Page:** 1 of 1
Location: 39.64010525, -110.3376721; Vicinity of A-27		**Date:** 08/11/14
Field Investigator: Ethan Lamiman		
Sampling Excavation Method: Bobcat E45 Excavator	**Sampling Method:** Grab	
Depth of Excavation: 29"	**Depth to Water:** Not Encountered	**Backfill Material:** Spoils

Sample Information

Depth (in)	Lithologic Description	Comments /Analysis Results
0-7	**Surficial Soil**, Dark Brown Clay with little sand, trace organics and root hairs, dry to moist	
7-12	Dark Brown to Brown, Fat CLAY (CH), trace to little fine sand , moist	Bag Sample Collected @1'
12-29	Interbedded Clay (CH) and Claystone/MudStone, horizontally bedded, 2-4" thicknesses, moist	
29	Rock	Refusal/ Terminated @ 29"

Photograph/Sketch

Description

View of test pit TH14-01.

Recorded By: E. Lamiman	Date 08/11/14	Checked By: D. Pond	Date: 8/24/14

Surface and Shallow Soil Sampling Log

URS

Log ID: TH14-03	
US State Plane, Utah Central, NAD 83	
Northing: 7,039,242 ft	
Easting: 1,966,905 ft	Elevation: 10,035 ft

General Information

Project Number: 24585638	**Project Name:** Bruin Point Mine	**Page:** 1 of 1
Location: 39.63870448, -110.3405934; Vicinity of A-23		**Date:** 08/11/14
Field Investigator: Ethan Lamiman		
Sampling Excavation Method: Bobcat E45 Excavator	**Sampling Method:** Grab	
Depth of Excavation: 46"	**Depth to Water:** Not Encountered	**Backfill Material:** Spoils

Sample Information

Depth (in)	Lithologic Description	Comments /Analysis Results
0-9	**Surficial Soil**, Dark Brown Clay with little sand, trace organics and root hairs, dry to moist	
9-46	Brown, Fat CLAY (CH), trace to little fine sand, trace cobble 3-10" diameter, semi-angular, moist	Bag Sample Collected @ 1' W=16.4%, F= 82.0%, LL=57, PL=26, PI=31
46	Rock	Refusal/ Terminated @ 46" Sample Collected – Fragmented Rock

Photograph/Sketch

Description

View of test pit TH14-03.

Recorded By: E. Lamiman	Date 08/11/14	Checked By: D. Pond	Date: 8/24/14

Surface and Shallow Soil Sampling Log	URS	Log ID: TH14-04
		US State Plane, Utah Central, NAD 83
		Northing: 7,038,686 ft
		Easting: 1,968,936 ft / Elevation: 9,977 ft

General Information

Project Number: 24585638	**Project Name:** Bruin Point Mine	**Page:** 1 of 1
Location: 39.63710679, -110.3334068; Vicinity of A-4		**Date:** 08/11/14
Field Investigator: Ethan Lamiman		
Sampling Excavation Method: Bobcat E45 Excavator	**Sampling Method:** Grab	
Depth of Excavation: 72”	**Depth to Water:** Not Encountered	**Backfill Material:** Spoils

Sample Information

Depth (in)	Lithologic Description	Comments /Analysis Results
0-7	**Surficial Soil**, Dark Brown Clay with little sand, trace organics and root hairs, dry to moist	
7-24	Brown, Clayey SAND (SC), little fine to coarse gravel, moist	Bag Sample Collected @ 1’ W=7.9%, F=45.2%, LL=35, PL=24, PI=11
24-72	Brown, Clayey SAND (SC), little fine to coarse gravel, contains cobble 3-10” diameter , moist	Bag Sample Collected @ 3’ W=13.1%, F=26.1%, LL=37, PL=23, PI=14
72	Rock	Refusal/Boring Terminated @ 6’ Sample Collected – Fragmented Rock

Photograph/Sketch

Description

View of test pit TH14-04.

Recorded By: E. Lamiman	Date 08/11/14	Checked By: D. Pond	Date: 8/24/14

Surface and Shallow Soil Sampling Log

URS

Log ID: TH14-05	
US State Plane, Utah Central, NAD 83	
Northing: 7,038,699 ft	
Easting: 1,967,445 ft	Elevation: 9,925 ft

General Information

Project Number: 24585638	**Project Name:** Bruin Point Mine	**Page:** 1 of 1
Location: 39.63719365, -110.3387013		**Date:** 08/11/14
Field Investigator: Ethan Lamiman		
Sampling Excavation Method: Bobcat E45 Excavator	**Sampling Method:** Grab	
Depth of Excavation: 96"	**Depth to Water:** Not Encountered	**Backfill Material:** Spoils

Sample Information

Depth (in)	Lithologic Description	Comments /Analysis Results
0-8	**Surficial Soil**, Dark Brown Clay with little sand, trace organics and root hairs, dry to moist	
8-42	Brown, Clayey SAND (SC), little fine to coarse gravel, moist	
42-96 @66 Below 66"	Light Tan to Gray, LEAN CLAY (CL), trace fine sand, trace fine to coarse gravel, moist -2-3" thick rock shelf, moderately soft siltstone -same: Lean Clay (CL) contains small 2-4" angular siltstone and cobble below 66", moist	Bag Sample Collected @ 3.75' W=16.7%, F=60.5%, LL=40, PL=21, PI=19
96	Rock	Boring Terminated @ 8'

Photograph/Sketch

Description

View of test pit TH14-05

Recorded By: E. Lamiman	Date 08/11/14	Checked By: D. Pond	Date: 8/24/14

Surface and Shallow Soil Sampling Log

URS

Log ID: TH14-06	
US State Plane, Utah Central, NAD 83	
Northing: 7,037,679 ft	
Easting: 1,967,755 ft	**Elevation:** 10,056 ft

General Information

Project Number: 24585638	**Project Name:** Bruin Point Mine	**Page:** 1 of 1
Location: 39.63438462, -110.3376450; Vicinity of A-11		**Date:** 08/11/14
Field Investigator: Ethan Lamiman		
Sampling Excavation Method: Bobcat E45 Excavator	**Sampling Method:** Grab	
Depth of Excavation: 20"	**Depth to Water:** Not Encountered	**Backfill Material:** Spoils

Sample Information

Depth (in)	Lithologic Description	Comments /Analysis Results
0-10	**Surficial Soil**, Dark Brown Clay with little sand, trace organics and root hairs, dry to moist	
10-12	Brown, Clayey SAND (SC), trace fine to coarse gravel, moist	
12-20	Tan to Brown to Dark Brown Mudstone, moist	Bag Sample Collected @ 1.5'
20	Rock	Refusal/ Terminated @ 20"

Photograph/Sketch

Description

View of test pit TH14-06.

Recorded By: E. Lamiman	Date 08/11/14	Checked By: D. Pond	Date: 8/24/14

Surface and Shallow Soil Sampling Log

URS

Log ID: TH14-07	
US State Plane, Utah Central, NAD 83	
Northing: 7,037,320 ft	
Easting: 1,968,517 ft	**Elevation:** 10,027 ft

General Information

Project Number: 24585638	**Project Name:** Bruin Point Mine	**Page:** 1 of 1
Location: 39.63337053, -110.3349577; Vicinity of Proposed Plant Site		**Date:** 08/11/14
Field Investigator: Ethan Lamiman		
Sampling Excavation Method: Bobcat E45 Excavator	**Sampling Method:** Grab	
Depth of Excavation: 69"	**Depth to Water:** Not Encountered	**Backfill Material:** Spoils

Sample Information

Depth (in)	Lithologic Description	Comments /Analysis Results
0-10	**Surficial Soil**, Dark Brown Clay with little sand, trace organics and root hairs, dry to moist	
10-36	Tan to White, Calcareous Sandstone shelf, highly weathered, ripable with excavator bucket, dry to moist	
36-69	Soft Siltstone/Mudstone, moist	Sample collected @ 3.5'
69	Rock	Refusal/ Terminated @ 5'9"

Photograph/Sketch

Description

View of test pit TH14-07.

Left Photo: Top of sandstone shelf at 10"

Right Photo: To bottom of excavation

Recorded By: E. Lamiman	Date 08/11/14	Checked By: D. Pond	Date: 8/24/14

Surface and Shallow Soil Sampling Log

URS

Log ID: TH14-08	
US State Plane, Utah Central, NAD 83	
Northing: 7,037,026 ft	
Easting: 1,968,918 ft	Elevation: 10,015 ft

General Information

Project Number: 24585638	**Project Name:** Bruin Point Mine	**Page:** 1 of 1
Location: 39.63254919, -110.3335455; Vicinity of Proposed Plant Site		**Date:** 08/11/14
Field Investigator: Ethan Lamiman		
Sampling Excavation Method: Bobcat E45 Excavator	**Sampling Method:** Grab	
Depth of Excavation: 64”	**Depth to Water:** Not Encountered	**Backfill Material:** Spoils

Sample Information

Depth (in)	Lithologic Description	Comments /Analysis Results
0-7	**Surficial Soil**, Dark Brown Clay with little sand, trace organics and root hairs	
7-12	Fine to coarse gravel, unnaturally bedded: possible disturbed material	Subsurface observed to be disturbed, offset 15’ ESE into vegetated area.
0-10	**Surficial Soil**, Dark Brown Clay with little sand, trace organics and root hairs	
10-36	Brown, Clayey SAND (SC), little fine to coarse gravel, moist	
36-64	Tan to White, Calcareous Sandstone shelf, highly weathered, ripable with excavator bucket, dry to moist	Bag Sample Collected @ 3’
64	Rock	Refusal/ Terminated @ 5’4”

Photograph/Sketch

Description

View of test pit TH14-08.

Recorded By: E. Lamiman	Date 08/11/14	Checked By: D. Pond	Date: 8/24/14

APENDIX B

LABORATORY TEST RESULTS

Water Content and Unit Weight of Soil

(In General Accordance with ASTM D7263 Method B and D2216)

IGES

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/20/2014
By: JDF

Sample Info.	Boring No.	TH14-03	TH14-04	TH14-04	TH14-05				
	Sample	3	4	5	6				
	Depth	1'	1.5'	3'	3.75'				
	Split	No	Yes	Yes	Yes				
	Split sieve		No.4	3/4"	3/8"				
	Total sample (g)		568.29	1274.42	880.96				
	Moist coarse fraction (g)		87.50	357.03	66.36				
	Moist split fraction (g)		480.79	917.39	814.60				
	Sample height, H (in)								
	Sample diameter, D (in)								
	Mass rings + wet soil (g)								
	Mass rings/tare (g)								
	Moist unit wt., γ_m (pcf)								
Coarse Fraction	Wet soil + tare (g)		212.47	478.43	194.45				
	Dry soil + tare (g)		208.63	444.90	190.81				
	Tare (g)		124.96	121.41	128.08				
	Water content (%)		4.6	10.4	5.8				
Split Fraction	Wet soil + tare (g)	363.41	259.65	618.44	550.74				
	Dry soil + tare (g)	330.33	249.25	559.18	486.98				
	Tare (g)	128.53	127.05	140.31	126.79				
	Water content (%)	16.4	8.5	14.1	17.7				
	Water Content, w (%)	**16.4**	**7.9**	**13.1**	**16.7**				
	Dry Unit Wt., γ_d (pcf)								

Entered by:___________

Reviewed:___________

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Liquid Limit, Plastic Limit, and Plasticity Index of Soils
(ASTM D4318)

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/20/2014
By: BRR

Boring No.: TH14-03
Sample: 3
Depth: 1'
Description: Brown fat clay

Preparation method: Wet
Liquid limit test method: Multipoint

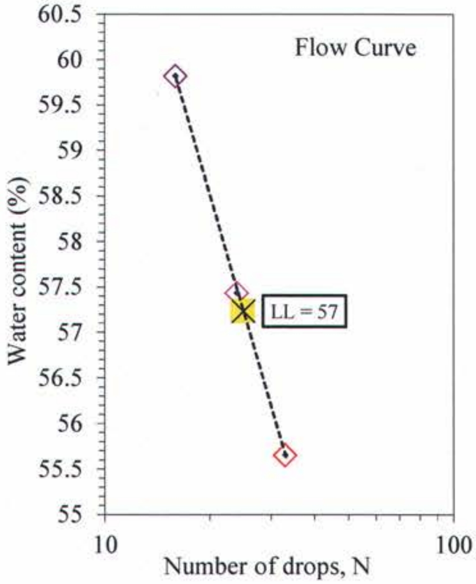
Plastic Limit

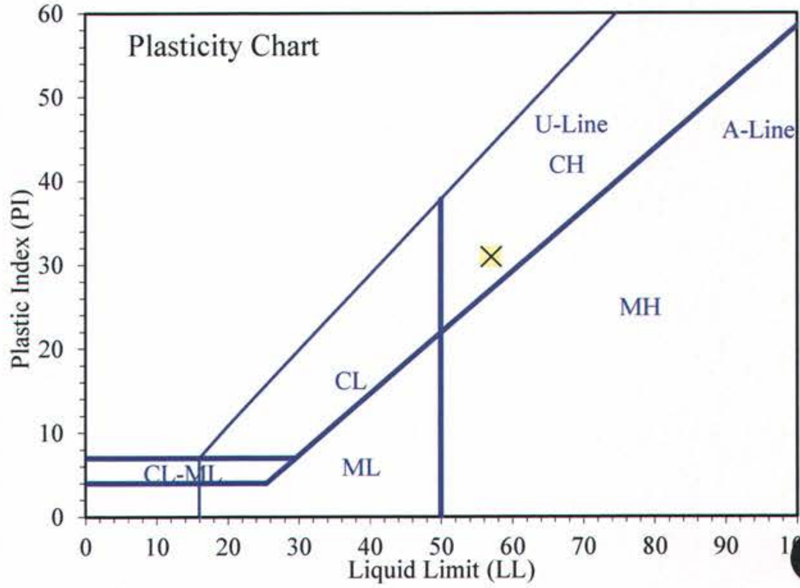
Determination No	1	2				
Wet Soil + Tare (g)	31.30	29.24				
Dry Soil + Tare (g)	29.41	27.77				
Water Loss (g)	1.89	1.47				
Tare (g)	22.11	22.18				
Dry Soil (g)	7.30	5.59				
Water Content, w (%)	25.89	26.30				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	33	24	16			
Wet Soil + Tare (g)	29.14	30.42	28.93			
Dry Soil + Tare (g)	26.58	27.37	26.25			
Water Loss (g)	2.56	3.05	2.68			
Tare (g)	21.98	22.06	21.77			
Dry Soil (g)	4.60	5.31	4.48			
Water Content, w (%)	55.65	57.44	59.82			
One-Point LL (%)		57				

Liquid Limit, LL (%)	**57**
Plastic Limit, PL (%)	**26**
Plasticity Index, PI (%)	**31**





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Reviewed:___________

Liquid Limit, Plastic Limit, and Plasticity Index of Soils
(ASTM D4318)

IGES

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/20/2014
By: BRR

Boring No.: TH14-04
Sample: 4
Depth: 1.5'
Description: Brown lean clay

Preparation method: Wet
Liquid limit test method: Multipoint

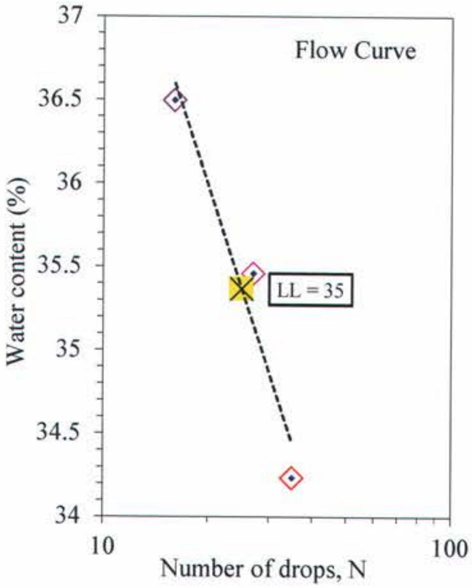
Plastic Limit

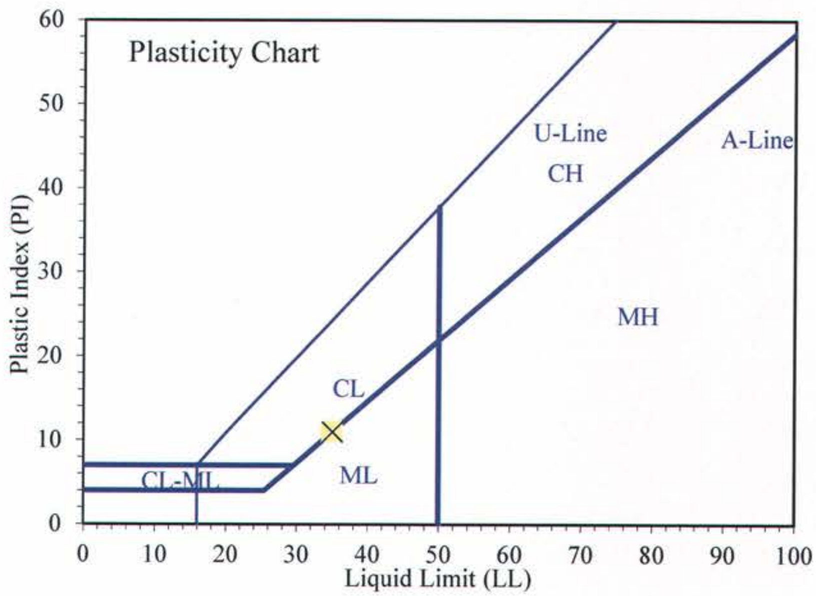
Determination No	1	2				
Wet Soil + Tare (g)	30.39	31.14				
Dry Soil + Tare (g)	28.74	29.34				
Water Loss (g)	1.65	1.80				
Tare (g)	21.80	21.65				
Dry Soil (g)	6.94	7.69				
Water Content, w (%)	23.78	23.41				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	35	27	16			
Wet Soil + Tare (g)	30.83	28.32	30.34			
Dry Soil + Tare (g)	28.55	26.65	28.11			
Water Loss (g)	2.28	1.67	2.23			
Tare (g)	21.89	21.94	22.00			
Dry Soil (g)	6.66	4.71	6.11			
Water Content, w (%)	34.23	35.46	36.50			
One-Point LL (%)		36				

Liquid Limit, LL (%)	**35**
Plastic Limit, PL (%)	**24**
Plasticity Index, PI (%)	**11**





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Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/20/2014
By: BRR

Boring No.: TH14-04
Sample: 5
Depth: 3'
Description: Brown lean clay

Preparation method: Wet
Liquid limit test method: Multipoint

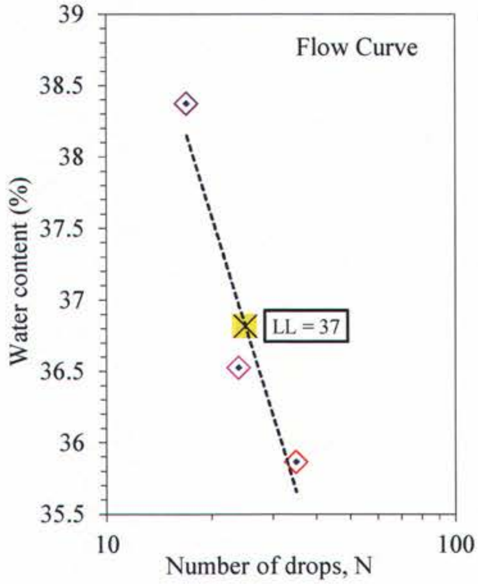
Plastic Limit

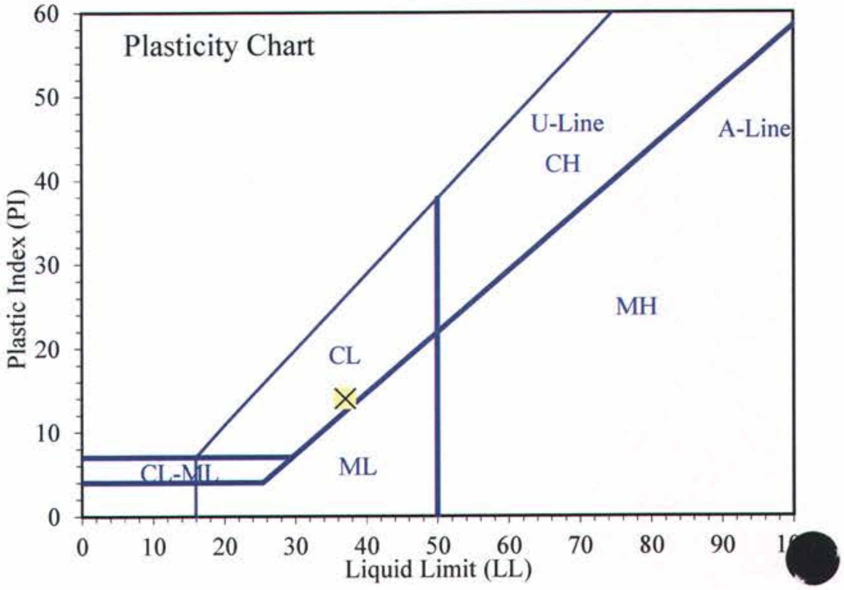
Determination No	1	2				
Wet Soil + Tare (g)	30.58	31.42				
Dry Soil + Tare (g)	28.99	29.55				
Water Loss (g)	1.59	1.87				
Tare (g)	22.16	21.47				
Dry Soil (g)	6.83	8.08				
Water Content, w (%)	23.28	23.14				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	35	24	17			
Wet Soil + Tare (g)	30.47	30.50	30.49			
Dry Soil + Tare (g)	28.25	28.25	28.13			
Water Loss (g)	2.22	2.25	2.36			
Tare (g)	22.06	22.09	21.98			
Dry Soil (g)	6.19	6.16	6.15			
Water Content, w (%)	35.86	36.53	38.37			
One-Point LL (%)		36				

Liquid Limit, LL (%)	**37**
Plastic Limit, PL (%)	**23**
Plasticity Index, PI (%)	**14**





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Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

IGES

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/20/2014
By: BRR

Boring No.: TH14-05
Sample: 6
Depth: 3.75'
Description: Brown lean clay

Preparation method: Wet
Liquid limit test method: Multipoint

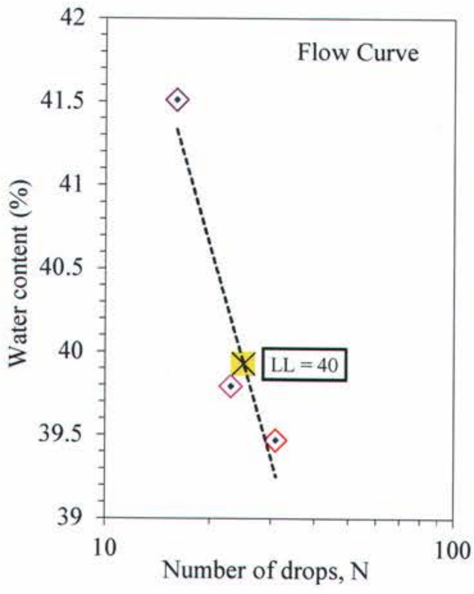
Plastic Limit

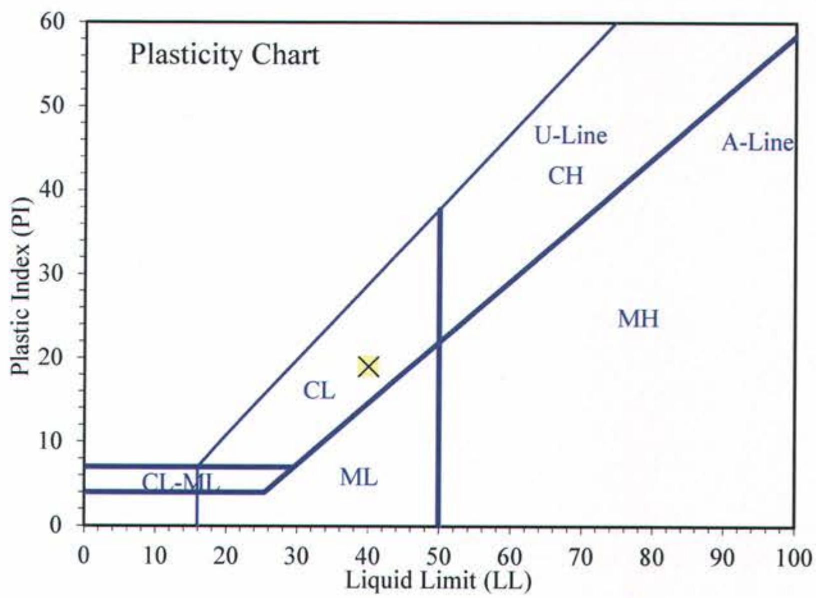
Determination No	1	2				
Wet Soil + Tare (g)	29.19	29.93				
Dry Soil + Tare (g)	27.94	28.59				
Water Loss (g)	1.25	1.34				
Tare (g)	22.01	22.20				
Dry Soil (g)	5.93	6.39				
Water Content, w (%)	21.08	20.97				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	31	23	16			
Wet Soil + Tare (g)	30.59	29.96	30.93			
Dry Soil + Tare (g)	28.21	27.66	28.24			
Water Loss (g)	2.38	2.30	2.69			
Tare (g)	22.18	21.88	21.76			
Dry Soil (g)	6.03	5.78	6.48			
Water Content, w (%)	39.47	39.79	41.51			
One-Point LL (%)		39				

Liquid Limit, LL (%)	**40**
Plastic Limit, PL (%)	**21**
Plasticity Index, PI (%)	**19**





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Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

IGES

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/25/2014
By: BRR

Boring No.: Parting
Sample: 1
Depth:
Description: Grey lean clay

Preparation method: Wet
Liquid limit test method: Multipoint

Plastic Limit

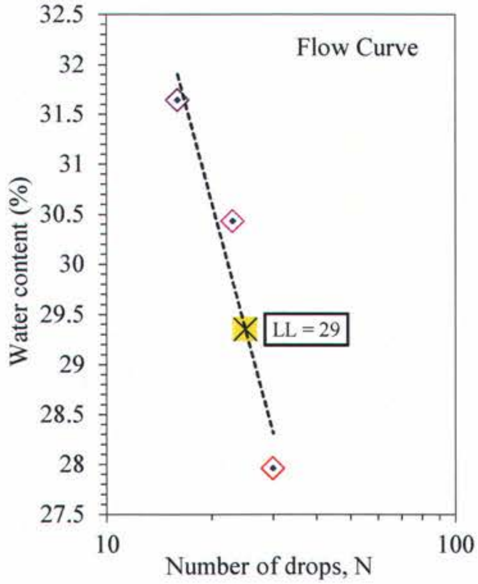
Determination No	1	2				
Wet Soil + Tare (g)	31.71	29.70				
Dry Soil + Tare (g)	30.09	28.43				
Water Loss (g)	1.62	1.27				
Tare (g)	22.25	22.26				
Dry Soil (g)	7.84	6.17				
Water Content, w (%)	20.66	20.58				

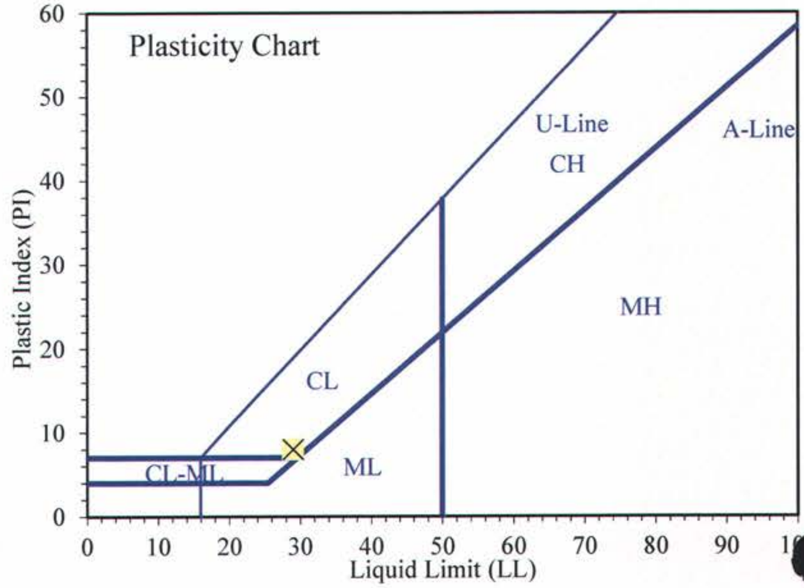
Liquid Limit

Determination No	1	2	3			
Number of Drops, N	30	23	16			
Wet Soil + Tare (g)	30.45	30.63	31.37			
Dry Soil + Tare (g)	28.49	28.60	29.06			
Water Loss (g)	1.96	2.03	2.31			
Tare (g)	21.48	21.93	21.76			
Dry Soil (g)	7.01	6.67	7.30			
Water Content, w (%)	27.96	30.43	31.64			
One-Point LL (%)	29	30				

Liquid Limit, LL (%)	**29**
Plastic Limit, PL (%)	**21**
Plasticity Index, PI (%)	**8**

Comments:
Test specimen created by crushing core sample.





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Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

(ASTM D6913)

IGES

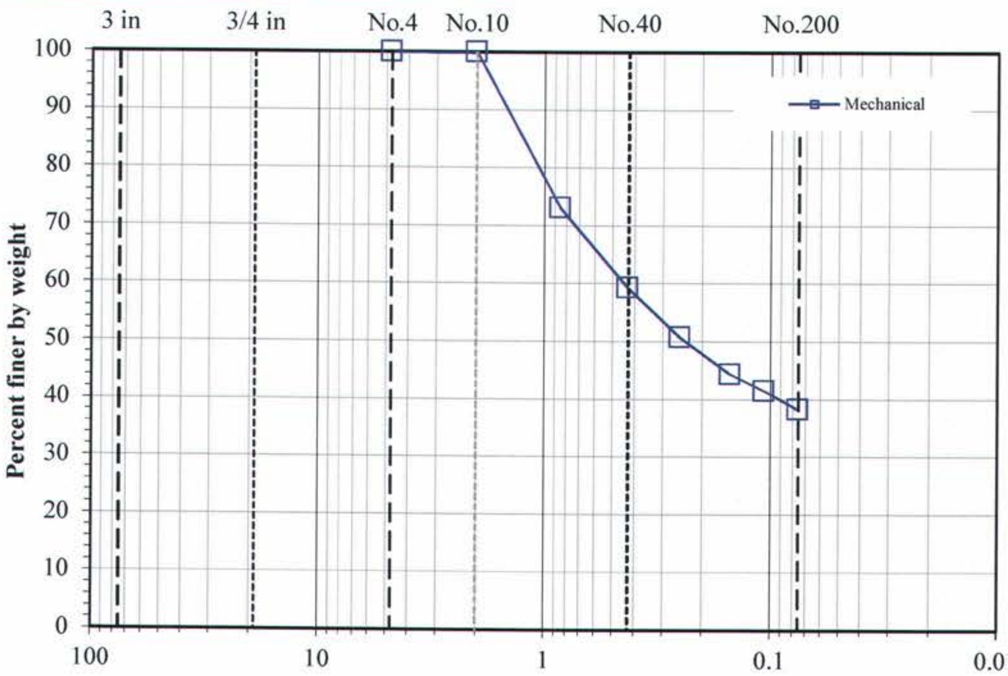
Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/22/2014
By: NB

Boring No.: Parting
Sample: 1
Depth:
Description: Light grey clayey sand

Split:	No	
	-	
	Moist	Dry
Total sample wt. (g):	129.79	124.68
Split fraction:	1.000	

Water content data		
Moist soil + tare (g):	-	596.81
Dry soil + tare (g):	-	591.70
Tare (g):	-	467.02
Water content (%):	0.0	4.1

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer
8"	-	200	-
6"	-	150	-
4"	-	100	-
3"	-	75	-
1.5"	-	37.5	-
3/4"	-	19	-
3/8"	-	9.5	-
No.4	-	4.75	100.0
No.10	0.12	2	99.9
No.20	33.63	0.85	73.0
No.40	50.87	0.425	59.2
No.60	61.53	0.25	50.6
No.100	69.43	0.15	44.3
No.140	73.04	0.106	41.4
No.200	77.05	0.075	38.2



Gravel (%): 0.0
Sand (%): 61.8
Fines (%): 38.2

Comments:
Test specimen created by crushing core sample.

Entered by:___________
Reviewed:___________

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Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

(ASTM D6913)

IGES

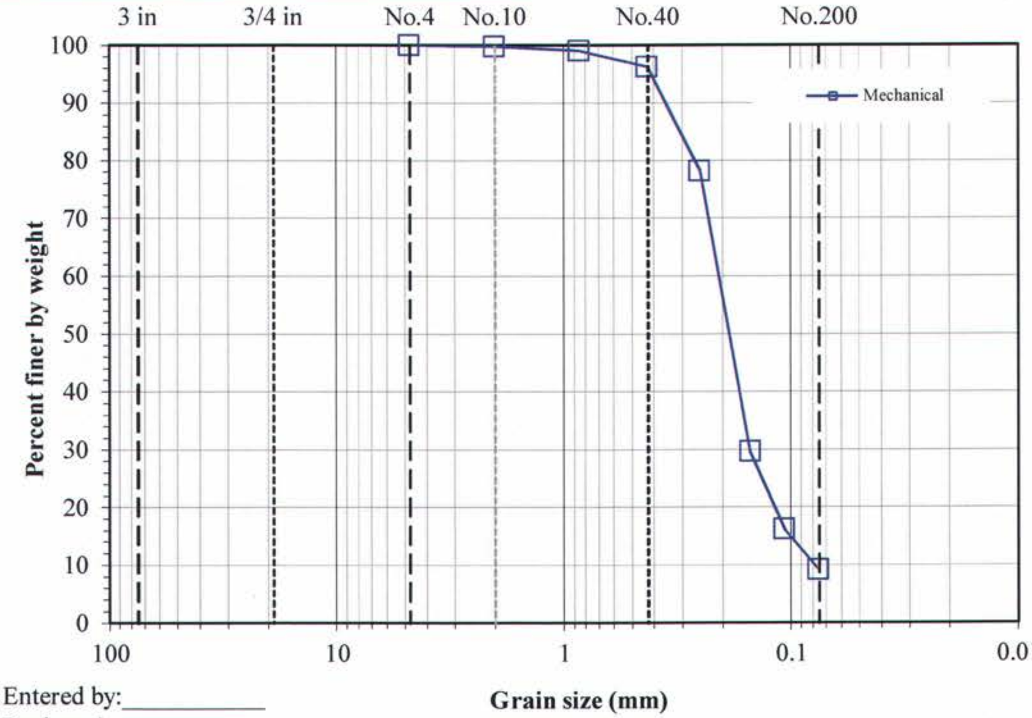
Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/22/2014
By: NB

Boring No.: Tailings
Sample: 2
Depth:
Description: Brown sand with silt

Split:	No	
	-	
	Moist	Dry
Total sample wt. (g):	293.32	289.04
Split fraction:	1.000	

Water content data		
Moist soil + tare (g):	-	624.08
Dry soil + tare (g):	-	619.80
Tare (g):	-	330.76
Water content (%):	0.0	1.5

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer
8"	-	200	-
6"	-	150	-
4"	-	100	-
3"	-	75	-
1.5"	-	37.5	-
3/4"	-	19	-
3/8"	-	9.5	-
No.4	-	4.75	100.0
No.10	0.74	2	99.7
No.20	2.85	0.85	99.0
No.40	10.91	0.425	96.2
No.60	63.00	0.25	78.2
No.100	203.45	0.15	29.6
No.140	242.34	0.106	16.2
No.200	262.62	0.075	9.1



Gravel (%): 0.0
Sand (%): 90.9
Fines (%): 9.1

Entered by:___________
Reviewed:___________

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Amount of Material in Soil Finer than the No. 200 (75μm) Sieve

(ASTM D1140)

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/20/2014
By: JDF

Sample Info.	Boring No.	TH14-03	TH14-04	TH14-04	TH14-05				
	Sample	3	4	5	6				
	Depth	1'	1.5'	3'	3.75'				
	Split	No	Yes	Yes	Yes				
	Split Sieve*		No. 4	3/4"	3/8"				
	Method	A	A	A	A				
	Moist total sample wt. (g)	234.88	568.30	1274.42	880.96				
	Moist coarse fraction (g)		85.06	350.52	65.48				
	Moist split fraction + tare (g)		259.65	618.44	550.74				
	Split fraction tare (g)		127.05	140.31	126.79				
	Dry split fraction (g)		122.20	418.87	360.19				
	Dry retained No. 200 + tare (g)	164.82	183.92	406.70	249.78				
	Wash tare (g)	128.53	127.05	140.31	126.79				
	No. 200 Dry wt. retained (g)	36.29	56.87	266.39	122.99				
	Split sieve* Dry wt. retained (g)		81.33	317.60	61.89				
	Dry total sample wt. (g)	201.80	526.67	1126.99	754.72				
Coarse Fraction	Moist soil + tare (g)		212.47	478.43	194.45				
	Dry soil + tare (g)		208.63	444.90	190.81				
	Tare (g)		124.96	121.41	128.08				
	Water content (%)		4.59	10.37	5.80				
Split Fraction	Moist soil + tare (g)	363.41	259.65	618.44	550.74				
	Dry soil + tare (g)	330.33	249.25	559.18	486.98				
	Tare (g)	128.53	127.05	140.31	126.79				
	Water content (%)	16.39	8.51	14.15	17.70				
	Percent passing split sieve* (%)		**84.6**	**71.8**	**91.8**				
	Percent passing No. 200 sieve (%)	**82.0**	**45.2**	**26.1**	**60.5**				

Entered by:___________

Reviewed:___________

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Specific Gravity of Soil Solids by Water Pycnometer

(ASTM D854)

IGES

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/27/2014
By: DKS

Drill hole / Sample:	Parting	Tailings				
Sample No:	1	2				
Depth (ft)						
Engineering Classification	Not req.	Not req.				
Method	A	A				
Material passing No. 4 seive, P (%)	100	100				
Pycnometer No.	8	1				
Mass of pycnometer (g)	188.92	167.64				
Mass of pycnometer, soil, and water, $M_{\rho ws,t}$ (g)	721.54	711.16				
Temperature, T_t (°C)	21.2	21.2				
Mass of pycnometer and water at test temperature, $M_{pw,t}$ (g)	687.61	666.08				
Mass of tare + dry soil (g)	382.76	401.44				
Mass of tare (g)	328.33	328.97				
Mass of soil, M_s (g)	54.43	72.47				
Specific gravity of soil solids at test temperature, G_t	2.655	2.646				
Temperature coefficient, K	0.99974	0.99974				
Specific gravity of soil solids at 20°C, $G_{20°C}$	**2.654**	**2.645**				
Apparent specific gravity of solids retained on No. 4, $G_{1@20°C}$						
Average specific gravity at 20°C, $G_{avg\,@20°C}$						

Tested by:__________
Reviewed by:__________

Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

IGES

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/20/2014
By: JDF

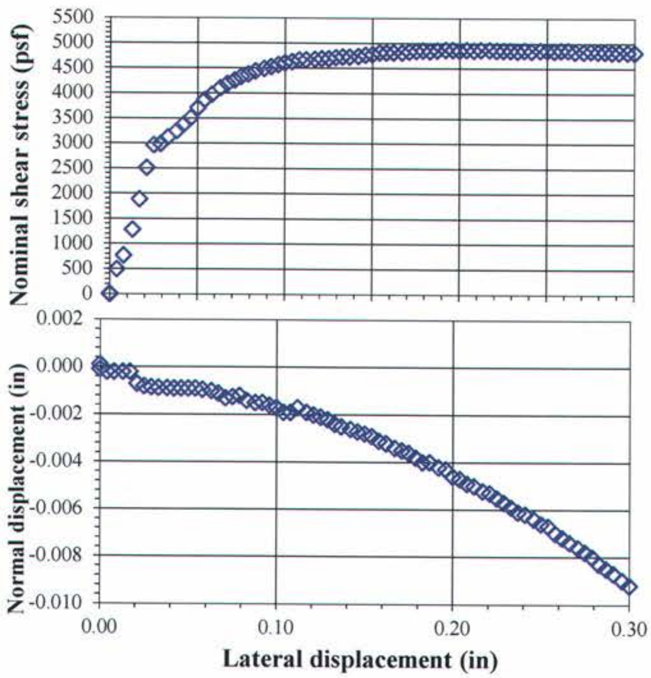
Boring No.: TH14-04
Sample: 4
Depth: 1.5'
Sample Description: Brown silty sand
Sample type: Laboratory compacted
Dry unit weight 105 pcf
at 16 (%) w
Compaction specifications: Provided by client

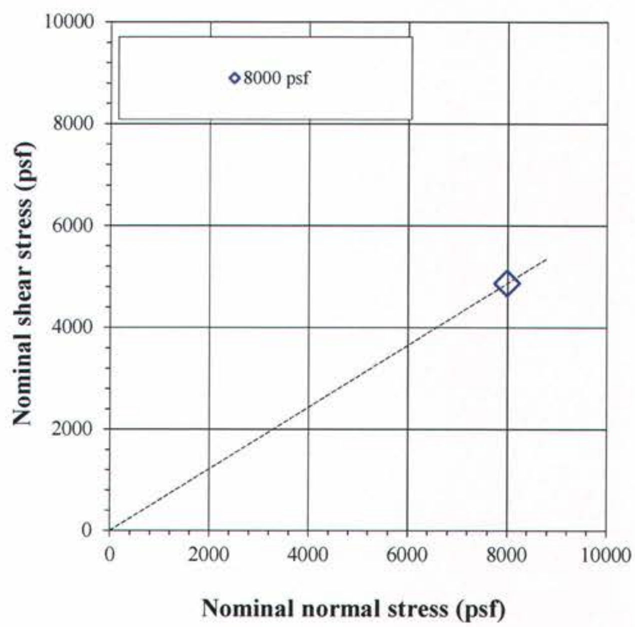
Test type: Inundated
Lateral displacement (in.): 0.3
Shear rate (in./min): 0.0035
Specific gravity, Gs: 2.65 Assumed

	Sample 1	
Nominal normal stress (psf)	8000	
Peak shear stress (psf)	4872	
Lateral displacement at peak (in)	0.192	
Load Duration (min)	195	
	Initial	Pre-shear
Sample height (in)	1.0000	0.9803
Sample diameter (in)	2.416	2.416
Wt. rings + wet soil (g)	189.37	195.07
Wt. rings (g)	42.67	42.67
Wet soil + tare (g)	222.94	
Dry soil + tare (g)	209.61	
Tare (g)	126.19	
Water content (%)	16.0	20.5
Dry unit weight (pcf)	105.1	107.2
Void ratio, e, for assumed Gs	0.57	0.54
Saturation (%)*	73.8	100.0

ϕ' (deg)	31
c' (psf)	0

*Pre-shear saturation set to 100% for phase calculations





Entered by:___________
Reviewed:___________

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Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

IGES

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy

Boring No.: TH14-04
Sample: 4
Depth: 1.5'

Nominal normal stress = 8000 psf		
Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)
0.000	0	0.000
0.000	12	0.000
0.004	492	0.000
0.008	768	0.000
0.013	1284	0.000
0.017	1884	0.000
0.021	2508	-0.001
0.025	2964	-0.001
0.029	2988	-0.001
0.033	3117	-0.001
0.038	3246	-0.001
0.042	3375	-0.001
0.046	3504	-0.001
0.050	3708	-0.001
0.054	3864	-0.001
0.058	3972	-0.001
0.063	4104	-0.001
0.067	4188	-0.001
0.071	4260	-0.001
0.075	4332	-0.001
0.079	4380	-0.001
0.083	4440	-0.001
0.088	4488	-0.002
0.092	4524	-0.002
0.096	4572	-0.002
0.100	4608	-0.002
0.104	4632	-0.002
0.108	4668	-0.002
0.112	4668	-0.002
0.117	4680	-0.002
0.121	4692	-0.002
0.125	4692	-0.002
0.129	4716	-0.002
0.133	4728	-0.002
0.137	4728	-0.003
0.142	4740	-0.003
0.146	4764	-0.003
0.150	4776	-0.003
0.154	4812	-0.003
0.158	4812	-0.003
0.162	4812	-0.003
0.167	4812	-0.003
0.171	4836	-0.004
0.175	4848	-0.004
0.179	4860	-0.004
0.183	4848	-0.004
0.187	4860	-0.004
0.192	4872	-0.004
0.196	4872	-0.004
0.200	4860	-0.005
0.204	4872	-0.005
0.208	4860	-0.005
0.212	4872	-0.005
0.217	4872	-0.005
0.221	4860	-0.005
0.225	4860	-0.006
0.229	4860	-0.006
0.233	4848	-0.006
0.237	4860	-0.006
0.241	4848	-0.006
0.246	4860	-0.006
0.250	4860	-0.007
0.254	4848	-0.007
0.258	4860	-0.007
0.262	4860	-0.007

Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

IGES

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy

Boring No.: TH14-04
Sample: 4
Depth: 1.5'

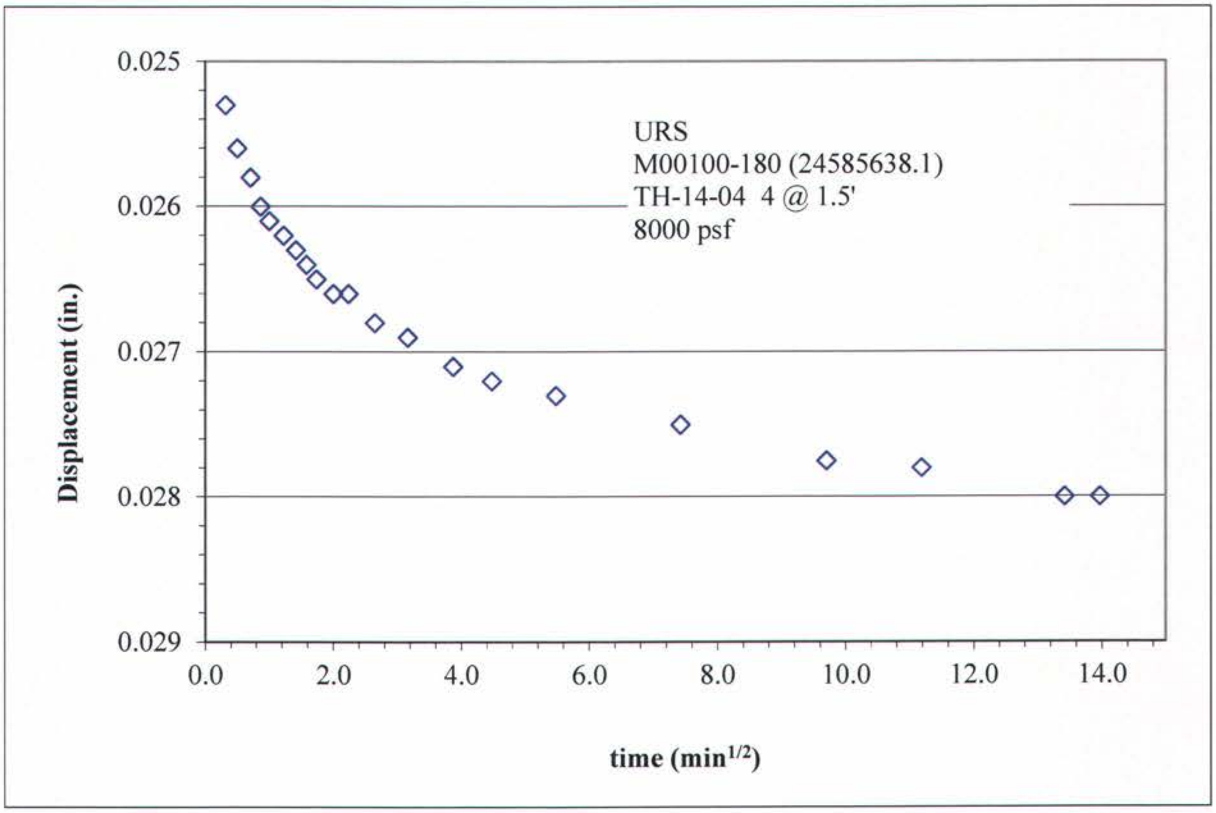
Nominal normal stress = 8000 psf		
Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)
0.266	4836	-0.007
0.271	4836	-0.008
0.275	4848	-0.008
0.279	4836	-0.008
0.283	4836	-0.008
0.287	4824	-0.009
0.291	4824	-0.009
0.296	4824	-0.009
0.300	4812	-0.009
0.300	4812	-0.009

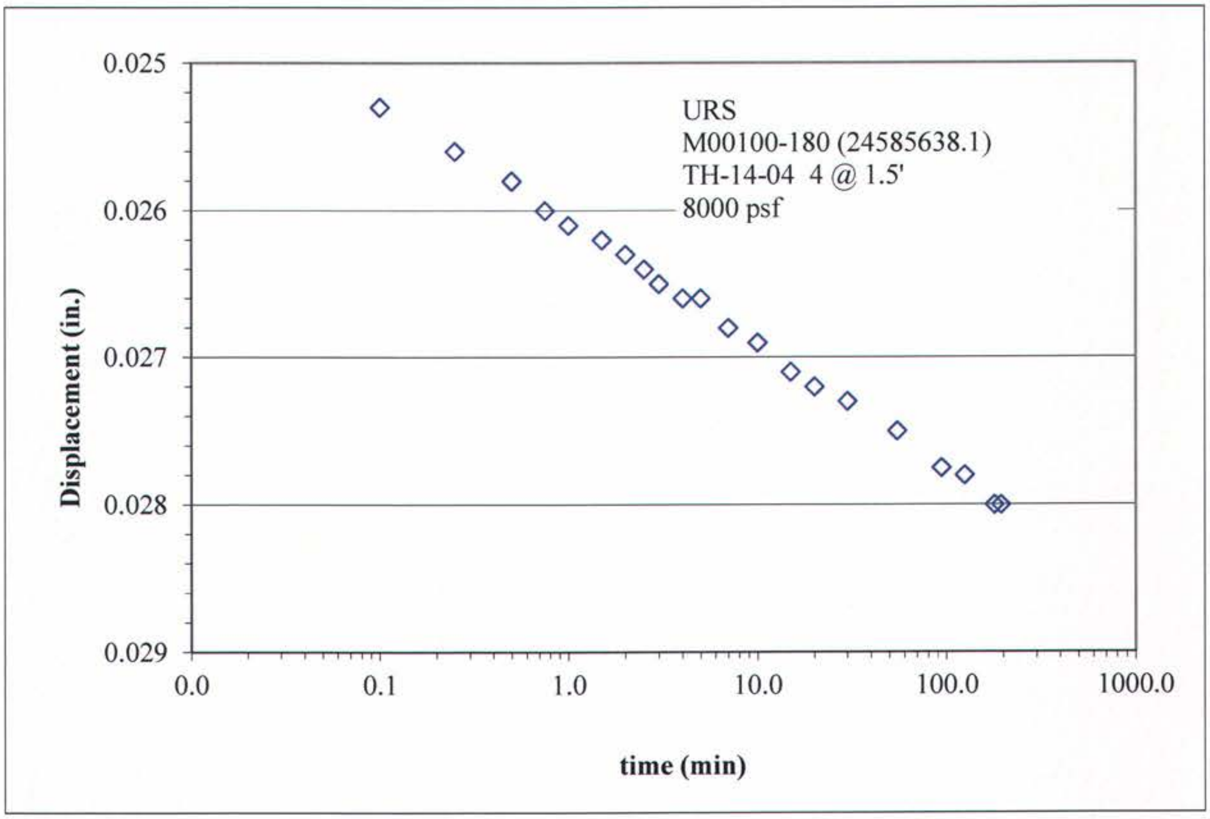
Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy

Boring No.: TH14-04
Sample: 4
Depth: 1.5'





Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/25/2014
By: NB

Boring No.: Parting
Sample: 1
Depth:
Sample Description: Light grey clayey sand
Sample type: Laboratory compacted
Dry unit weight 110 pcf
at 16 (%) w
Compaction specifications: Provided by client

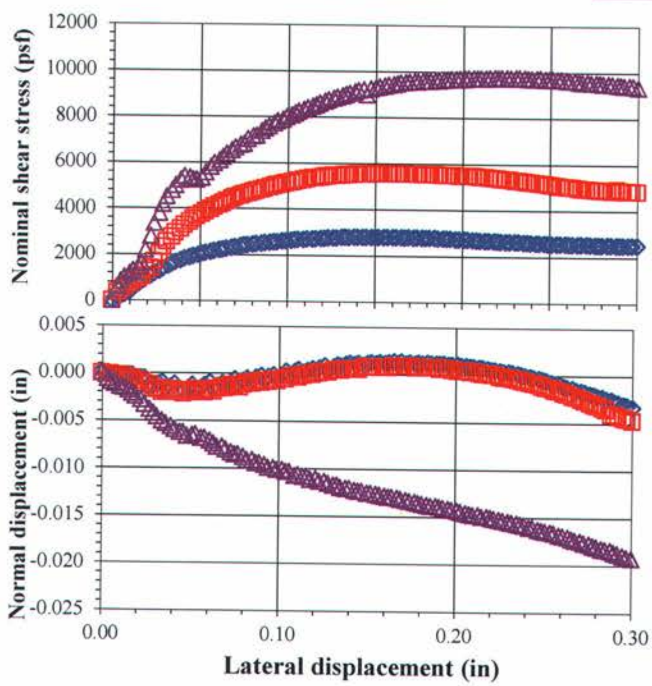
Test type: Inundated
Lateral displacement (in.): 0.3
Shear rate (in./min): 0.0035
Specific gravity, Gs: 2.654 Determined

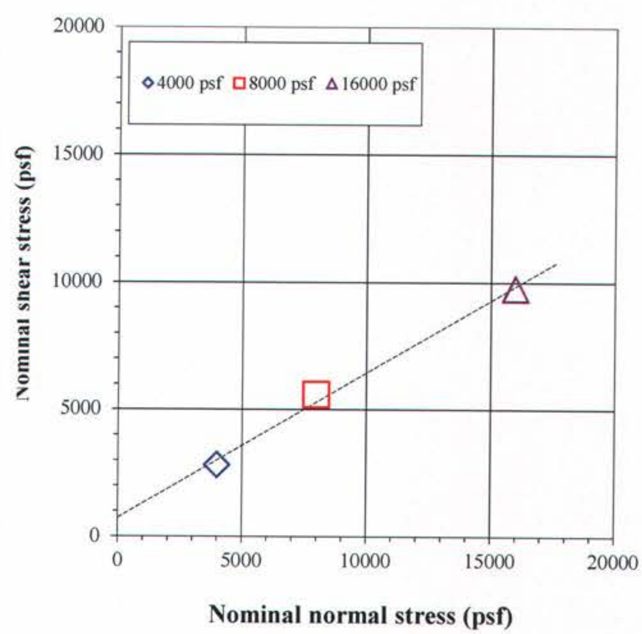
	Sample 1		Sample 2		Sample 3	
Nominal normal stress (psf)	4000		8000		16000	
Peak shear stress (psf)	2820		5580		9755	
Lateral displacement at peak (in)	0.138		0.148		0.218	
Load Duration (min)	1387		1499		460	
	Initial	Pre-shear	Initial	Pre-shear	Initial	Pre-shear
Sample height (in)	1.0000	0.9817	1.0000	0.9623	1.0000	0.9464
Sample diameter (in)	2.416	2.416	2.416	2.416	2.416	2.416
Wt. rings + wet soil (g)	199.17	201.42	196.62	197.41	198.35	197.95
Wt. rings (g)	45.48	45.48	42.93	42.93	44.66	44.66
Wet soil + tare (g)	509.87		509.87		509.87	
Dry soil + tare (g)	461.38		461.38		461.38	
Tare (g)	168.11		168.11		168.11	
Water content (%)	16.5	18.2	16.5	17.1	16.5	16.2
Dry unit weight (pcf)	109.6	111.6	109.6	113.8	109.6	115.7
Void ratio, e	0.51	0.48	0.51	0.45	0.51	0.43
Saturation (%)*	85.7	100.0	85.7	100.0	85.7	100.0

φ' (deg)	30
c' (psf)	733

Average of 3 samples	Initial	Pre-shear
Water content (%)	16.5	17.2
Dry unit weight (pcf)	109.6	113.7

*Pre-shear saturation set to 100% for phase calculations





Entered by:___________
Reviewed:___________

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Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy

Boring No.: Parting
Sample: 1
Depth:

Nominal normal stress = 4000 psf			Nominal normal stress = 8000 psf			Nominal normal stress = 16000 psf		
Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)	Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)	Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)
0.000	0	0.000	0.000	0	0.000	0.000	0	0.000
0.003	132	0.000	0.003	360	0.000	0.003	600	-0.001
0.005	204	0.000	0.005	480	0.000	0.005	852	-0.001
0.007	276	0.000	0.007	600	0.000	0.007	1020	-0.001
0.010	396	0.000	0.010	720	0.000	0.010	1176	-0.001
0.012	576	0.000	0.012	840	0.000	0.012	1308	-0.002
0.015	732	0.000	0.015	960	-0.001	0.015	1440	-0.002
0.017	852	0.000	0.017	1068	-0.001	0.017	1644	-0.002
0.019	984	-0.001	0.019	1296	-0.001	0.019	2196	-0.002
0.022	1104	-0.001	0.022	1404	-0.001	0.022	2796	-0.003
0.024	1212	-0.001	0.024	1704	-0.001	0.024	3360	-0.003
0.027	1308	-0.002	0.027	2040	-0.001	0.027	3804	-0.004
0.029	1416	-0.001	0.029	2340	-0.002	0.029	4188	-0.004
0.032	1524	-0.001	0.031	2580	-0.002	0.031	4524	-0.005
0.034	1608	-0.001	0.034	2784	-0.002	0.034	4788	-0.005
0.036	1680	-0.002	0.036	2964	-0.002	0.036	5004	-0.005
0.039	1752	-0.001	0.039	3132	-0.002	0.039	5244	-0.006
0.041	1836	-0.001	0.041	3300	-0.002	0.041	5412	-0.006
0.044	1896	-0.002	0.044	3444	-0.002	0.044	5340	-0.006
0.046	1944	-0.002	0.046	3564	-0.002	0.046	5268	-0.006
0.049	2004	-0.002	0.048	3684	-0.002	0.048	5268	-0.007
0.051	2052	-0.001	0.051	3792	-0.002	0.051	5340	-0.007
0.053	2088	-0.002	0.053	3900	-0.002	0.053	5568	-0.006
0.056	2136	-0.002	0.056	3996	-0.002	0.056	5808	-0.007
0.058	2172	-0.001	0.058	4092	-0.002	0.058	5988	-0.007
0.061	2220	-0.001	0.061	4188	-0.002	0.061	6108	-0.007
0.063	2244	-0.002	0.063	4260	-0.002	0.063	6252	-0.007
0.065	2280	-0.001	0.065	4356	-0.002	0.065	6396	-0.008
0.068	2316	-0.001	0.068	4440	-0.001	0.068	6540	-0.008
0.070	2352	-0.001	0.070	4524	-0.002	0.070	6660	-0.008
0.073	2388	-0.001	0.073	4596	-0.001	0.073	6792	-0.008
0.075	2424	-0.001	0.075	4644	-0.001	0.075	6828	-0.009
0.077	2436	-0.001	0.078	4704	-0.001	0.077	7044	-0.009
0.080	2460	-0.001	0.080	4752	-0.001	0.080	7164	-0.009
0.082	2496	-0.001	0.082	4812	-0.001	0.082	7188	-0.009
0.085	2508	-0.001	0.085	4860	-0.001	0.085	7392	-0.009
0.087	2532	0.000	0.087	4920	-0.001	0.087	7512	-0.009
0.090	2556	0.000	0.090	4968	-0.001	0.089	7596	-0.009
0.092	2568	-0.001	0.092	5016	-0.001	0.092	7716	-0.010
0.094	2592	0.000	0.094	5064	-0.001	0.094	7824	-0.010
0.097	2628	0.000	0.097	5100	-0.001	0.097	7896	-0.010
0.099	2628	0.000	0.099	5136	-0.001	0.099	8004	-0.010
0.102	2652	0.000	0.102	5184	-0.001	0.102	8088	-0.010
0.104	2676	0.000	0.104	5220	-0.001	0.104	8172	-0.010
0.106	2688	0.000	0.106	5268	0.000	0.106	8255	-0.010
0.109	2700	0.000	0.109	5304	0.000	0.109	8339	-0.011
0.111	2724	0.001	0.111	5340	0.000	0.111	8399	-0.011
0.114	2724	0.000	0.114	5376	0.000	0.114	8483	-0.011
0.116	2736	0.000	0.116	5388	0.000	0.116	8543	-0.011
0.119	2748	0.001	0.119	5412	0.000	0.118	8615	-0.011
0.121	2748	0.000	0.121	5448	0.000	0.121	8699	-0.011
0.123	2772	0.001	0.123	5460	0.000	0.123	8759	-0.011
0.126	2772	0.001	0.126	5484	0.000	0.126	8831	-0.011
0.128	2772	0.001	0.128	5484	0.000	0.128	8891	-0.012
0.131	2796	0.001	0.131	5508	0.001	0.131	8939	-0.012
0.133	2808	0.001	0.133	5532	0.001	0.133	8999	-0.012
0.135	2796	0.001	0.135	5532	0.001	0.135	9059	-0.012
0.138	2820	0.001	0.138	5544	0.001	0.138	9119	-0.012
0.140	2820	0.001	0.140	5556	0.001	0.140	9179	-0.012
0.143	2820	0.001	0.143	5556	0.001	0.143	9215	-0.012
0.145	2820	0.001	0.145	5556	0.001	0.145	8987	-0.012
0.148	2820	0.001	0.148	5580	0.001	0.147	9263	-0.012
0.150	2820	0.001	0.150	5568	0.001	0.150	9311	-0.013
0.152	2820	0.001	0.152	5580	0.001	0.152	9347	-0.013
0.155	2808	0.001	0.155	5580	0.001	0.155	9383	-0.013

Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy

Boring No.: Parting
Sample: 1
Depth:

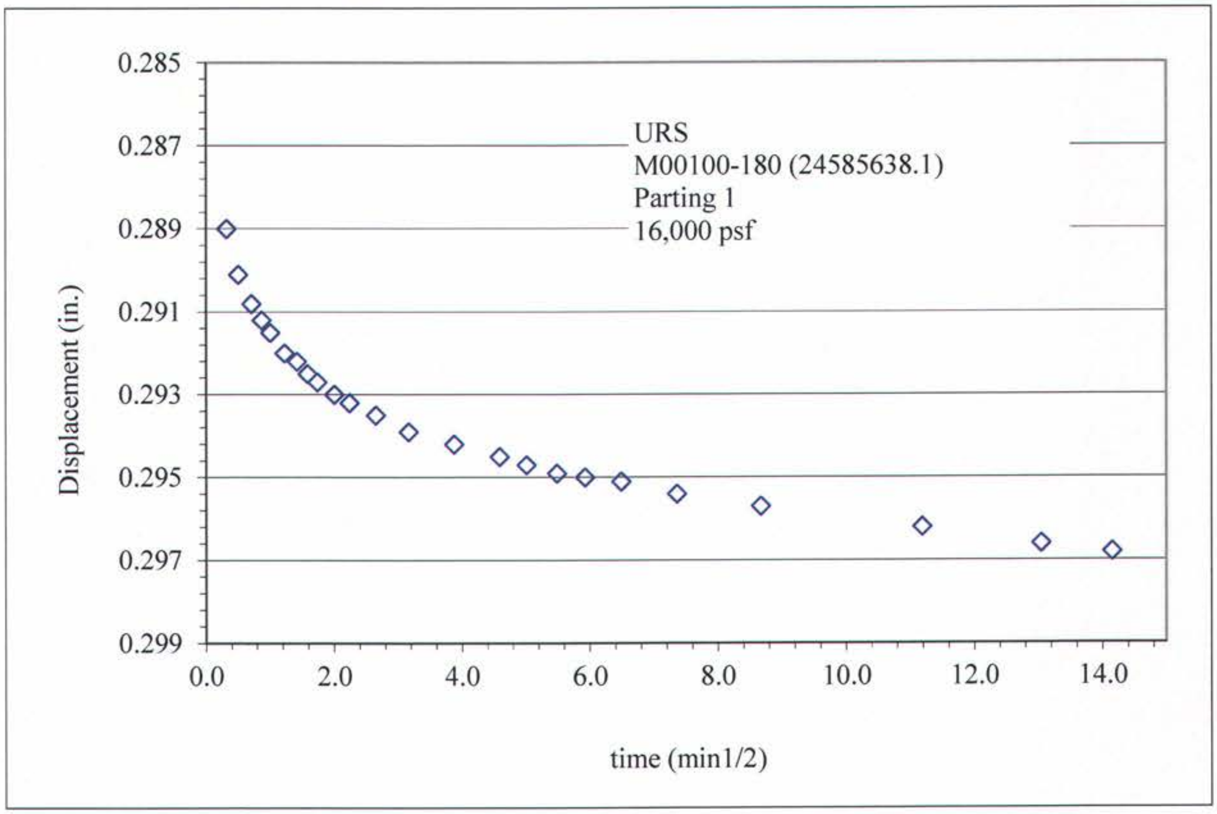
Nominal normal stress = 4000 psf			Nominal normal stress = 8000 psf			Nominal normal stress = 16000 psf		
Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)	Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)	Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)
0.157	2820	0.001	0.157	5568	0.001	0.157	9419	-0.013
0.160	2808	0.001	0.160	5580	0.001	0.160	9443	-0.013
0.162	2820	0.001	0.162	5568	0.001	0.162	9479	-0.013
0.165	2820	0.001	0.164	5568	0.001	0.164	9527	-0.013
0.167	2796	0.001	0.167	5580	0.001	0.167	9539	-0.013
0.169	2808	0.001	0.169	5568	0.001	0.169	9563	-0.013
0.172	2796	0.001	0.172	5568	0.001	0.172	9587	-0.013
0.174	2808	0.001	0.174	5568	0.001	0.174	9587	-0.013
0.177	2796	0.001	0.177	5556	0.001	0.177	9611	-0.013
0.179	2796	0.001	0.179	5556	0.001	0.179	9611	-0.014
0.181	2796	0.001	0.181	5556	0.001	0.181	9611	-0.014
0.184	2796	0.001	0.184	5556	0.001	0.184	9635	-0.014
0.186	2772	0.001	0.186	5544	0.001	0.186	9635	-0.014
0.189	2772	0.001	0.189	5532	0.001	0.189	9659	-0.014
0.191	2772	0.001	0.191	5532	0.001	0.191	9671	-0.014
0.193	2772	0.001	0.193	5532	0.001	0.193	9683	-0.014
0.196	2748	0.001	0.196	5532	0.001	0.196	9683	-0.014
0.198	2748	0.001	0.198	5508	0.001	0.198	9695	-0.014
0.201	2748	0.001	0.201	5508	0.001	0.201	9707	-0.014
0.203	2736	0.001	0.203	5508	0.001	0.203	9731	-0.014
0.206	2724	0.001	0.206	5508	0.001	0.206	9731	-0.015
0.208	2712	0.001	0.208	5484	0.000	0.208	9731	-0.015
0.210	2700	0.001	0.210	5460	0.000	0.210	9731	-0.015
0.213	2700	0.001	0.213	5460	0.000	0.213	9731	-0.015
0.215	2700	0.001	0.215	5436	0.000	0.215	9743	-0.015
0.218	2676	0.001	0.218	5424	0.000	0.218	9755	-0.015
0.220	2676	0.001	0.220	5412	0.000	0.220	9743	-0.015
0.222	2664	0.001	0.222	5388	0.000	0.222	9755	-0.015
0.225	2652	0.001	0.225	5364	0.000	0.225	9755	-0.015
0.227	2652	0.000	0.227	5352	0.000	0.227	9743	-0.015
0.230	2652	0.000	0.230	5316	0.000	0.230	9755	-0.015
0.232	2652	0.000	0.232	5316	0.000	0.232	9755	-0.016
0.235	2628	0.000	0.235	5292	0.000	0.235	9743	-0.016
0.237	2628	0.000	0.237	5268	-0.001	0.237	9731	-0.016
0.239	2616	0.000	0.239	5244	-0.001	0.239	9719	-0.016
0.242	2604	0.000	0.242	5220	-0.001	0.242	9731	-0.016
0.244	2604	0.000	0.244	5196	-0.001	0.244	9743	-0.016
0.247	2604	0.000	0.247	5184	-0.001	0.247	9707	-0.016
0.249	2592	0.000	0.249	5148	-0.001	0.249	9707	-0.016
0.251	2580	-0.001	0.251	5124	-0.001	0.251	9695	-0.016
0.254	2580	-0.001	0.254	5100	-0.001	0.254	9683	-0.017
0.256	2580	-0.001	0.256	5076	-0.002	0.256	9683	-0.017
0.259	2568	-0.001	0.259	5064	-0.002	0.259	9659	-0.017
0.261	2556	-0.001	0.261	5052	-0.002	0.261	9647	-0.017
0.263	2556	-0.001	0.263	5028	-0.002	0.264	9647	-0.017
0.266	2556	-0.001	0.266	5004	-0.002	0.266	9611	-0.017
0.268	2556	-0.002	0.268	4980	-0.002	0.268	9587	-0.017
0.271	2556	-0.002	0.271	4968	-0.002	0.271	9575	-0.017
0.273	2544	-0.002	0.273	4956	-0.003	0.273	9551	-0.018
0.276	2532	-0.002	0.276	4944	-0.003	0.276	9551	-0.018
0.278	2532	-0.002	0.278	4932	-0.003	0.278	9539	-0.018
0.280	2532	-0.002	0.280	4920	-0.003	0.280	9515	-0.018
0.283	2532	-0.002	0.283	4908	-0.003	0.283	9515	-0.018
0.285	2532	-0.002	0.285	4884	-0.004	0.285	9503	-0.018
0.288	2520	-0.003	0.288	4956	-0.004	0.288	9479	-0.018
0.290	2520	-0.003	0.290	4908	-0.004	0.290	9467	-0.019
0.292	2520	-0.003	0.292	4872	-0.004	0.292	9431	-0.019
0.295	2520	-0.003	0.295	4884	-0.004	0.295	9431	-0.019
0.297	2520	-0.003	0.297	4872	-0.005	0.297	9419	-0.019
0.300	2520	-0.003	0.300	4860	-0.005	0.300	9371	-0.019
0.300	2520	-0.003	0.300	4860	-0.005	0.300	9371	-0.019

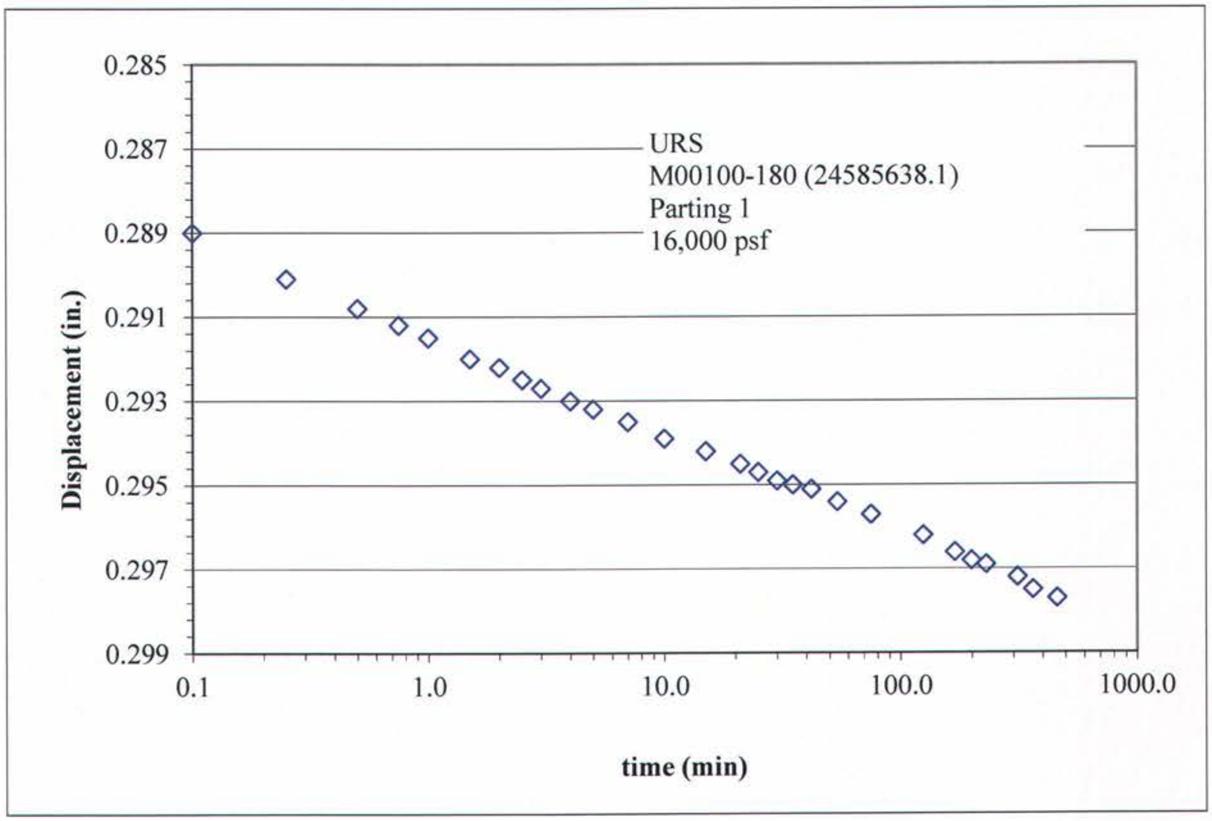
Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy

Boring No.: Parting
Sample: 1
Depth:





Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/25/2014
By: NB

Boring No.: Tailings
Sample: 2
Depth:
Sample Description: Brown sand with silt
Sample type: Laboratory compacted
Dry unit weight 90 pcf
at 3 (%) w
Compaction specifications: Provided by client

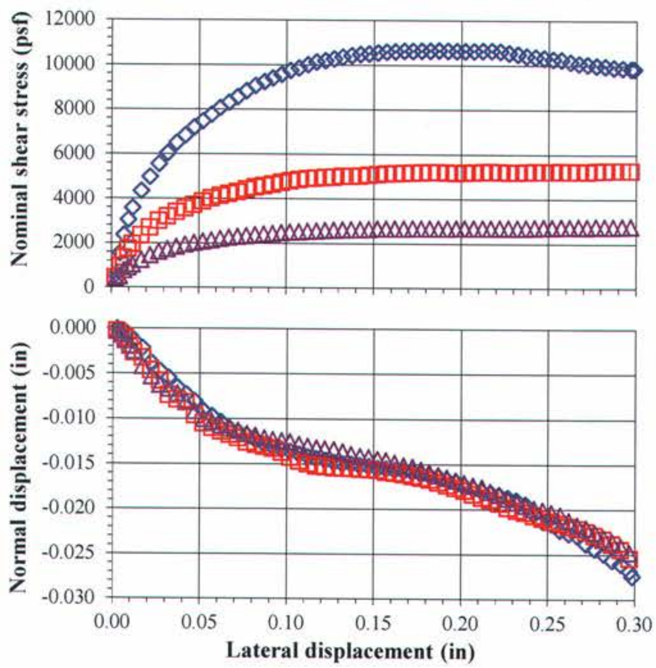
Test type: Inundated
Lateral displacement (in.): 0.3
Shear rate (in./min): 0.0172
Specific gravity, Gs: 2.645 Determined

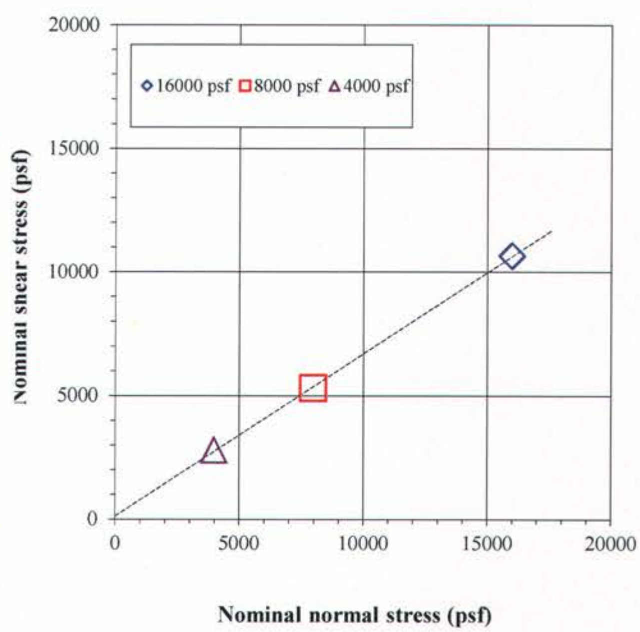
	Sample 1		Sample 2		Sample 3	
Nominal normal stress (psf)	16000		8000		4000	
Peak shear stress (psf)	10670		5315		2807	
Lateral displacement at peak (in)	0.187		0.301		0.300	
Load Duration (min)	3698		3731		3731	
	Initial	Pre-shear	Initial	Pre-shear	Initial	Pre-shear
Sample height (in)	1.0000	0.9319	1.0000	0.9497	1.0000	0.9618
Sample diameter (in)	2.416	2.416	2.416	2.416	2.416	2.416
Wt. rings + wet soil (g)	153.03	178.97	153.93	181.21	154.05	182.24
Wt. rings (g)	41.38	41.38	42.28	42.28	42.40	42.40
Wet soil + tare (g)	440.39		440.39		440.39	
Dry soil + tare (g)	431.91		431.91		431.91	
Tare (g)	122.78		122.78		122.78	
Water content (%)	2.7	26.6	2.7	27.8	2.7	28.7
Dry unit weight (pcf)	90.3	96.9	90.3	95.0	90.3	93.8
Void ratio, e	0.83	0.70	0.83	0.74	0.83	0.76
Saturation (%)*	8.8	100.0	8.8	100.0	8.8	100.0

ϕ' (deg)	33
c' (psf)	129

Average of 3 samples	Initial	Pre-shear
Water content (%)	2.7	27.7
Dry unit weight (pcf)	90.3	95.3

*Pre-shear saturation set to 100% for phase calculations





Entered by:___________
Reviewed:___________

Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

IGES

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy

Boring No.: Tailings
Sample: 2
Depth:

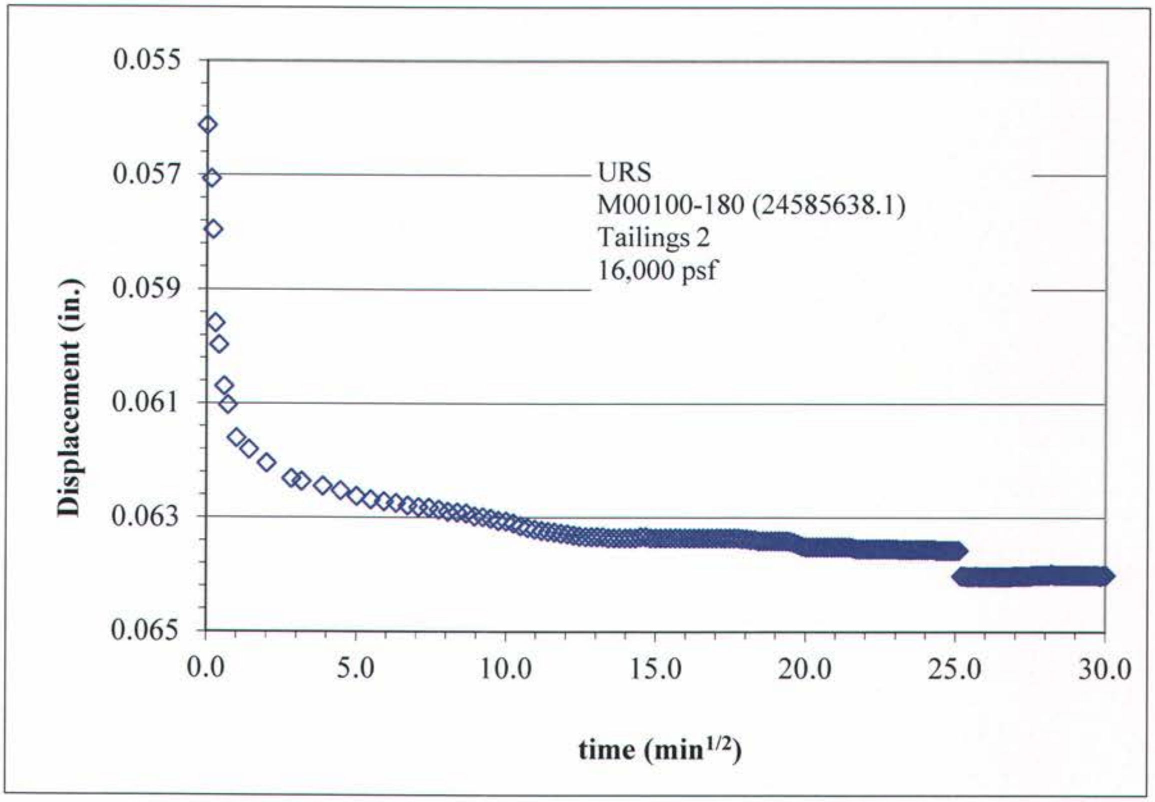
Nominal normal stress = 16000 psf			Nominal normal stress = 8000 psf			Nominal normal stress = 4000 psf		
Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)	Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)	Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)
0.002	579	0.000	0.002	458	0.000	0.002	415	0.000
0.005	1541	0.000	0.005	979	-0.001	0.005	521	-0.001
0.007	2369	0.000	0.007	1339	-0.001	0.007	774	-0.001
0.010	3049	-0.001	0.010	1742	-0.002	0.010	922	-0.002
0.012	3589	-0.001	0.012	1966	-0.003	0.012	1040	-0.002
0.017	4345	-0.002	0.017	2351	-0.003	0.017	1255	-0.004
0.022	4978	-0.004	0.022	2700	-0.005	0.022	1454	-0.005
0.027	5559	-0.005	0.027	3007	-0.006	0.027	1621	-0.006
0.032	6048	-0.005	0.032	3212	-0.007	0.032	1736	-0.007
0.037	6501	-0.006	0.037	3401	-0.008	0.037	1841	-0.007
0.042	6841	-0.007	0.042	3567	-0.008	0.042	1935	-0.008
0.047	7203	-0.008	0.047	3726	-0.010	0.047	2019	-0.009
0.052	7476	-0.009	0.052	3889	-0.010	0.052	2081	-0.010
0.057	7759	-0.010	0.057	4030	-0.011	0.057	2140	-0.010
0.062	8070	-0.010	0.062	4136	-0.011	0.062	2199	-0.011
0.067	8315	-0.011	0.067	4231	-0.012	0.067	2254	-0.011
0.072	8572	-0.011	0.072	4325	-0.012	0.072	2299	-0.011
0.077	8837	-0.012	0.077	4432	-0.013	0.077	2345	-0.012
0.082	9063	-0.012	0.082	4531	-0.013	0.082	2384	-0.012
0.087	9246	-0.013	0.087	4595	-0.013	0.087	2418	-0.012
0.092	9408	-0.013	0.092	4665	-0.013	0.092	2440	-0.012
0.097	9578	-0.013	0.097	4751	-0.014	0.097	2477	-0.012
0.102	9753	-0.014	0.102	4815	-0.014	0.102	2502	-0.013
0.107	9874	-0.014	0.107	4880	-0.015	0.107	2522	-0.013
0.112	10020	-0.014	0.112	4926	-0.015	0.112	2547	-0.013
0.117	10140	-0.014	0.117	4961	-0.015	0.117	2565	-0.013
0.122	10200	-0.015	0.122	4984	-0.015	0.122	2587	-0.013
0.127	10290	-0.015	0.127	4992	-0.015	0.127	2605	-0.013
0.132	10370	-0.015	0.132	5036	-0.015	0.132	2619	-0.014
0.137	10430	-0.015	0.137	5047	-0.015	0.137	2634	-0.014
0.142	10490	-0.015	0.142	5060	-0.015	0.142	2636	-0.014
0.147	10520	-0.015	0.147	5091	-0.016	0.147	2650	-0.014
0.152	10560	-0.015	0.152	5120	-0.016	0.152	2668	-0.014
0.157	10600	-0.016	0.157	5144	-0.016	0.157	2668	-0.015
0.162	10620	-0.016	0.162	5162	-0.016	0.162	2679	-0.015
0.167	10640	-0.016	0.167	5176	-0.016	0.167	2681	-0.015
0.172	10650	-0.016	0.172	5194	-0.016	0.172	2684	-0.015
0.177	10660	-0.016	0.177	5211	-0.016	0.177	2687	-0.016
0.182	10660	-0.016	0.182	5219	-0.017	0.182	2688	-0.016
0.187	10670	-0.016	0.187	5215	-0.017	0.187	2688	-0.016
0.192	10660	-0.017	0.192	5208	-0.017	0.192	2693	-0.016
0.197	10640	-0.017	0.197	5196	-0.018	0.197	2699	-0.017
0.202	10640	-0.017	0.202	5204	-0.018	0.202	2704	-0.017
0.207	10650	-0.018	0.207	5221	-0.018	0.207	2704	-0.017
0.212	10660	-0.018	0.212	5230	-0.019	0.212	2703	-0.018
0.217	10660	-0.018	0.217	5241	-0.019	0.217	2706	-0.018
0.222	10630	-0.018	0.222	5238	-0.019	0.222	2713	-0.018
0.227	10560	-0.019	0.227	5224	-0.020	0.227	2715	-0.019
0.232	10500	-0.019	0.232	5219	-0.020	0.232	2718	-0.019
0.237	10420	-0.019	0.237	5231	-0.020	0.237	2719	-0.020
0.242	10380	-0.020	0.242	5241	-0.021	0.242	2736	-0.020
0.247	10340	-0.021	0.247	5247	-0.021	0.247	2740	-0.020
0.252	10290	-0.022	0.252	5245	-0.021	0.252	2748	-0.020
0.257	10250	-0.022	0.257	5260	-0.022	0.257	2751	-0.021
0.262	10160	-0.023	0.262	5245	-0.022	0.262	2756	-0.021
0.267	10090	-0.023	0.267	5256	-0.022	0.267	2766	-0.022
0.272	10050	-0.024	0.272	5250	-0.022	0.272	2764	-0.022
0.277	9992	-0.024	0.277	5270	-0.023	0.277	2780	-0.023
0.282	9959	-0.025	0.282	5286	-0.023	0.282	2771	-0.023
0.287	9907	-0.026	0.287	5297	-0.024	0.287	2766	-0.024
0.292	9881	-0.026	0.292	5300	-0.024	0.292	2782	-0.024
0.297	9853	-0.027	0.297	5306	-0.025	0.297	2801	-0.025
0.299	9843	-0.027	0.301	5315	-0.026	0.300	2807	-0.025

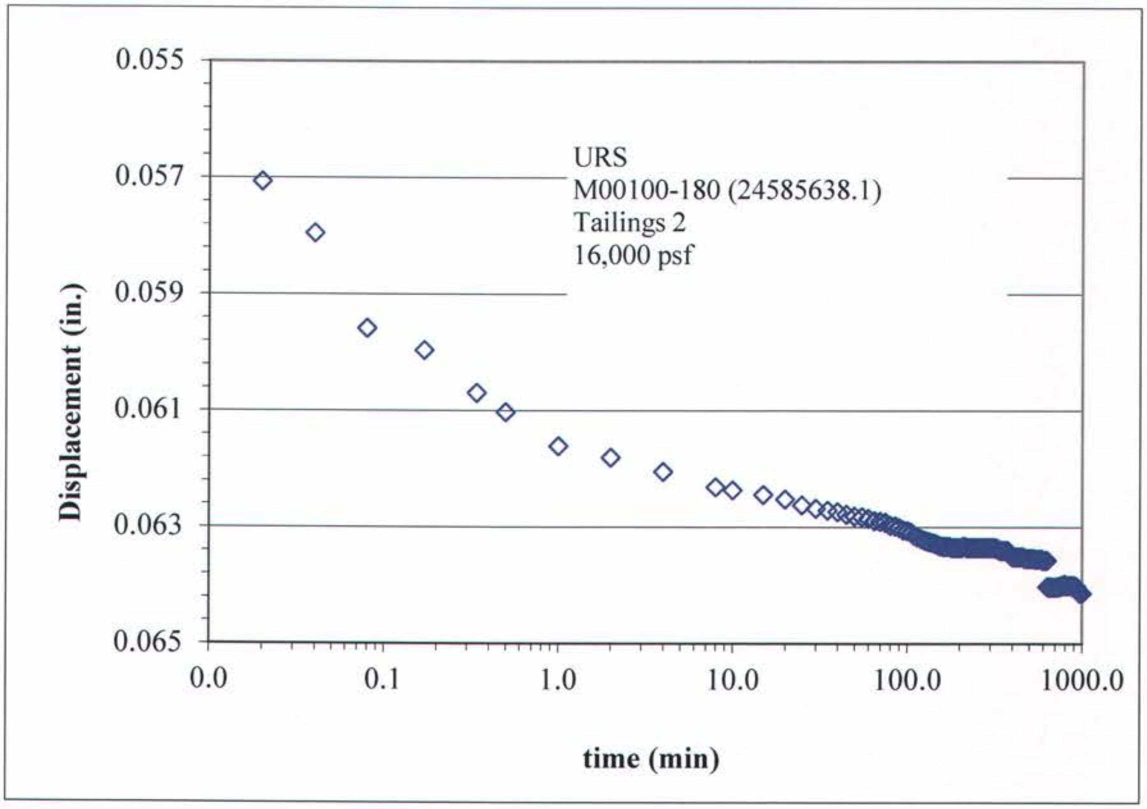
Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy

Boring No.: Tailings
Sample: 2
Depth:





Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter, Method C (ASTM D5084)

IGES

Project: URS
No: M00100-180 (24585638.1)
Location: American Sands Energy
Date: 8/26/2014
By: JDF

Boring No.: Parting
Sample: 1
Depth:
Sample Description: Light grey clayey sand
Sample Type: Remolded
Compaction Specifications: 110 pcf
at 16 (%) w

	Initial (o)	Final (f)
Sample Height, H (in)	3.128	3.101
Sample Diameter, D (in)	2.863	2.80
Sample Length, L (cm)	7.945	7.877
Sample Area, A (cm^2)	41.534	39.649
Sample Volume, V (cm^3)	329.99	312.32
Wt. Rings + Wet Soil (g)	674.13	673.69
Wt. Rings (g)	0	0
Wet Unit Wt., γ_m (pcf)	127.5	134.7
Wet Soil + Tare (g)	509.87	991.29
Dry Soil + Tare (g)	461.38	895.94
Tare (g)	168.11	316.57
Weight of solids, Ws (g)	578.48	578.48
Water Content, w (%)	16.53	16.46
Dry Unit Wt, γ_d (pcf)	109.4	115.6
Void ratio, e	0.51	0.44
Saturation (%)	85.4	100 [a]
Average K[b] (cm/sec)	**2.3E-07**	

[a] Saturation set to 100% for phase calculations
[b] K corrected to 20°C

Gs	2.654	Determined
Cell No.	4	
Station No.	2	
Permeant liquid used	De-aired tap water	
Total backpressure (psi)	20	
Effective horiz. consolidation stress (psi)	55.6	
Effective vert. consolidation stress (psi)	55.6	

	Initial (o)	Final (f)
B value	0.54	0.96
External Burette (cm^3)	12.80	42.20
Cell Pressure (psi)	0.0	75.6

Backpressure bottom (psi)	21.0
Backpressure top (psi)	20.0
System volume coefficient (cm^3/psi)	0.155
System volume change (cm^3)	11.73
Net sample volume change (cm^3)	-17.67
Bottom burette ground length, l_b (cm)	81.99
Top burette ground length, l_t (cm)	81.97
Burette area, a (cm^2)	0.197
Conversion, reading to cm head (cm/rd)	5.076

Start Date and Time: 8/25/14 9:01

Elapsed time (sec)	Bottom Burette (cm^3)	Top Burette (cm^3)	h_1 (cm)	h_2 (cm)	K (cm/sec)	Temp (°C)	Visc. Ratio R_f	K[b] (cm/sec)
1440.0	0.10 0.30	9.94 9.74	120.28	118.25	2.3E-07	22.8	0.93	2.2E-07
2580.0	0.30 0.68	9.74 9.36	118.25	114.39	2.5E-07	22.9	0.93	2.3E-07
2220.0	0.68 0.99	9.36 9.02	114.39	111.09	2.6E-07	22.8	0.93	2.4E-07
3240.0	0.99 1.42	9.02 8.58	111.09	106.67	2.5E-07	24.0	0.91	2.2E-07
6060.0	1.42 2.20	8.58 7.76	106.67	98.55	2.6E-07	25.0	0.89	2.3E-07
4800.0	2.20 2.80	7.76 7.15	98.55	92.41	2.6E-07	24.3	0.90	2.4E-07

Entered by:___________
Reviewed:___________

Aggregate-Soil Testing Summary

Inberg-Miller Engineers
350 Parsley Blvd
Cheyenne WY 82001
Ph: 307-635-6827
Fax: 307-635-2713
cheyenne@inberg-miller.com

INBERG-MILLER ENGINEERS
QUALITY SOLUTIONS THROUGH TEAMWORK

Client:	Mine Engineers, Inc.	**IME Sample No:**	16484-2
Address:	3901 South Industrial Rd.	**Sampled By:**	Client
	Cheyenne, WY 82007	**Sample Date:**	
		Date Received in Lab:	12/19/2013
Attention:	Eldon Strid	**Type of Material:**	
		Source:	American Sands Energy - Utah
IME Project No:	16484-HM	**Sample Description:**	Light brown fine SAND
Project Name:	General Testing		
Project Location:			
		Report Date:	1/15/14
Sample Location/ID:	American Sands Energy - Utah	**Reviewed By:**	MTJ

Particle Size Analysis
ASTM C117 & C136

Sieve	% Passing	Specification
2 1/2" (63.5mm)		
2" (50.8mm)		
1 1/2" (37.5mm)		
1" (25mm)		
3/4" (19mm)		
1/2" (12.5mm)		
3/8" (9.5mm)		
No. 4 (4.75mm)	100%	
No. 8 (2.36mm)	100%	
No. 16 (1.18mm)	99%	
No. 30 (600μm)	98%	
No. 40 (425μm)		
No. 50 (300μm)	87%	
No. 100 (150μm)	21%	
No. 200 (75μm)	9.6%	
0.020 mm (20μm)		

Atterberg Limits
ASTM D4318

Test	Result	Specification
Liquid Limit (%)		
Plastic Limit (%)		
Plasticity Index (%)		

Other Testing

Test	Result	Specifications /Notes	ASTM
Fineness Modulus:	0.95		C136
Moisture Content (%):	0.1%	(from sieve sample)	D2216
Relative Density (pcf)			D4254
Minimum Density	89.3		
Maximum Density	94.7		
Angle of Repose			
Moisture Content (%)			
0%	26.5°		
4%	33.8°		
6%	37.7°		
Specific Gravity	Fine /	Coarse	
Absorption %			C128/C127
Bulk (Dry)			C128/C127
Bulk (SSD)			C128/C127
Apparent			C128/C127

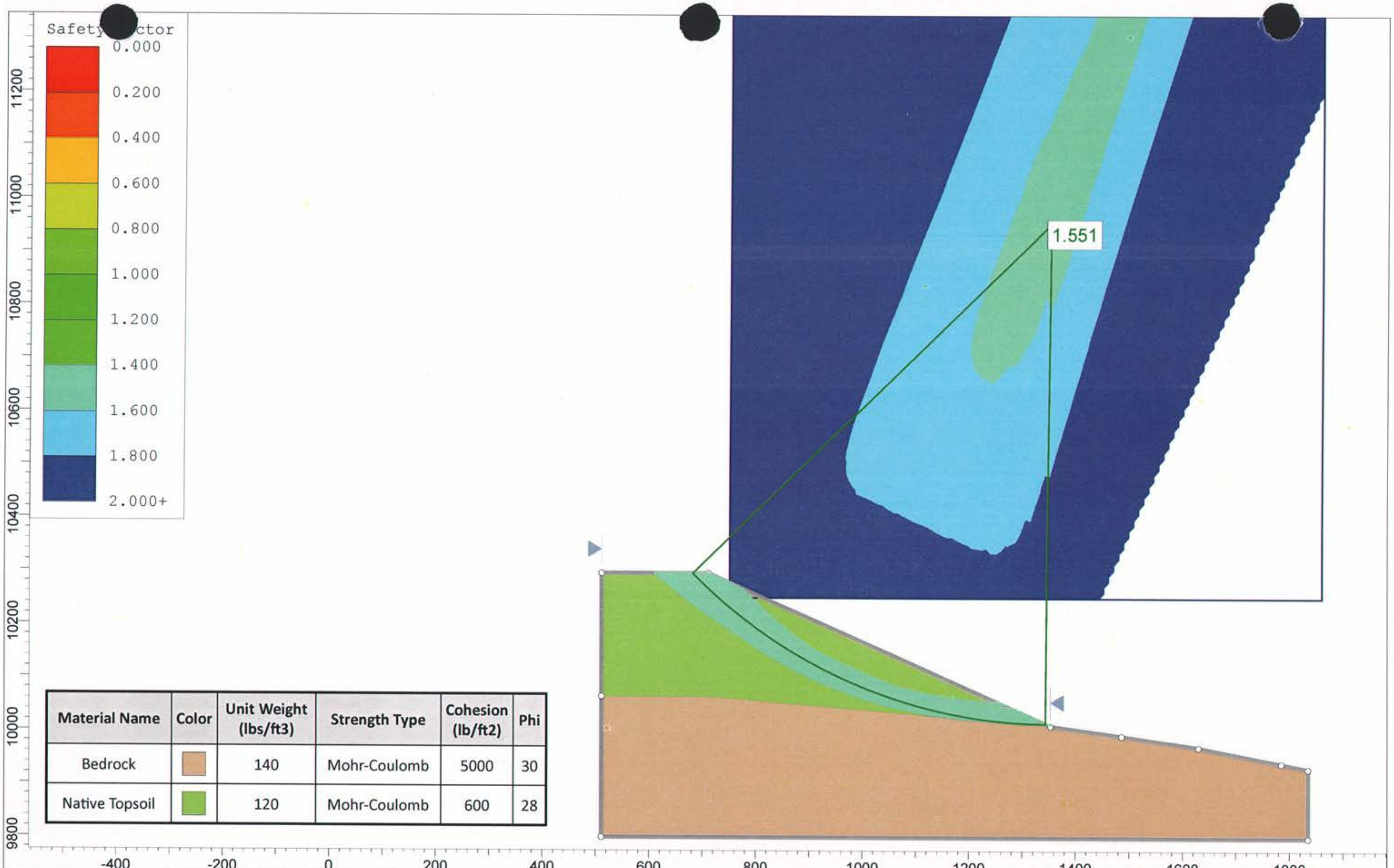
Remarks:

10YR

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Basin 1	0.0045312	2.4	01Jan2014, 13:00	0.2
Basin 2-5	0.0040680	2.7	01Jan2014, 13:00	0.2
Basin 6	0.0190000	12.1	01Jan2014, 13:00	1.0
Basin 7	0.0190000	12.1	01Jan2014, 13:00	1.0
Basin 8	0.1870000	47.1	01Jan2014, 13:45	10.2

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Basin 1	0.0045312	5.0	01Jan2014, 13:00	0.4
Basin 2-5	0.0040680	5.1	01Jan2014, 13:00	0.4
Basin 6	0.0190000	22.6	01Jan2014, 13:00	1.9
Basin 7	0.0190000	22.6	01Jan2014, 13:00	1.9
Basin 8	0.1870000	89.0	01Jan2014, 13:45	18.7

APPENDIX D
SLOPE STABILITY RESULTS



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Native Topsoil		120	Mohr-Coulomb	600	28

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

By: BWF 9/2/2014

Checked: ECL 9/2/2014

Client: American Sands Energy Corp

Title: General Topsoil Slope 2.25H:1V

Project: American Sands Bruin Point

Date: January 2015

Project No.: 24585638

Figure: D1

URS

Carbon County, Utah

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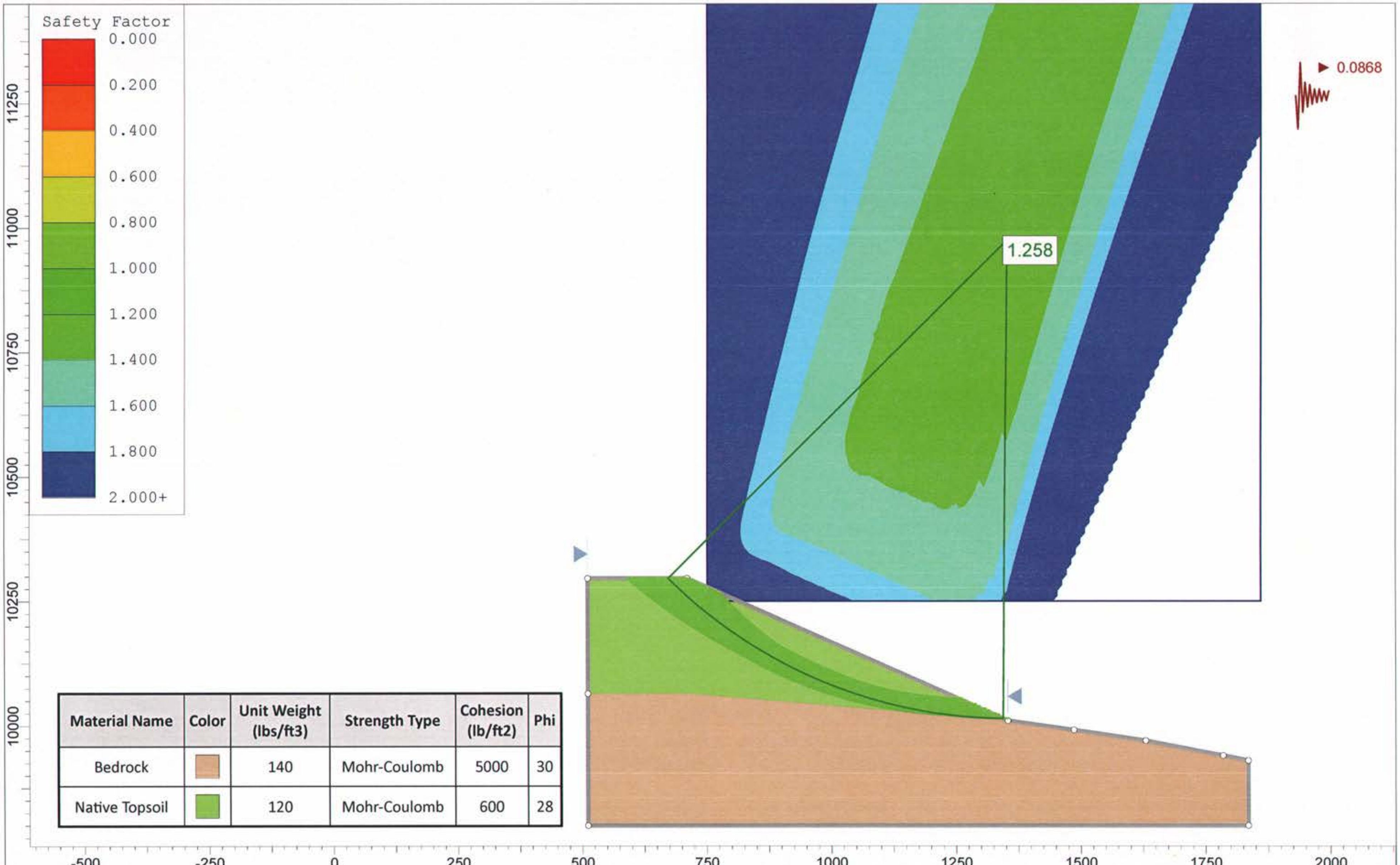

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Native Topsoil		120	Mohr-Coulomb	600	28

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

Client: American Sands Energy Corp

Title: General Topsoil Slope [Seismic]

Project: American Sands Bruin Point

Date: January 2015

Project No.: 24585638

Figure: D2

URS

Carbon County, Utah

By: BWF 9/2/2014

Checked: ECL 9/2/2014

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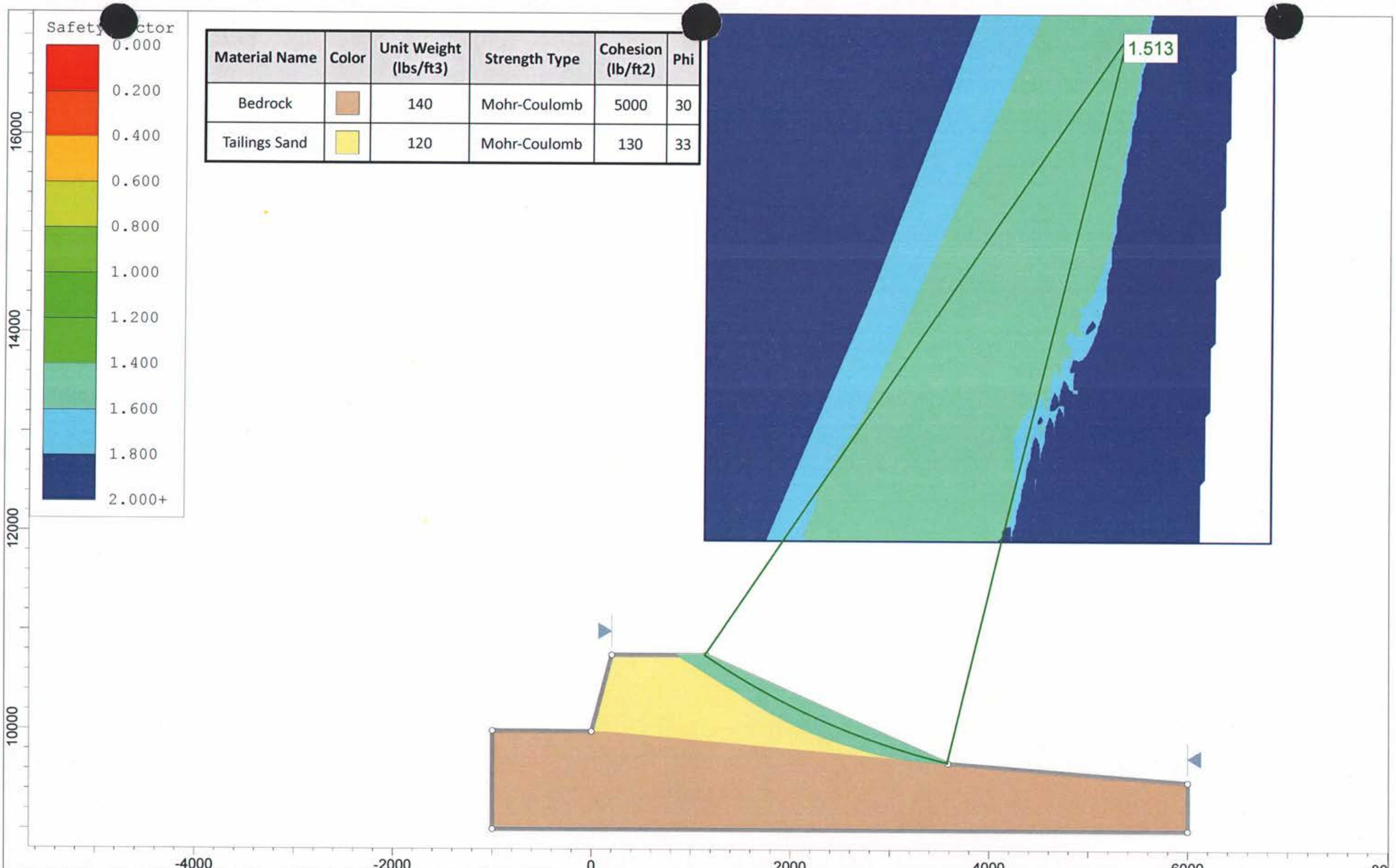


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Tailings Sand		120	Mohr-Coulomb	130	33

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

Client: American Sands Energy Corp

Title: General Tailings Slope 2.25H:1V

Project: American Sands Bruin Point

Date: January 2015

Project No.: 24585638

Figure: D3

URS

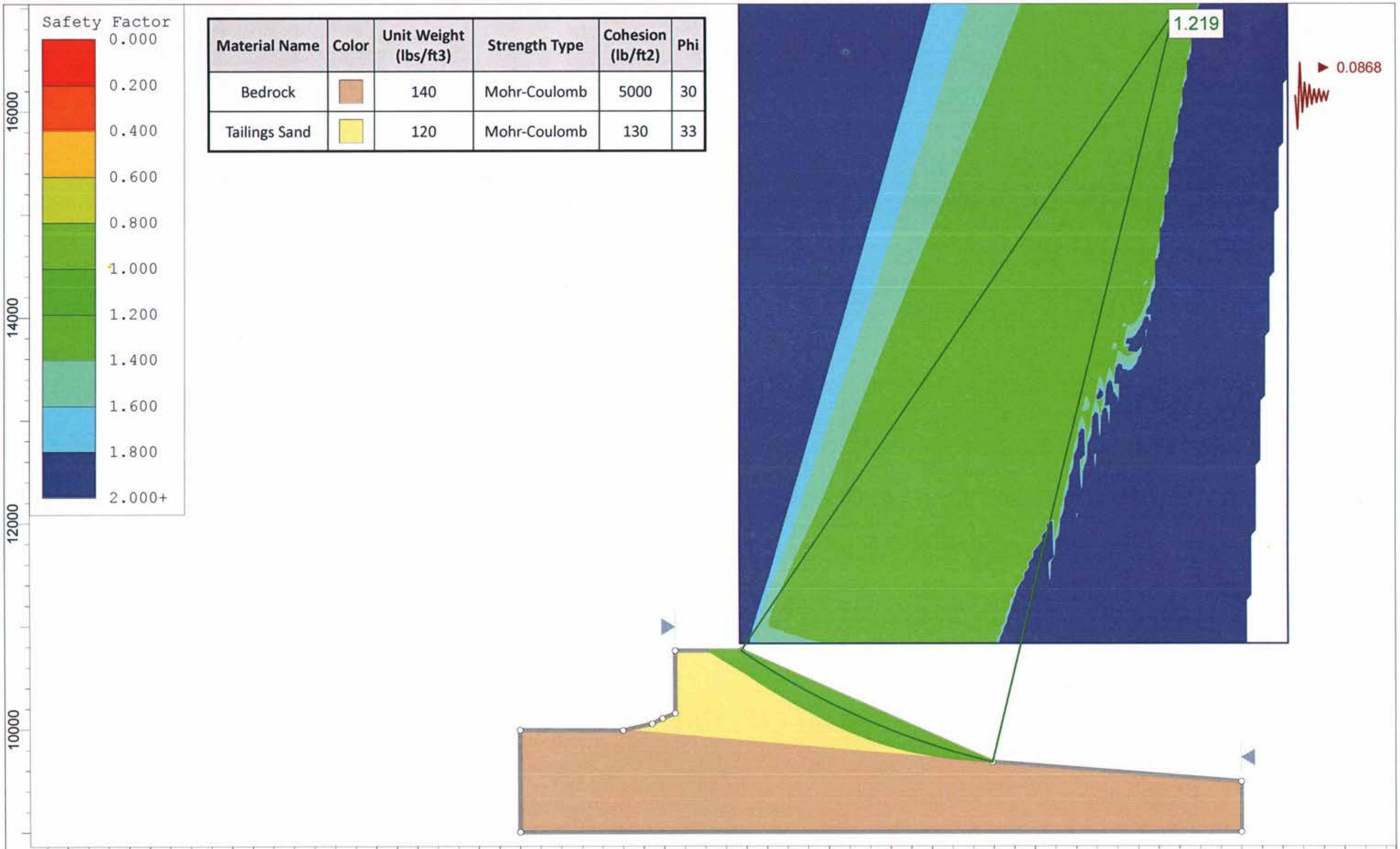
Carbon County, Utah

By: BWF 9/2/2014

Checked: ECL 9/2/2014

Q:\Projects\American Sands Energy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Tailings (c = 100) psf\Tailings Slope PHI=33deg, c=130 psf (2.25 to 1.0).slim

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Tailings Sand		120	Mohr-Coulomb	130	33



Description/Notes: Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.	Client: American Sands Energy Corp
By: BWF 9/2/2014 **Checked:** ECL 9/2/2014	

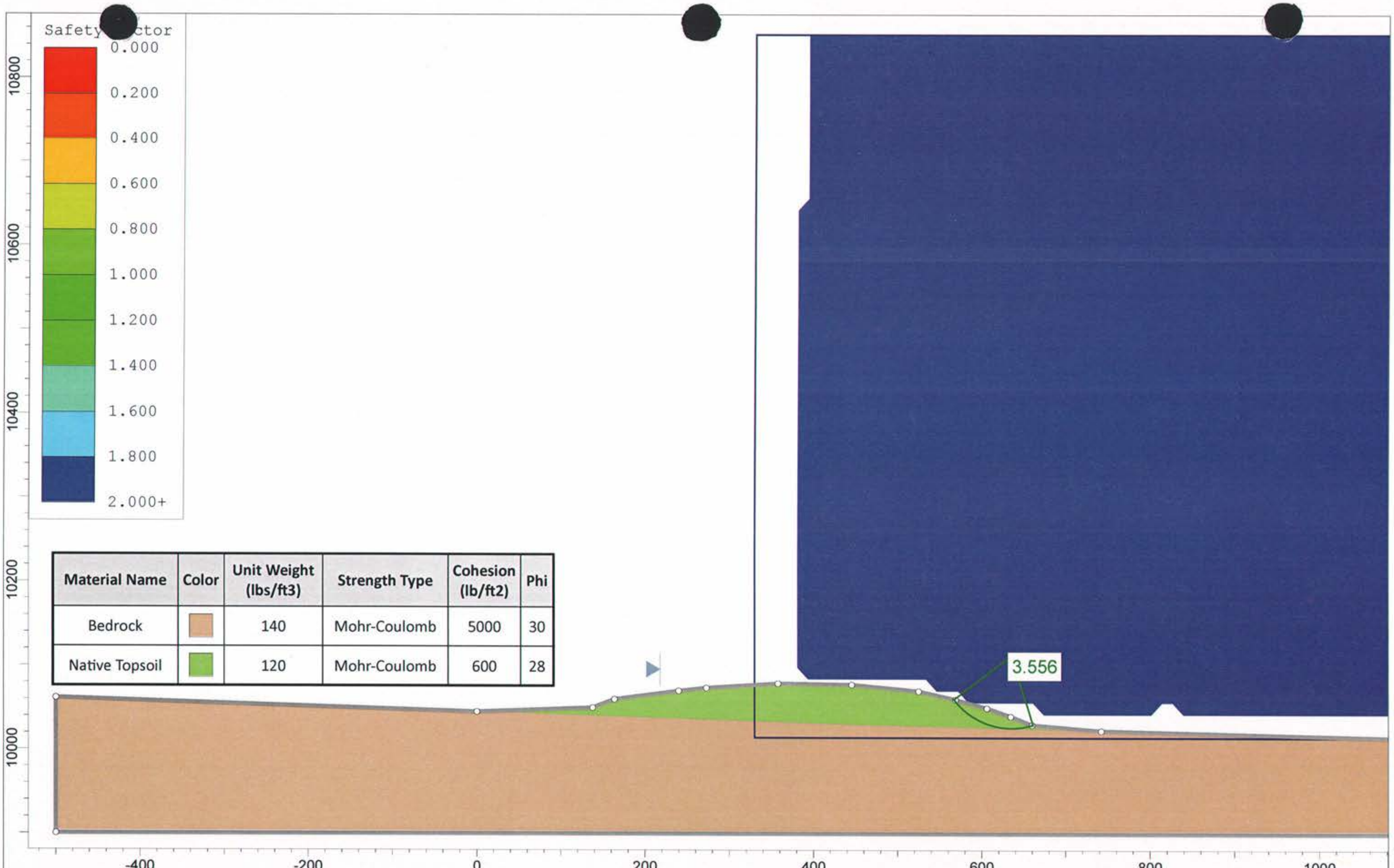
Title: General Tailings Slope [Seismic]

Project: American Sands Bruin Point

Date: January 2015 **Project No.:** 24585638

Figure: D4 URS Carbon County, Utah

Q:\Projects\American Sa[illegible]gy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Tailings (c = 100) psf\Tailings Slope PHI=33deg, c=130 psf (2.25 [illegible]ismic.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Native Topsoil		120	Mohr-Coulomb	600	28

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

By: BWF 9/2/2014 | Checked: ECL 9/2/2014

Q:\Projects\American Sands Energy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Proposed Geometry\Top Soil B-B (Right).slim

Client: American Sands Energy Corp

Title: Topsoil Stockpile No. 1 (B-B)

Project: American Sands Bruin Point

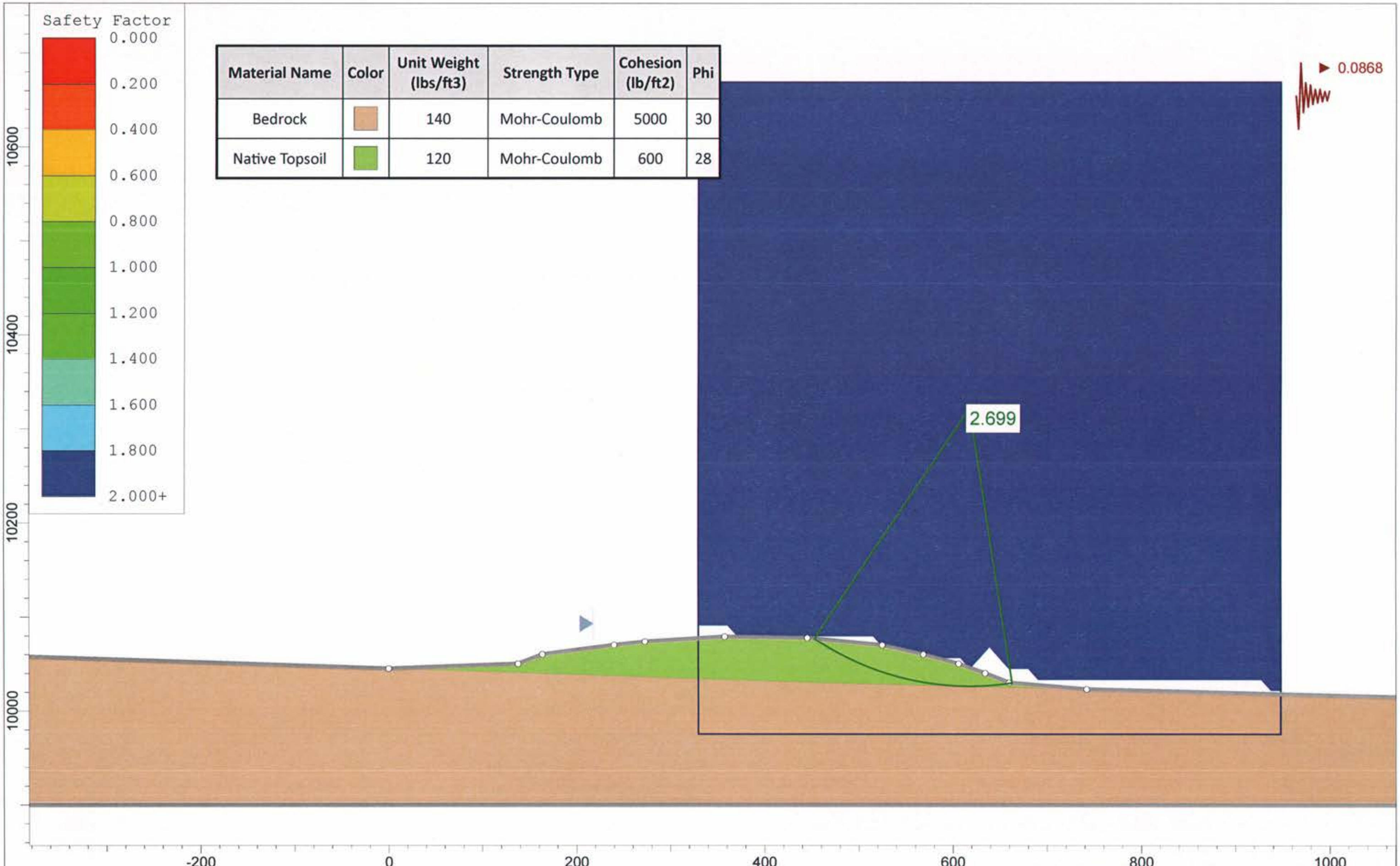
Date: January 2015

Project No.: 24585638

Figure: D5

URS

Carbon County, Utah



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Native Topsoil		120	Mohr-Coulomb	600	28

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

By: BWF 9/2/2014 | **Checked:** ECL 9/2/2014

Q:\Projects\American Sa gy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Seismic\Top Soil B-B (Right).slim

Client:

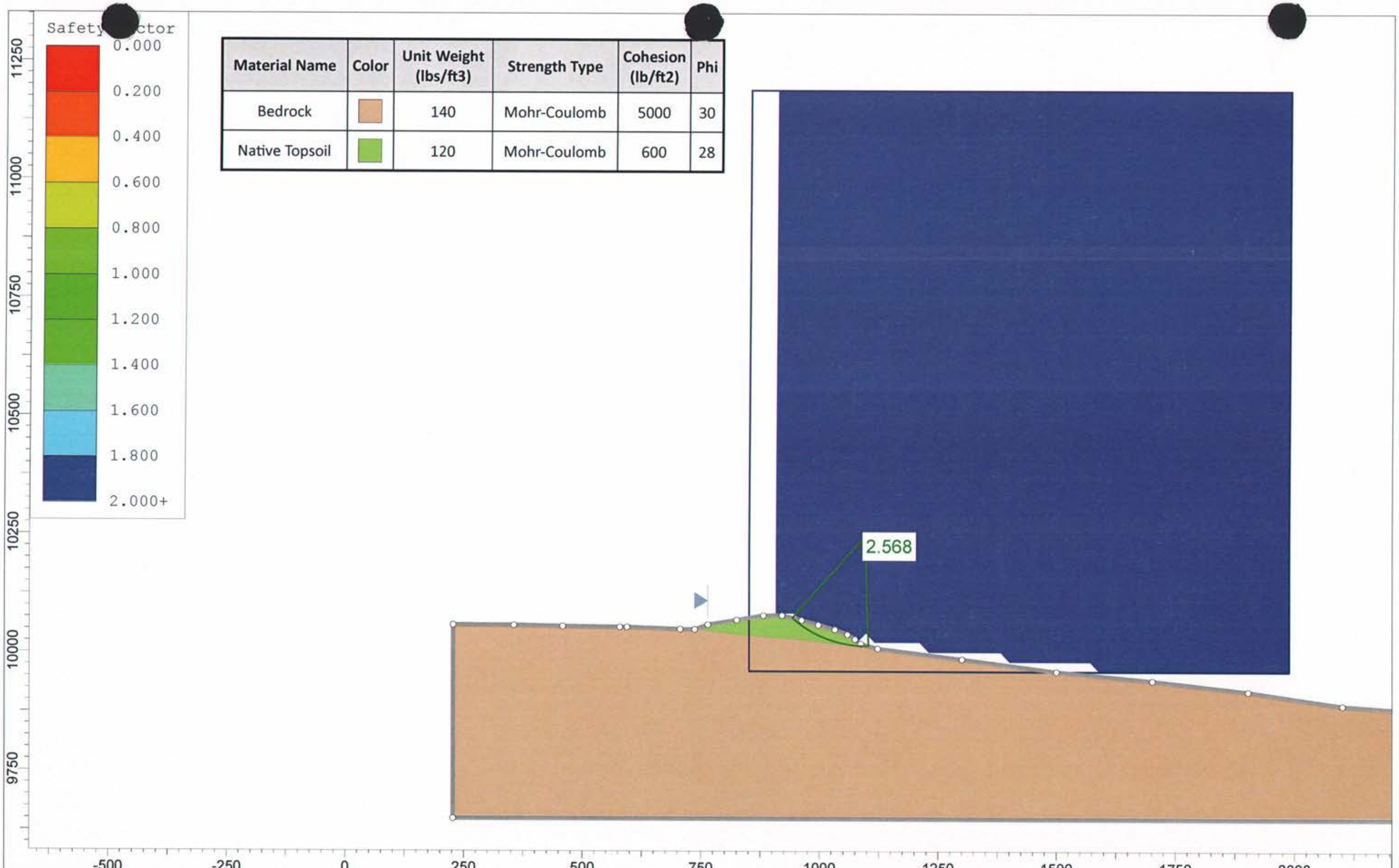
American Sands Energy Corp

Title: Topsoil Stockpile No. 1 (B-B) [Seismic]

Project: American Sands Bruin Point

Date: January 2015 | **Project No.:** 24585638

Figure: D6 | URS | Carbon County, Utah



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Native Topsoil		120	Mohr-Coulomb	600	28

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

By: BWF 9/2/2014 | Checked: ECL 9/2/2014

Client: American Sands Energy Corp

Title: Topsoil Stockpile No. 1 (B-B')

Project: American Sands Bruin Point

Date: January 2015

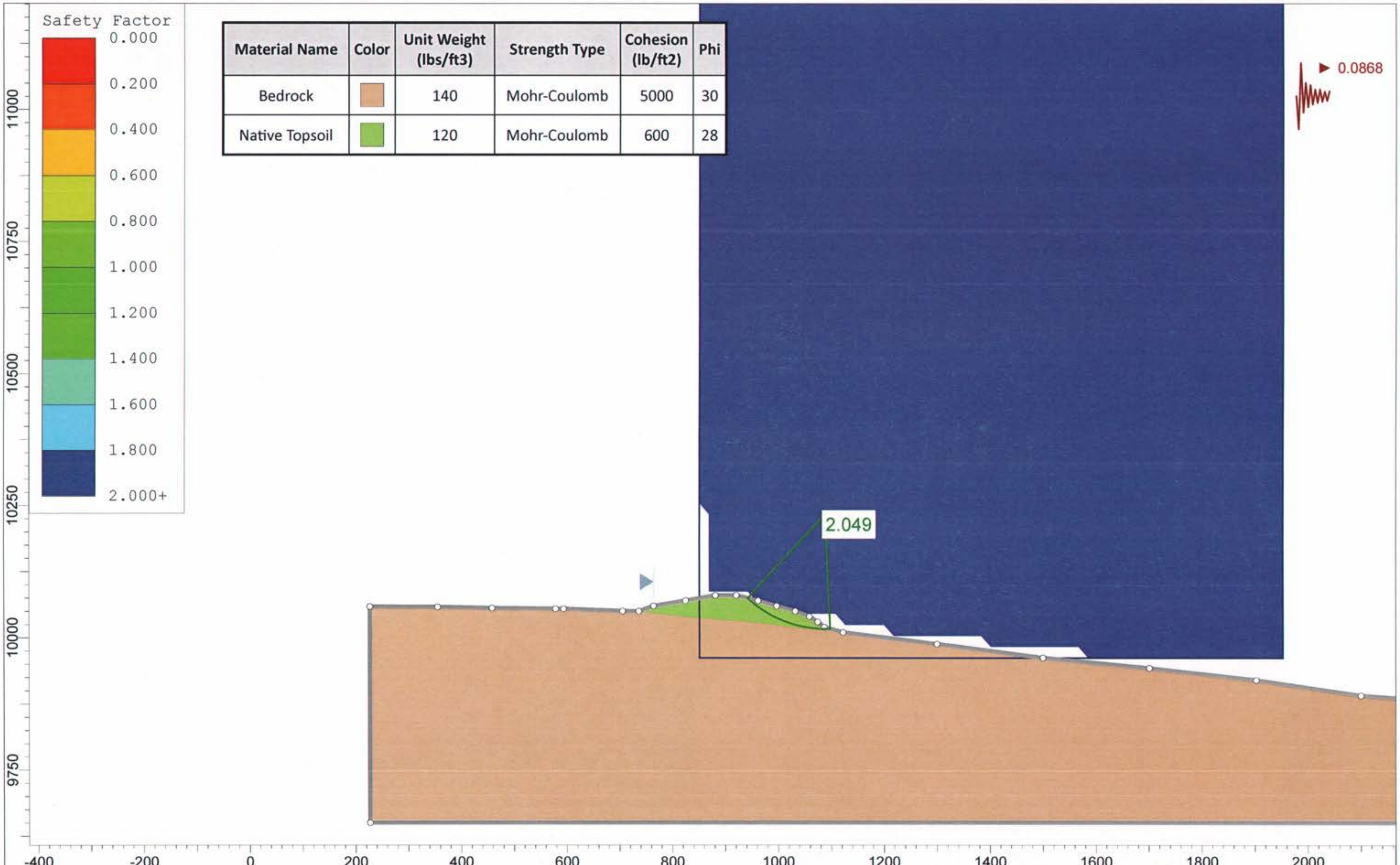
Project No.: 24585638

Figure: D7

URS

Carbon County, Utah

Q:\Projects\American Sands Energy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Proposed Geometry\Top Soil B-B-Prime.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Native Topsoil		120	Mohr-Coulomb	600	28

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

By: BWF 9/2/2014

Checked: ECL 9/2/2014

Q:\Projects\American Sa y\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Seismic\Top Soil B-B-Prime.slim

Client: American Sands Energy Corp

Title: Topsoil Stockpile No. 1 (B-B') [Seismic]

Project: American Sands Bruin Point

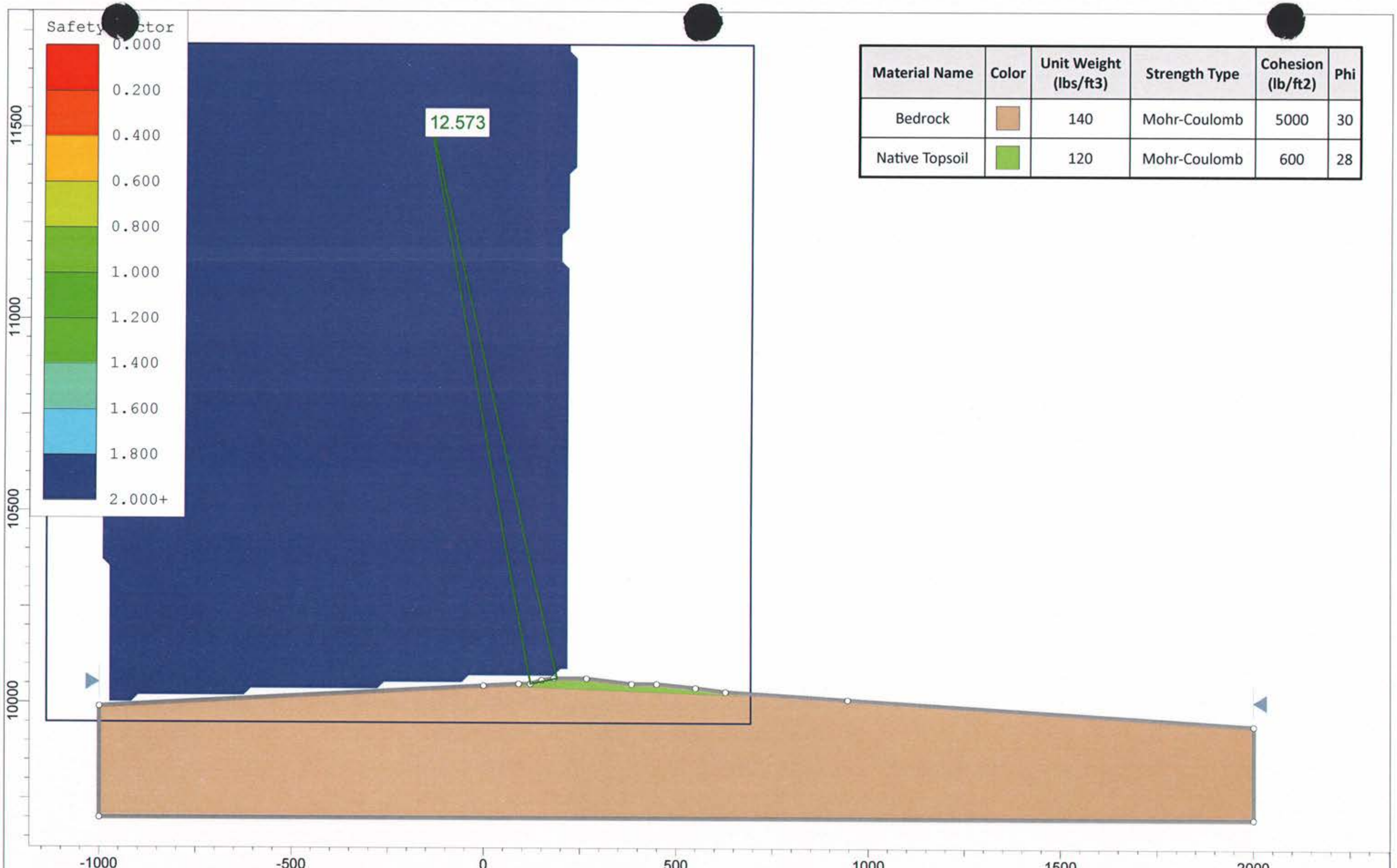
Date: January 2015

Project No.: 24585638

Figure: D8

URS

Carbon County, Utah



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Native Topsoil		120	Mohr-Coulomb	600	28

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

By: BWF 9/2/2014

Checked: ECL 9/2/2014

Client: American Sands Energy Corp

Title: Topsoil Stockpile No. 2 (A-A)

Project: American Sands Bruin Point

Date: January 2015

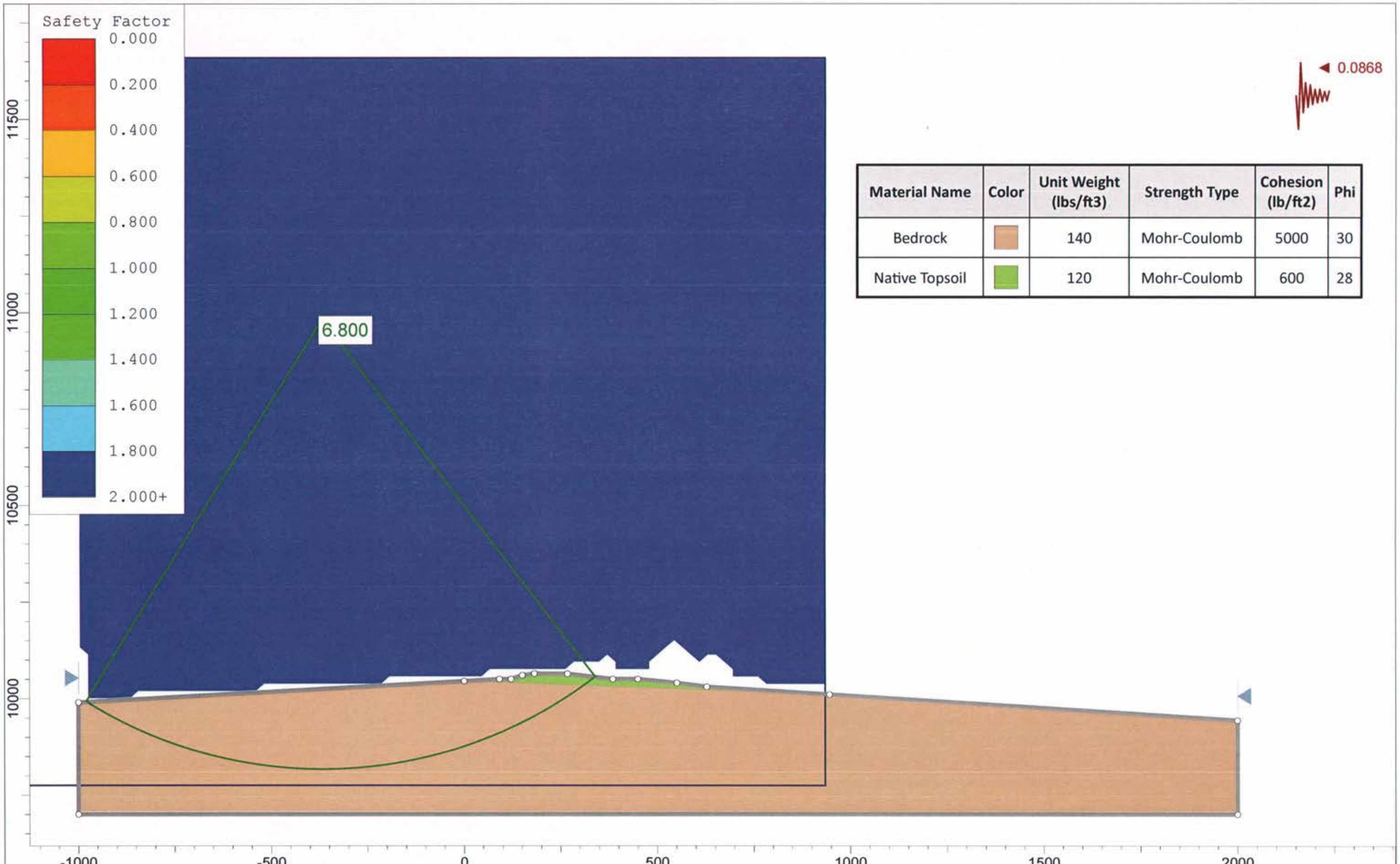
Project No.: 24585638

Figure: D9

URS

Carbon County, Utah

Q:\Projects\American Sands Energy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Proposed Geometry\Top Soil A-A.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Native Topsoil		120	Mohr-Coulomb	600	28

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

By: BWF 9/2/2014 **Checked:** ECL 9/2/2014

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Client: American Sands Energy Corp

Title: Topsoil Stockpile No. 2 (A-A) [Seismic]

Project: American Sands Bruin Point

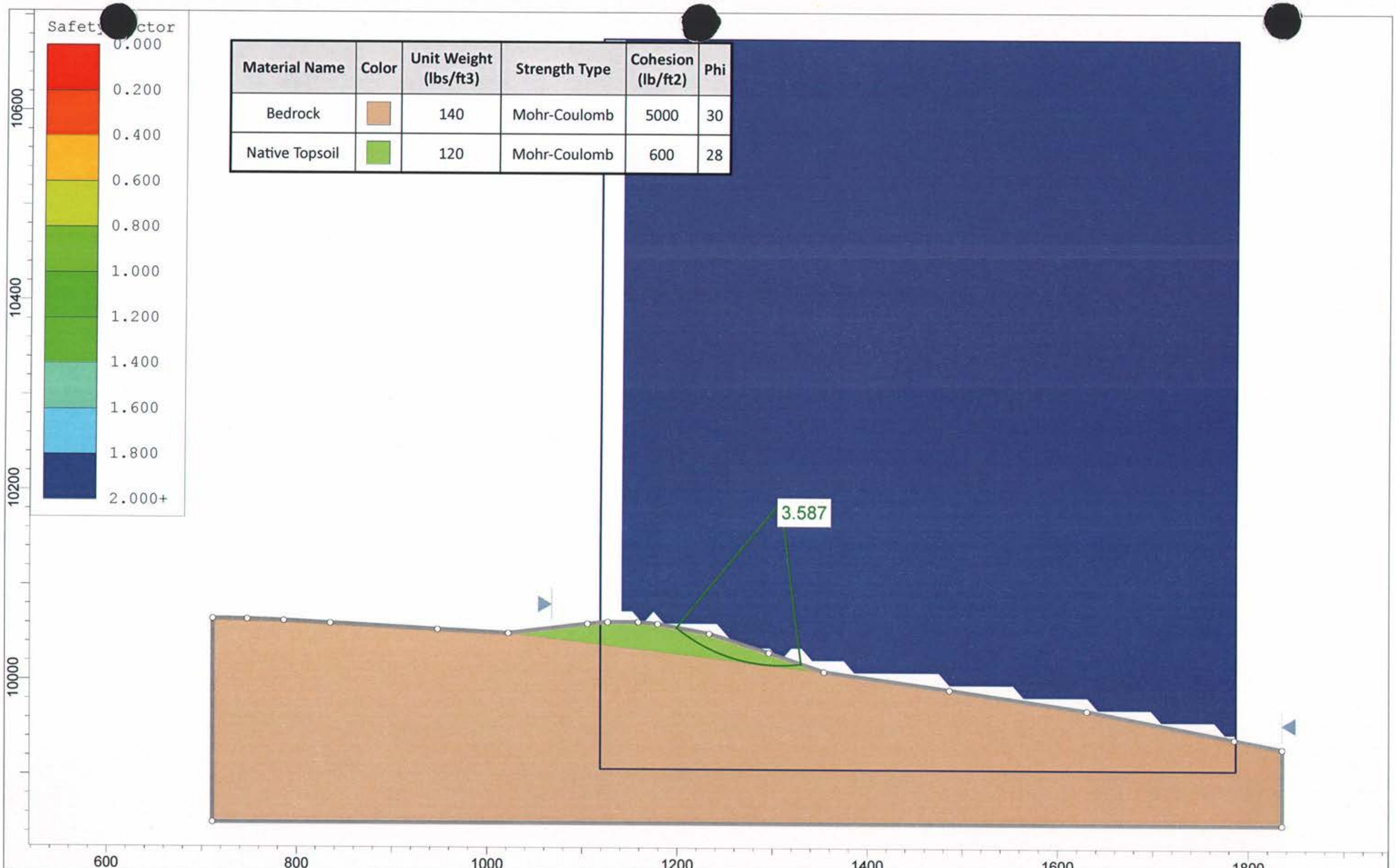
Date: January 2015

Project No.: 24585638

Figure: D10

URS

Carbon County, Utah



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Native Topsoil		120	Mohr-Coulomb	600	28

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

By: BWF 9/2/2014

Checked: ECL 9/2/2014

Client: American Sands Energy Corp

Title: Topsoil Stockpile No. 2 Section A-A'

Project: American Sands Bruin Point

Date: January 2015

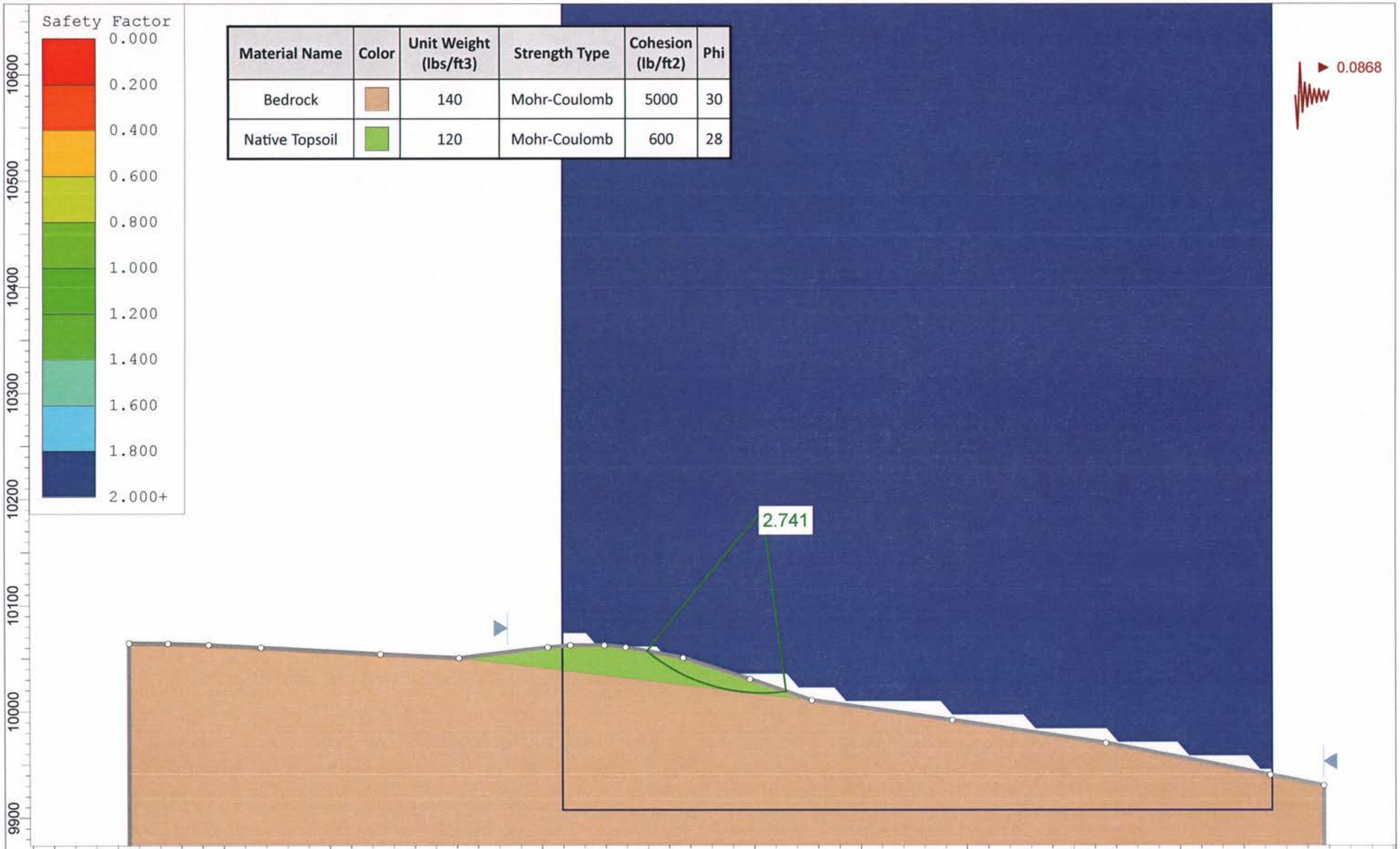
Project No.: 24585638

Figure: D11

URS

Carbon County, Utah

Q:\Projects\American Sands Energy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Proposed Geometry\Top Soil A-A-Prime.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Native Topsoil		120	Mohr-Coulomb	600	28

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

Client: American Sands Energy Corp

Title: Topsoil Stockpile No. 2 (A-A') [Seismic]

Project: American Sands Bruin Point

Date: January 2015

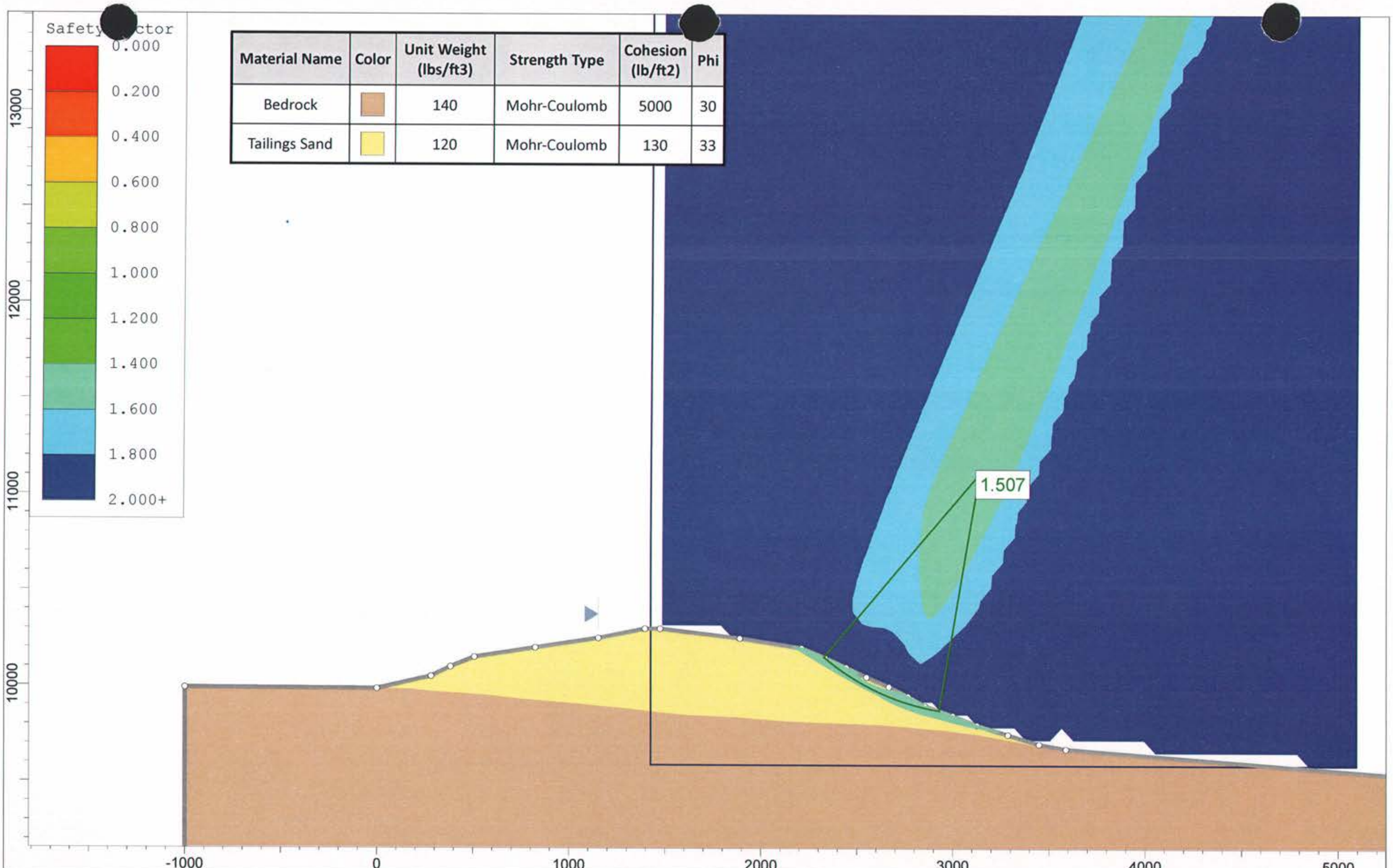
Project No.: 24585638

Figure: D12

URS Carbon County, Utah

By: BWF 9/2/2014 **Checked:** ECL 9/2/2014

Q:\Projects\American Sa gy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Seismic\Top Soil A-A-Prime.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Tailings Sand		120	Mohr-Coulomb	130	33

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

By: BWF 9/2/2014 **Checked:** ECL 9/2/2014

Q:\Projects\American Sands Energy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Proposed Geometry\Tailings A-A (Right).slim

Client: American Sands Energy Corp

Title: Tailings Stockpile (A-A)

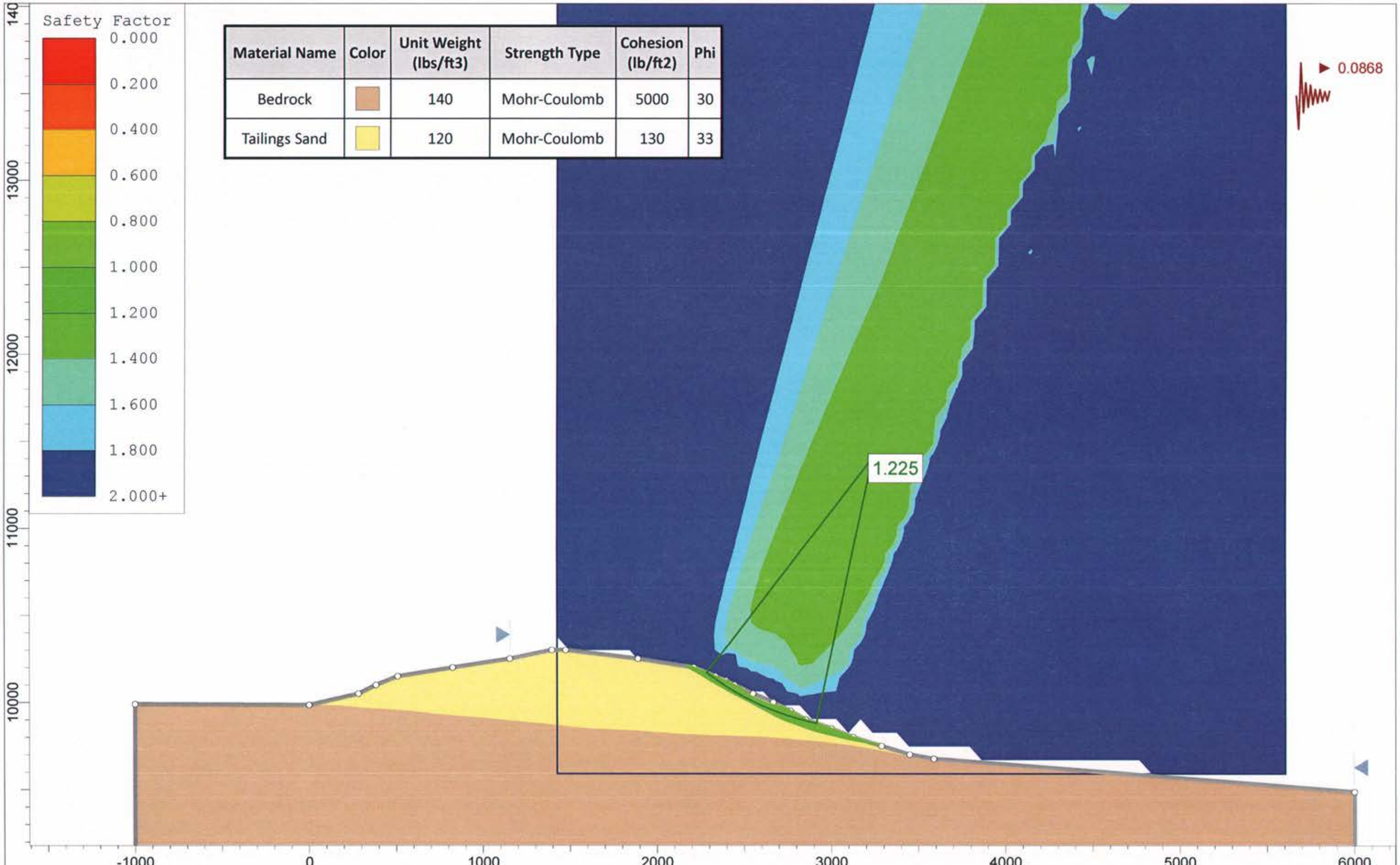
Project: American Sands Bruin Point

Date: January 2015

Project No.: 24585638

Figure: D13

URS Carbon County, Utah



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Tailings Sand		120	Mohr-Coulomb	130	33

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

Client: American Sands Energy Corp

Title: Tailings Stockpile (A-A) [Seismic]

Project: American Sands Bruin Point

Date: January 2015

Project No.: 24585638

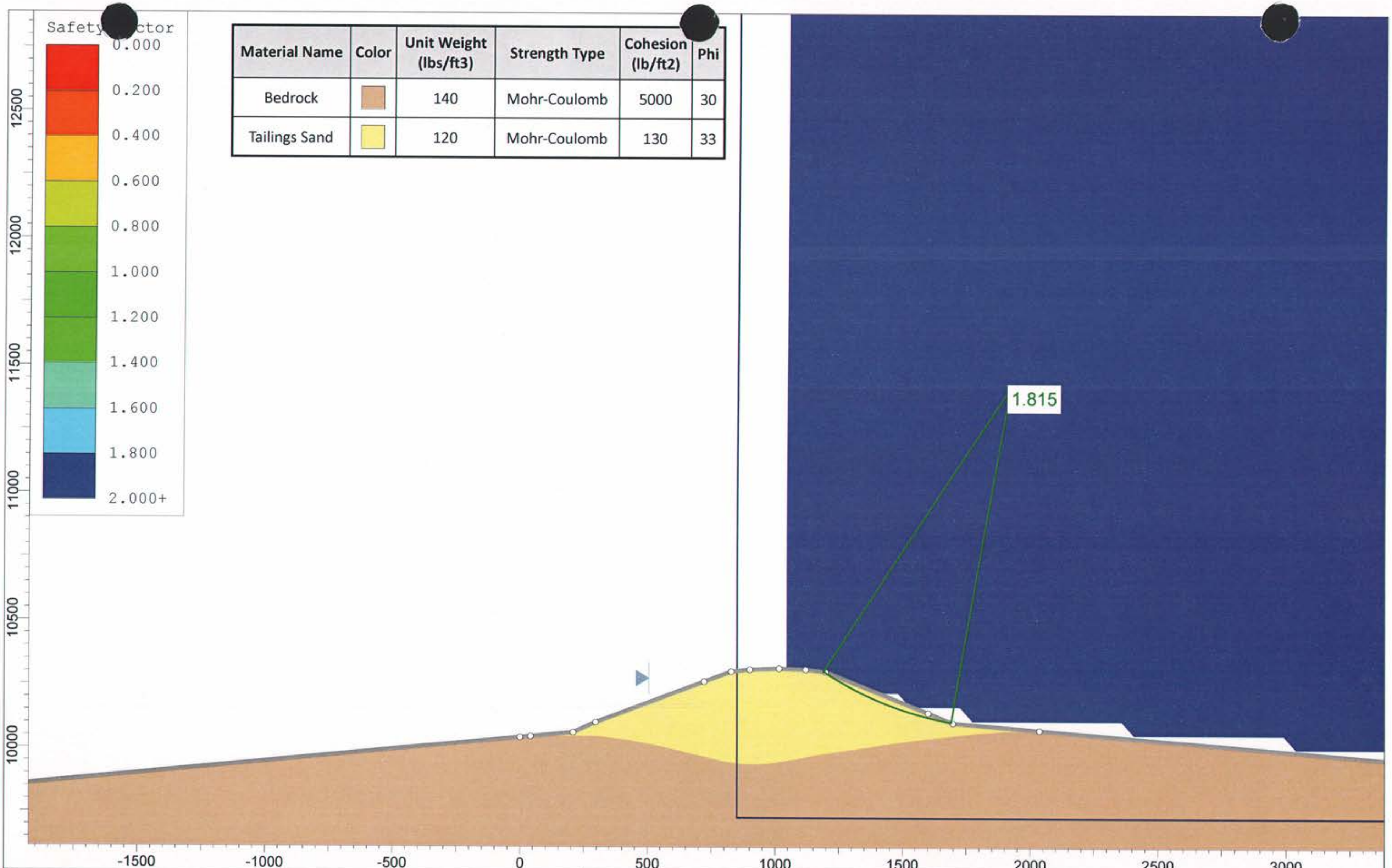
Figure: D14

URS

Carbon County, Utah

By: BWF 9/2/2014 **Checked:** ECL 9/2/2014

Q:\Projects\American Sa gy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Seismic\Tailings A-A (Right).slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Tailings Sand		120	Mohr-Coulomb	130	33

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

By: BWF 9/2/2014

Checked: ECL 9/2/2014

Client: American Sands Energy Corp

Title: Tailings Stockpile (B-B)

Project: American Sands Bruin Point

Date: January 2015

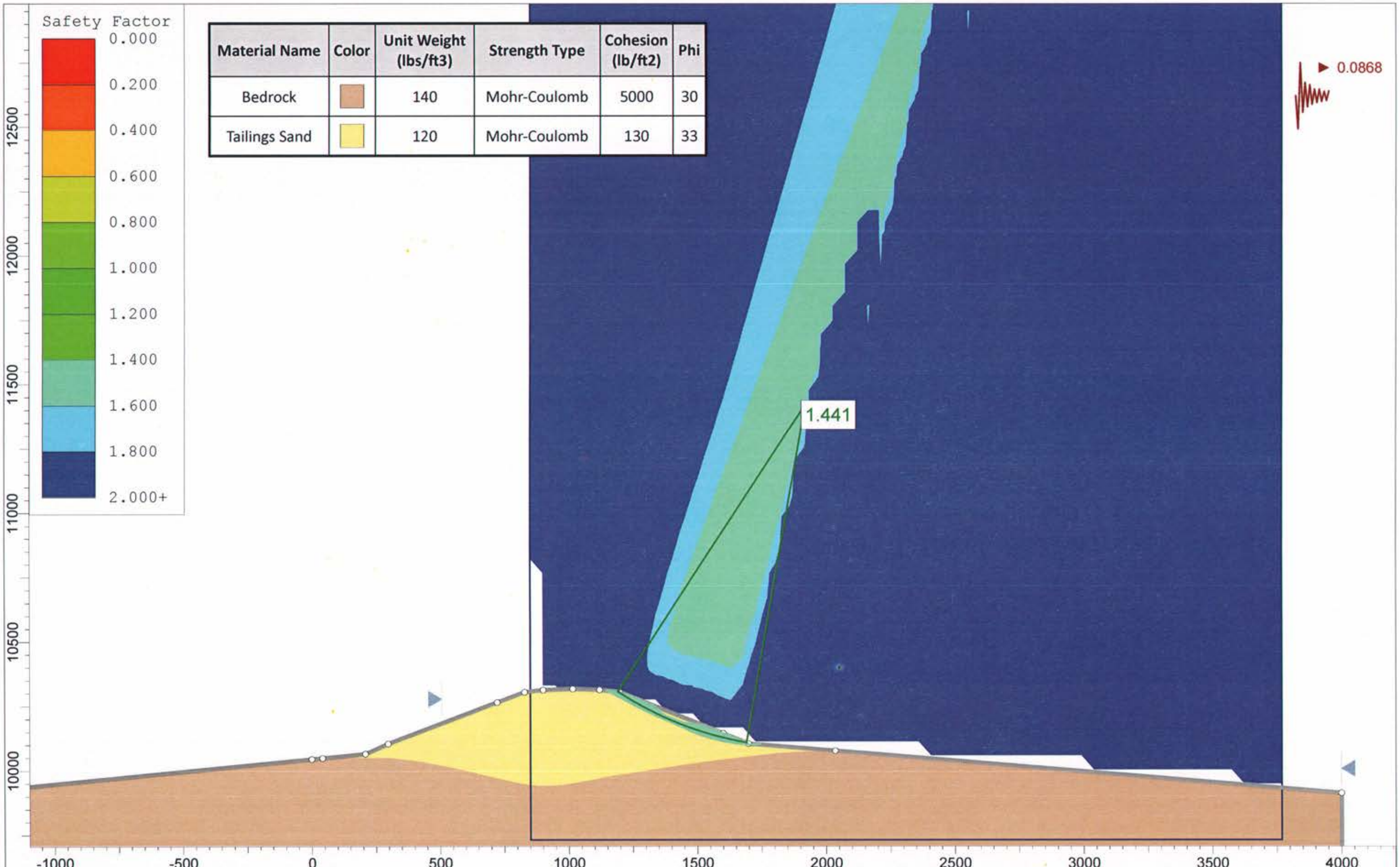
Project No.: 24585638

Figure: D15

URS

Carbon County, Utah

Q:\Projects\American Sands Energy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Proposed Geometry\Tailings B-B (Right).slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Tailings Sand		120	Mohr-Coulomb	130	33

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

Client: American Sands Energy Corp

Title: Tailings Stockpile (B-B) [Seismic]

Project: American Sands Bruin Point

Date: January 2015

Project No.: 24585638

Figure: D16

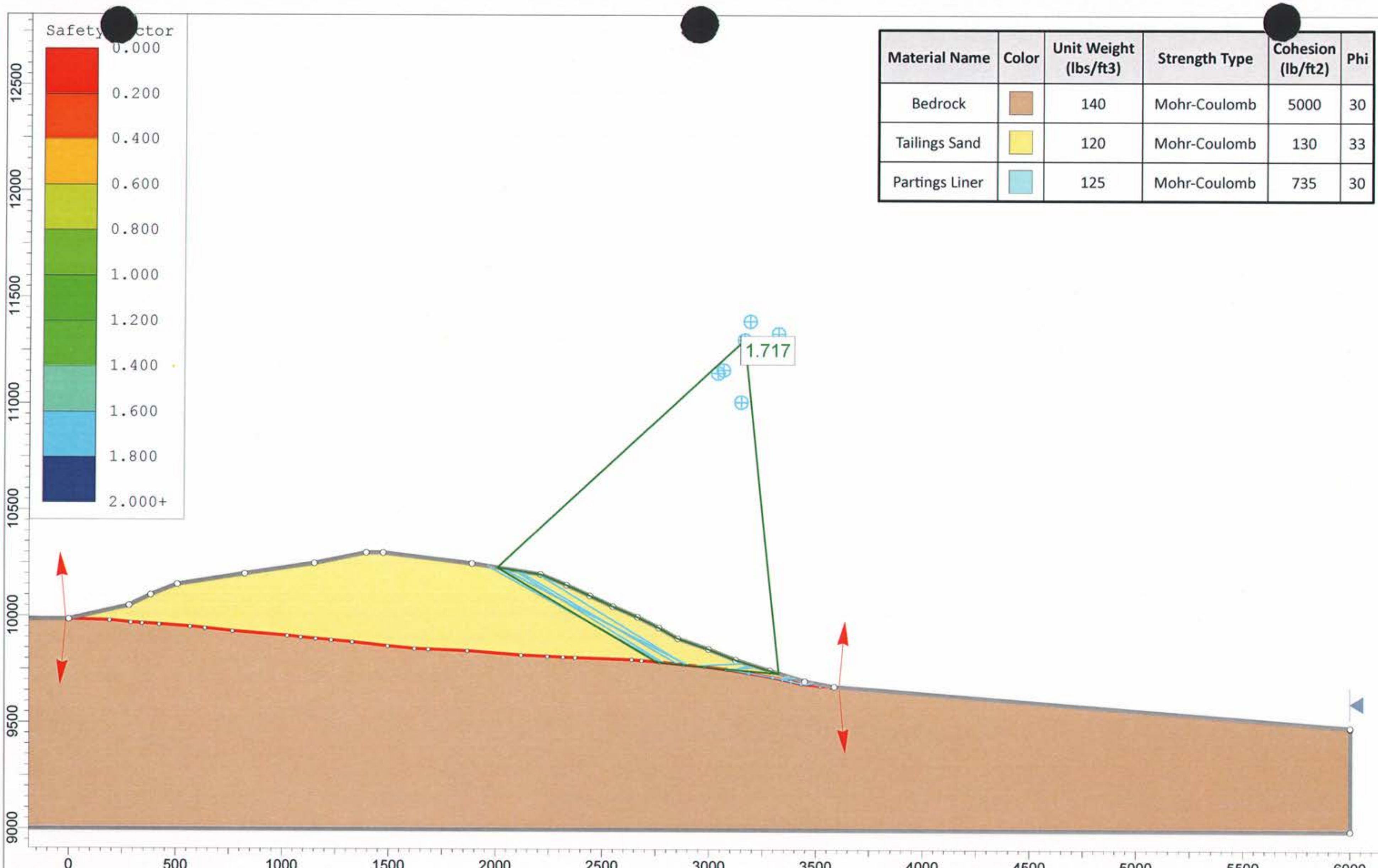
URS

Carbon County, Utah

By: BWF 9/2/2014

Checked: ECL 9/2/2014

Q:\Projects\American Sa gy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Seismic\Tailings B-B (Right).slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Tailings Sand		120	Mohr-Coulomb	130	33
Partings Liner		125	Mohr-Coulomb	735	30

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

Client: American Sands Energy Corp

Title: Tailings with Liner (A-A)

Project: American Sands Bruin Point

Date: January 2015

Project No.: 24585638

Figure: D17

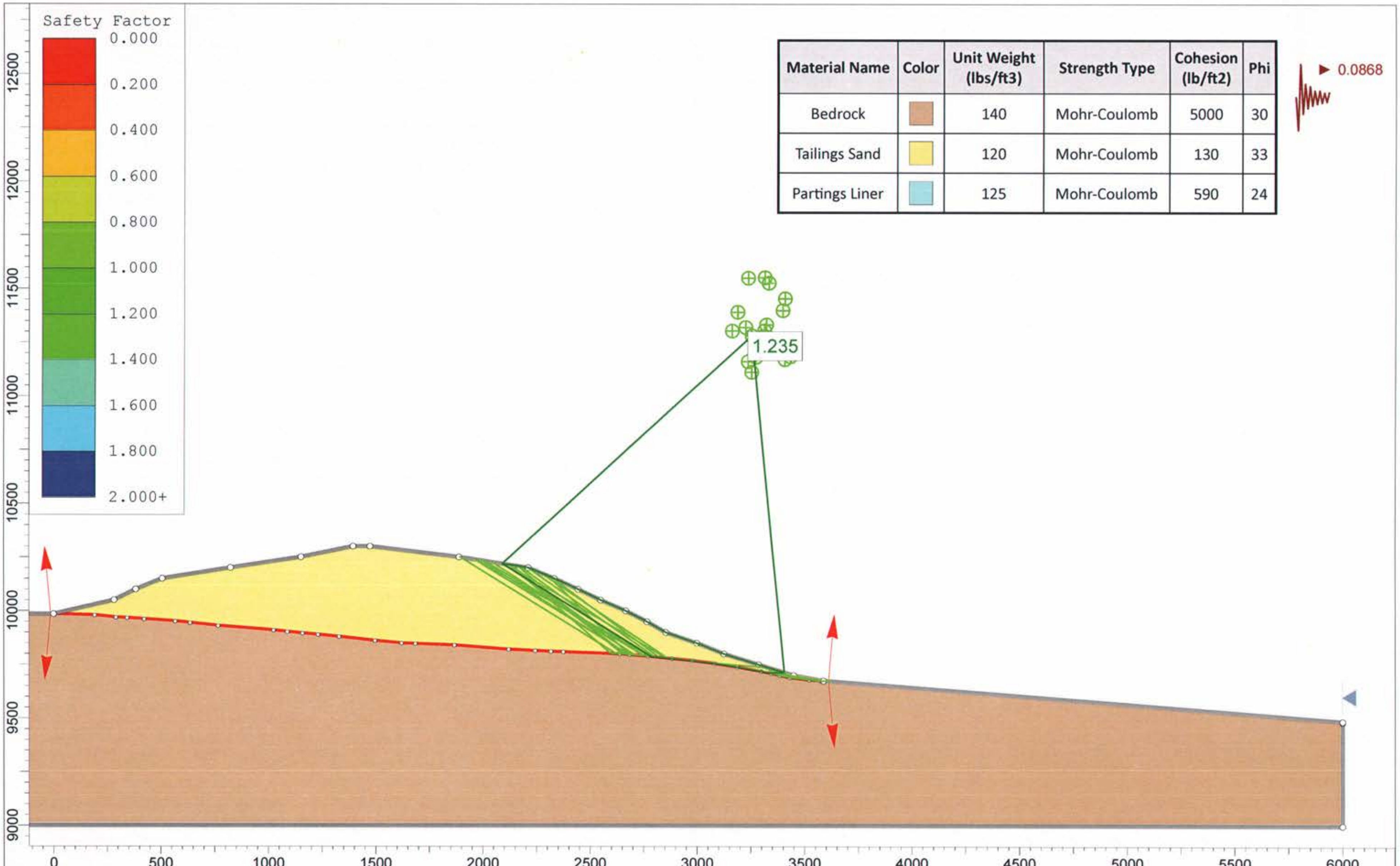
URS

Carbon County, Utah

By: BWF 9/2/2014

Checked: ECL 9/2/2014

Q:\Projects\American Sands Energy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Proposed Geometry\Clay Liner\Tailings A-A (Right).slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Tailings Sand		120	Mohr-Coulomb	130	33
Partings Liner		125	Mohr-Coulomb	590	24

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

By: BWF 9/2/2014 **Checked:** ECL 9/2/2014

Client: American Sands Energy Corp

Title: Tailings with Liner (A-A) [Seismic]

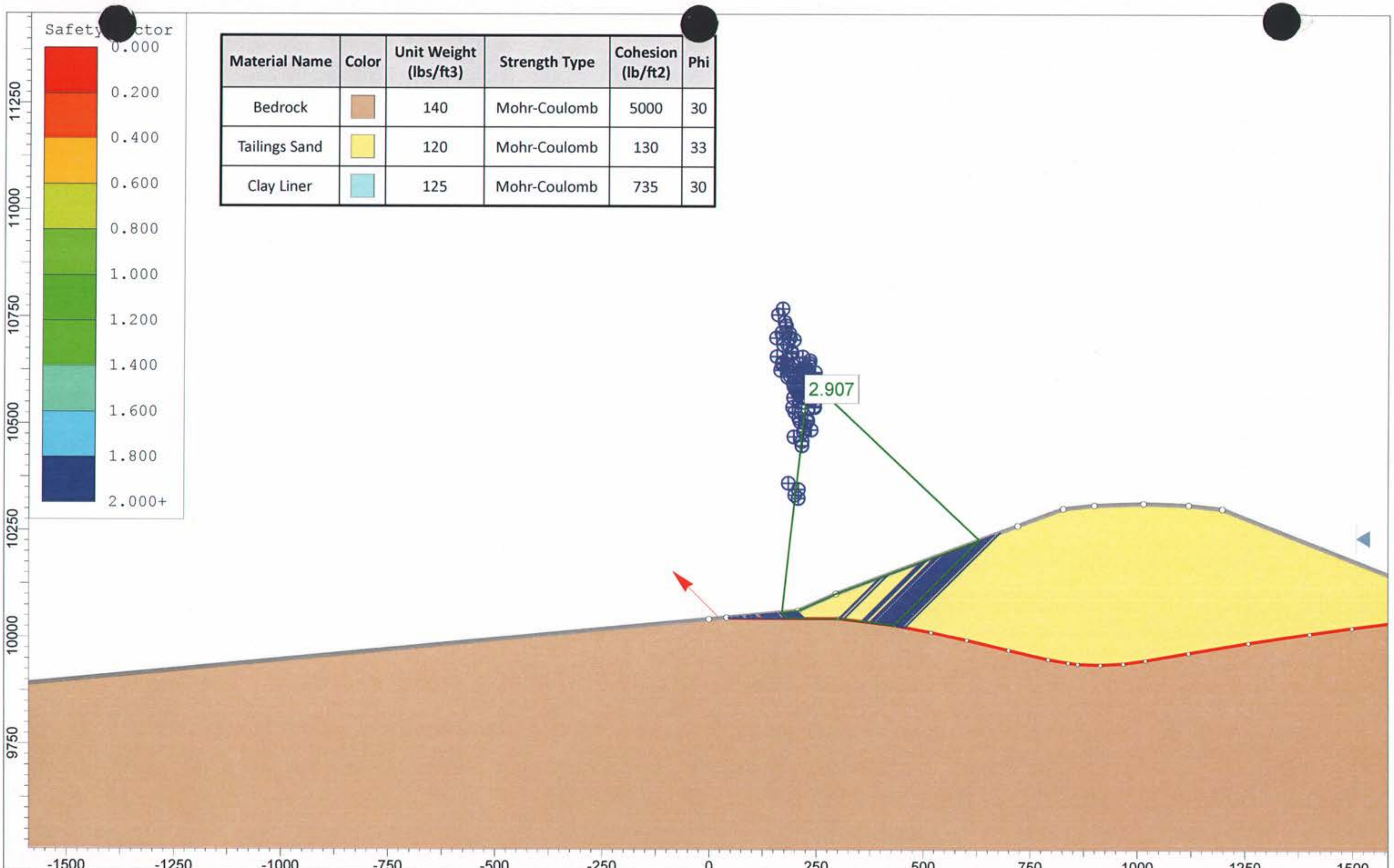
Project: American Sands Bruin Point

Date: January 2015 **Project No.:** 24585638

Figure: D18

URS Carbon County, Utah

Q:\Projects\American Sa gy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Proposed Geometry\Clay Liner\Tailings A-A (Right)_Seismic.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Tailings Sand		120	Mohr-Coulomb	130	33
Clay Liner		125	Mohr-Coulomb	735	30

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

Client: American Sands Energy Corp

Title: Tailings with Liner (B-B)

Project: American Sands Bruin Point

Date: January 2015

Project No.: 24585638

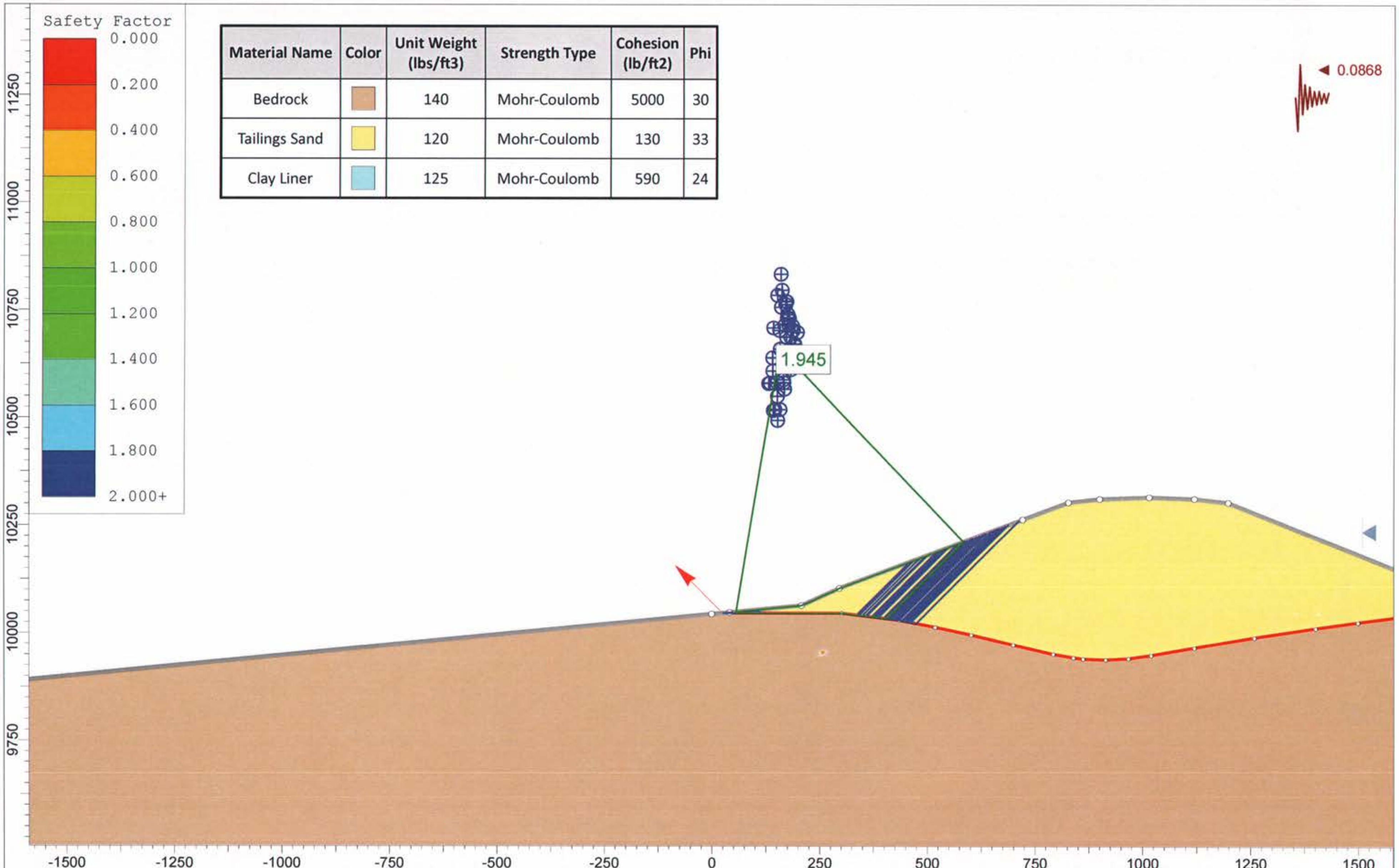
Figure: D19

URS

Carbon County, Utah

By: BWF 1/20/2015 **Checked:** ECL 1/20/2015

Q:\Projects\American Sands Energy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Proposed Geometry\Clay Liner\Tailings B-B (Left).slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi
Bedrock		140	Mohr-Coulomb	5000	30
Tailings Sand		120	Mohr-Coulomb	130	33
Clay Liner		125	Mohr-Coulomb	590	24

Description/Notes:

Stability analysis was performed using Slide v. 6.005 by Rocscience, Inc., of Toronto, Canada, and Spencer's Method of Slices.

By: BWF 1/20/2015 | Checked: ECL 1/20/2015

Q:\Projects\American Sa[illegible]gy\24585638\05_Analysis and Engineering\Geotech\Stability Analysis\Proposed Geometry\Clay Liner\Tailings B-B (Left)_Seismic.slim

Client: American Sands Energy Corp

Title: Tailings with Liner (B-B) [Seismic]

Project: American Sands Bruin Point

Date: January 2015

Project No.: 24585638

Figure: D20

URS

Carbon County, Utah

APPENDIX H

Surety Calculation

Bonding Calculations

Direct Costs

Subtotal Demolition and Removal	$1,036,975.50	
Subtotal Backfilling and Grading	$1,380,154.50	
Subtotal Revegetation	$208,000.00	
Direct Costs	$2,625,130.00	
Indirect Costs		
Mob/Demob	$262,513.00	10.0%
Contingency	$131,257.00	5.0%
Engineering Redesign	$65,628.00	2.5%
Main Office Expense	$178,509.00	6.8%
Project Management Fee	$65,628.00	2.5%
Subtotal Indirect Costs	$703,535.00	26.8%
Total Cost 2014	$3,328,665.00	
Number of years		5
Escalation factor		0.017
Escalation	$292,721.00	
Reclamation Cost Escalated	$3,621,386.00	
Bond Amount (rounded to nearest $1,000)	$3,621,000.00	
2014 Dollars		
Posted Bond	$3,621,000.00	
Difference Between Cost Estimate and Bond	$0.00	
Percent Difference		

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Office Building																			$ 4,085.50
	Warehouse and Maintenance Shop																			$ 3,393.00
	Process Building																			$ 4,564.00
	Electrical Building																			$ 2,019.00
	Bitumen Storage Tank (4)																			$ 9,866.00
	Water Recycle Tank																			$ 4,390.00
	Bitumen Solvent Storage Tank																			$ 8,051.00
	Process Equipment Building																			$ 11,432.00
	0																			$ 9,603.00
	Fan House																			$ 3,603.50
	Septic Tank																			$ 1,329.00
	Potable Water Storage Tank																			$ 5,860.00
	Bitumen Truck Loading Pad																			$ 1,165.00
	Storage Building																			$ 720,782.00
	Truck Dumping/Loading Building																			$ 44,425.00
	Raw Water Tank 3 tanks at 12.5 ton, one at plant site and two at the portal																			$ 10,784.00
	Bitumen Solution Tank																			$ 3,754.00
	Storage Building #2																			$ 117,519.50
	Diesel Tanks (3) Two at plant site and one at portal																			$ 7,227.00
	Gasoline Tanks (3) Two at plant site and one at portal																			$ 7,227.00
	Emission Control Building																			$ 679.00
	Parts Trailer																			$ 17,410.00
	Portable Office																			$ 17,410.00
	Fire Protection Storage Tanks (3) Two at plant site and one at portal																			$ 13,170.00
	Water Tanks (2)																			$ 7,227.00
																				$ 1,036,975.50

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Office Building																			
	Deduct 50% no interior walls		02 41 16.13 0020	$ 0.33		12	60	12			8640					CF		8640		$ 1,425.50
	Structure's Demolition Cost	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/CF	12	60	12			8640					CF		8640	CF	
	Structure's Vol. Demolished																0.3	96	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													96	CY	$ 1,152.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ 2,577.50
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	12	60	1			720							27	CY	$ 328.00
	Concrete's Vol. Demolished																1.3	35	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													35	CY	$ 65.00
	Transportation Cost	12 C.Y. dump truck, cycle 50 mile, 40 MPH ave.	31 23 23.20 1084	$ 17.85	/LCY													35	CY	$ 625.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													35	CY	$ 490.00
	Subtotal																			$ 1,508.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 4,085.50

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Warehouse and Maintenance Shop																			
	Deduct 50% no interior walls		02 41 16.13 0020	$ 0.33	/CF	20	30	12			7200					CF		7200		$ 1,188.00
	Structure's Demolition Cost	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/CF	20	30	12			7200					CF		7200	CF	
	Structure's Vol. Demolished																0.3	80	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													80	CY	$ 960.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ 2,148.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	20	30	1			600							22	CY	$ 267.00
	Concrete's Vol. Demolished																1.3	29	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													29	CY	$ 54.00
	Transportation Cost	12 C.Y. dump truck, cycle 50 mile, 40 MPH ave.	31 23 23.20 1084	$ 17.85	/LCY													29	CY	$ 518.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													29	CY	$ 406.00
	Subtotal																			$ 1,245.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 3,393.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Process Building																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/CF	20	20	20			8000					CF		8000	CF	$ 2,640.00
	Structure's Vol. Demolished																0.3	89	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													89	CY	$ 1,068.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ 3,708.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	20	20	1			400							15	CY	$ 182.00
	Concrete's Vol. Demolished																1.3	20	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													20	CY	$ 37.00
	Transportation Cost	12 C.Y. dump truck, cycle 50 mile, 40 MPH ave.	31 23 23.20 1084	$ 17.85	/LCY													20	CY	$ 357.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													20	CY	$ 280.00
	Subtotal																			$ 856.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 4,564.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Electrical Building																			
	Deduct 50% no interior walls		02 41 16.13 0020	$ 0.33	/CF	12	30	12			4320					CF		4320	CF	$ 713.00
	Structure's Demolition Cost	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/CF	12	30	12			4320					CF		4320	CF	
	Structure's Vol. Demolished																0.3	48	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													48	CY	$ 576.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ 1,289.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	12	30	1			360							13	CY	$ 158.00
	Concrete's Vol. Demolished																1.3	17	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													17	CY	$ 31.00
	Transportation Cost	12 C.Y. dump truck, cycle 50 mile, 40 MPH ave.	31 23 23.20 1084	$ 17.85	/LCY													17	CY	$ 303.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													17	CY	$ 238.00
	Subtotal																			$ 730.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 2,019.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Bitumen Storage Tank (4)																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/ton											Tons		0	Ton	$ -
	Structure's Vol. Demolished																0.3	0	Ton	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	Ton													0	CY	$ -
	Steel's Weight	City Services	City Services ECDC	$ 28.00	Ton							337.5						337.5	Ton	$ 9,450.00
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost	Remove sludge, water and remaining product from tank bottom	02 65 10.30 0823	$ 104.00											4	Ea		4		$ 416.00
	Subtotal																			$ 9,866.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	0	0	1			0	0						0	CY	$ -
	Concrete's Vol. Demolished																1.3	0	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													0	CY	$ -
	Transportation Cost	12 C.Y. dump truck, cycle 50 mile, 40 MPH ave.	31 23 23.20 1084	$ 17.85	/LCY													0	CY	$ -
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													0	CY	$ -
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 9,866.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume gal	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Water Recycle Tank																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Tanks, single wall	13 05 05.75 0540	$ 3,075.00	/Ea						16,956				1	gal		1	Ea	$ 3,075.00
	Structure's Vol. Demolished																0.3	0	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													0	CY	$ -
	Steel's Weight	City Services	City Services ECDC	$ 28.00	TON											Ton		0	Ton	$ -
	Truck's Capacity																			
	Haulage	Haul tank to certified sa	9,000 gal to 12,000	$ 1,150.00	/Ea						16,956				1	gal		1	Ea	$ 1,150.00
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost	Remove sludge, water	02 65 10.30 0863	$ 165.00	/Ea						16,956				1	gal		1	Ea	$ 165.00
	Subtotal																			$ 4,390.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	0	0	1			0							0	CY	$ -
	Concrete's Vol. Demolished																1.3	0	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													0	CY	$ -
	Transportation Cost	12 C.Y. dump truck, cycle 20 mile, 40 MPH ave.	31 23 23.20 1078	$ 8.90	/LCY													0	CY	$ -
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													0	CY	$ -
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 4,390.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Bitumen Solvent Storage Tank																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Tanks, single wall	15,000 thru 30,000	$ 3,075.00	/Ea						31500				1	gal		31500	Ea	$ 3,075.00
	Structure's Vol. Demolished																0.3	350	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													350	CY	$ 4,200.00
	Steel's Weight	City Services	City Services ECDC	$ 28.00	Ton						24					Ton		24	Ton	$ 672.00
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost	Remove sludge, water and remaining product from tank bottom	02 65 10.30 0823	$ 104.00	Ea										1	Ea		1	Ea	$ 104.00
	Subtotal																			$ 8,051.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	0	0	1			0							0	CY	$ -
	Concrete's Vol. Demolished																1.3	0	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													0	CY	$ -
	Transportation Cost	12 C.Y. dump truck, cycle 20 mile, 40 MPH ave.	31 23 23.20 1078	$ 8.90	/LCY													0	CY	$ -
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													0	CY	$ -
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 8,051.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Process Equipment Building																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/CF	30	50	20			30000					CF		30000	CF	$ 4,950.00
	Structure's Vol. Demolished																0.3	333	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													333	CY	$ 3,996.00
	Steel's Weight	City Services	City Services ECDC	$ 28.00	Ton											Ton			Ton	$ -
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ 8,946.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	30	50	1			1500							56	CY	$ 679.00
	Concrete's Vol. Demolished																1.3	73	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													73	CY	$ 135.00
	Transportation Cost	12 C.Y. dump truck, cycle 20 mile, 40 MPH ave.	31 23 23.20 1078	$ 8.90	/LCY													73	CY	$ 650.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													73	CY	$ 1,022.00
	Subtotal																			$ 2,486.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 11,432.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Substation																			
	Structure's Demolition Cost		02 41 16.13 0020	$ 0.33	/CF	20	50	12			12000					CF		12000	CF	$ 1,980.00
	Structure's Vol. Demolished	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/CF	20	50	12			12000					CF		12000	CF	$ 3,960.00
	Rubble's Weight (exclude steel)																0.3	133	CY	
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													133	CY	$ 1,596.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ 7,536.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	20	50	1			1000							37	CY	$ 449.00
	Concrete's Vol. Demolished																1.3	48	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													48	CY	$ 89.00
	Transportation Cost	12 C.Y. dump truck, cycle 50 mile, 40 MPH ave.	31 23 23.20 1084	$ 17.85	/LCY													48	CY	$ 857.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													48	CY	$ 672.00
	Subtotal																			$ 2,067.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 9,603.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Fan House																			
	Structure's Demolition Cost		02 41 16.13 0020	$ 0.33	/CF	15	25	12			4500					CF		4500	CF	$ 742.50
	Structure's Vol. Demolished	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/CF	15	25	12			4500					CF		4500	CF	$ 1,485.00
	Rubble's Weight (exclude steel)																0.3	50	CY	
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													50	CY	$ 600.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ 2,827.50
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	15	25	1			375							14	CY	$ 170.00
	Concrete's Vol. Demolished																1.3	18	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													18	CY	$ 33.00
	Transportation Cost	12 C.Y. dump truck, cycle 50 mile, 40 MPH ave.	31 23 23.20 1084	$ 17.85	/LCY													18	CY	$ 321.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													18	CY	$ 252.00
	Subtotal																			$ 776.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 3,803.50

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume gal	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Septic Tank																			
	Structure's Demolition Cost	Steel Tanks, single wall, above ground, not infludeing foundations, pumps and piping	13 05 05.75 0520	395	Ea						1000					gal		1	gal	$ 395.00
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage	Haul tank to certified salvage dump, 100 miles round trip	02 65 10.30 1023	830	Ea						1000					gal		1	gal	$ 830.00
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost	Remove sludge, water and remaining product from tank bottom	02 65 10.30 0823	104							1000					gal		1	gal	$ 104.00
	Subtotal																			$ 1,329.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			1329

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Potable Water Storage Tank																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Bldg. Large	Steel Tanks, single	$ 3,075.00	/Ea						16956				1	gal		16956	gal	$ 3,075.00
	Structure's Vol. Demolished																0.3	188	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													188	CY	$ 2,256.00
	Steel's Weight	City Services	City Services ECDC	$ 28.00	TON							12.5				Ton		13	Ton	$ 364.00
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost	Remove sludge, water and remaining produ	02 65 10.30 0863	$ 165.00	/Ea						16956				1	gal			/Ea	$ 165.00
	Subtotal																			$ 5,860.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	0	0	1			0							0	CY	$ -
	Concrete's Vol. Demolished																1.3	0	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													0	CY	$ -
	Transportation Cost	12 C.Y. dump truck, cycle 20 mile, 40 MPH ave.	31 23 23.20 1078	$ 8.90	/LCY													0	CY	$ -
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													0	CY	$ -
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 5,860.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Bitumen Truck Loading Pad																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost																	0	CF	$ -
	Structure's Vol. Demolished																	0	CF	
	Rubble's Weight (exclude steel)																	0	CY	
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													0	CY	$ -
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ -
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	15	75	0.5			562.5							21	CY	$ 255.00
	Concrete's Vol. Demolished																1.3	27	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													27	CY	$ 50.00
	Transportation Cost	12 C.Y. dump truck, cycle 50 mile, 40 MPH ave.	31 23 23.20 1084	$ 17.85	/LCY													27	CY	$ 482.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													27	CY	$ 378.00
	Subtotal																			$ 1,165.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 1,165.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Storage Building																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/CF	160	400	35			2240000					CF		2240000	CF	$ 369,600.00
	Structure's Vol. Demolished																0.3	24889	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													24889	CY	$ 298,668.00
	Steel's Weight	City Services	City Services ECDC	$ 28.00	Ton											Ton			Ton	$ -
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ 668,268.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	160	400	0.5			32000							1185	CY	$ 14,374.00
	Concrete's Vol. Demolished																1.3	1541	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													1541	CY	$ 2,851.00
	Transportation Cost	12 C.Y. dump truck, cycle 20 mile, 40 MPH ave.	31 23 23.20 1078	$ 8.90	/LCY													1541	CY	$ 13,715.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													1541	CY	$ 21,574.00
	Subtotal																			$ 52,514.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 720,782.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Truck Dumping/Loading Building																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/CF	30	60	40			72000				2	CF		144000	CF	$ 23,760.00
	Structure's Vol. Demolished																0.3	1600	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													1600	CY	$ 19,200.00
	Steel's Weight	City Services	City Services ECDC	$ 28.00	Ton											Ton			Ton	$ -
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ 42,960.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	30	60	0.5			900							33	CY	$ 400.00
	Concrete's Vol. Demolished																1.3	43	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													43	CY	$ 80.00
	Transportation Cost	12 C.Y. dump truck, cycle 20 mile, 40 MPH ave.	31 23 23.20 1078	$ 8.90	/LCY													43	CY	$ 383.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													43	CY	$ 602.00
	Subtotal																			$ 1,465.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 44,425.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Raw Water Tank 3 tanks at 12.5 ton, one at plant site and two at the portal																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Tanks, single wall, above ground, not	13 05 05.75 0540	$ 3,075.00	/Ea						16956	37.5			3	gal		3	Ea	$ 9,225.00
	Structure's Vol. Demolished																0.3	0	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													0	CY	$ -
	Steel's Weight	City Services	City Services ECDC	$ 28.00	TON							37.5				Ton		38	Ton	$ 1,064.00
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost	Remove sludge, water and remaining produ	12,000 gal	$ 165.00	/Ea						16956					gal		3	Ea	$ 495.00
	Subtotal																			$ 10,784.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	0	0	1			0							0	CY	$ -
	Concrete's Vol. Demolished																1.3	0	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													0	CY	$ -
	Transportation Cost	12 C.Y. dump truck, cycle 20 mile, 40 MPH ave.	31 23 23.20 1078	$ 8.90	/LCY													0	CY	$ -
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													0	CY	$ -
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 10,784.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Bitumen Solution Tank																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Tanks, double walled, above ground,	13 05 05.75 0540	$ 3,225.00	/Ea						18000				1	gal		1	Ea	$ 3,225.00
	Structure's Vol. Demolished																0.3	0	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													0	CY	$ -
	Steel's Weight	City Services	City Services ECDC	$ 28.00	Ton						12.5					Ton		13	Ton	$ 364.00
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost	Remove sludge, water and remaining product from tank bottom	02 65 10.30 0863	$ 165.00	Ea										1	Ea		1	Ea	$ 165.00
	Subtotal																			$ 3,754.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	0	0	1			0							0	CY	$ -
	Concrete's Vol. Demolished																1.3	0	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													0	CY	$ -
	Transportation Cost	12 C.Y. dump truck, cycle 20 mile, 40 MPH ave.	31 23 23.20 1078	$ 8.90	/LCY													0	CY	$ -
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													0	CY	$ -
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 3,754.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Storage Building #2																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/CF			30	175	12026	360780					CF		360780	CF	$ 59,528.50
	Structure's Vol. Demolished																0.3	4009	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													4009	CY	$ 48,108.00
	Steel's Weight	City Services	City Services ECDC	$ 28.00	Ton											Ton			Ton	$ -
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ 107,636.50
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	0	0	0.5	175	12026	6013							223	CY	$ 2,705.00
	Concrete's Vol. Demolished																1.3	290	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													290	CY	$ 537.00
	Transportation Cost	12 C.Y. dump truck, cycle 20 mile, 40 MPH ave.	31 23 23.20 1078	$ 8.90	/LCY													290	CY	$ 2,581.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													290	CY	$ 4,060.00
	Subtotal																			$ 9,883.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 117,519.50

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume gal	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Diesel Tanks (3) **Two at plant site and one at portal**																			
	Structure's Demolition Cost	Steel Tanks, single wall, above ground, not infludeing foundations, pumps and piping	13 05 05.75 0530	1,475	Ea						6000					gal		3	gal	$ 4,425.00
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage	Haul tank to certified salvage dump, 100 miles round trip	02 65 10.30 1023	830	Ea						1000					gal		3	gal	$ 2,490.00
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost	Remove sludge, water and remaining product from tank bottom	02 65 10.30 0823	104							1000					gal		3	gal	$ 312.00
	Subtotal																			$ 7,227.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			7227

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume gal	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Gasoline Tanks (3) Two at plant site and one at portal																			
	Structure's Demolition Cost	Steel Tanks, single wall, above ground, not infludeing foundations, pumps and piping	13 05 05.75 0530	1,475	Ea						6000					gal		3	gal	$ 4,425.00
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage	Haul tank to certified salvage dump, 100 miles round trip	02 65 10.30 1023	830	Ea						1000					gal		3	gal	$ 2,490.00
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost	Remove sludge, water and remaining product from tank bottom	02 65 10.30 0823	104							1000					gal		3	gal	$ 312.00
	Subtotal																			$ 7,227.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			7227

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Emission Control Building																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/CF	10	10	10			1000					CF		1000	CF	$ 330.00
	Structure's Vol. Demolished																0.3	11	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													11	CY	$ 132.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ 462.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	10	10	1			100							4	CY	$ 49.00
	Concrete's Vol. Demolished																1.3	5	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													5	CY	$ 9.00
	Transportation Cost	12 C.Y. dump truck, cycle 50 mile, 40 MPH ave.	31 23 23.20 1084	$ 17.85	/LCY													5	CY	$ 89.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													5	CY	$ 70.00
	Subtotal																			$ 217.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 679.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Parts Trailer																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/CF	12	30	100			36000			-		CF		36000	CF	$ 11,880.00
	Structure's Vol. Demolished																0.3	400	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													400	CY	$ 4,800.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ 16,680.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	12	30	1			360							13	CY	$ 158.00
	Concrete's Vol. Demolished																1.3	17	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													17	CY	$ 31.00
	Transportation Cost	12 C.Y. dump truck, cycle 50 mile, 40 MPH ave.	31 23 23.20 1084	$ 17.85	/LCY													17	CY	$ 303.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													17	CY	$ 238.00
	Subtotal																			$ 730.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 17,410.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length ft	Width ft	Height ft	Diameter ft	Area	Volume ft^3	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Portable Office																			
	Deduct 50% no interior walls																			
	Structure's Demolition Cost	Steel Bldg. Large	02 41 16.13 0020	$ 0.33	/CF	12	30	100			36000					CF		36000	CF	$ 11,880.00
	Structure's Vol. Demolished																0.3	400	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services ECDC	$ 12.00	CY													400	CY	$ 4,800.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$ 16,680.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost	Concrete Demolition	Concrete Demo1	$ 12.13	/CY	12	30	1			360							13	CY	$ 158.00
	Concrete's Vol. Demolished																1.3	17	CY	
	Loading Cost	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr.	31 23 16.42 1350	$ 1.85	/BCY													17	CY	$ 31.00
	Transportation Cost	12 C.Y. dump truck, cycle 50 mile, 40 MPH ave.	31 23 23.20 1084	$ 17.85	/LCY													17	CY	$ 303.00
	Disposal Costs	City Services	City Services ECDC	$ 14.00	/CY													17	CY	$ 238.00
	Subtotal																			$ 730.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			$ -
	Total																			$ 17,410.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume gal	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Fire Protection Storage Tanks (3) Two at plant site and one at portal																			
	Structure's Demolition Cost	Steel Tanks, single wall, above ground, not infludeing foundations, pumps and piping	13 05 05.75 0540	3,075	Ea						50000				3	gal		3	gal	$ 9,225.00
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage	Haul tank to certified salvage dump, 100 miles round trip	02 65 10.30 1029	1,150	Ea						1000				3	gal		3	gal	$ 3,450.00
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost	Remove sludge, water and remaining product from tank bottom	02 65 10.30 0863	165							1000				3	gal		3	gal	$ 495.00
	Subtotal																			$ 13,170.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			13170

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume gal	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Water Tanks (2)																			
	Structure's Demolition Cost	Steel Tanks, single wall, above ground, not infludeing foundations, pumps and piping	13 05 05.75 0530	1,475	Ea						6000					gal		3	gal	$ 4,425.00
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage	Haul tank to certified salvage dump, 100 miles round trip	02 65 10.30 1023	830	Ea						1000					gal		3	gal	$ 2,490.00
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost	Remove sludge, water and remaining product from tank bottom	02 65 10.30 0823	104							1000					gal		3	gal	$ 312.00
	Subtotal																			$ 7,227.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			7227

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Summary Earthwork															
Replace Topsoil -															$ 564,360.00
Scarifying - Roads, Plant and Stockpiles															$ 524.00
Portal Closure															$ 142,854.25
Clay liner															$ 517,562.00
Total															$ 1,368,154.50

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Replace 2' topsoil over tailings, plant, and roads															
Cat D8 Dozer	$ 19,485.00	$ 100.65	0.1	$ 74.15	$ 211.36	1	$ 286.00	$/HR	220000	LCY	498	LCY/HR	480	HR	$ 137,280.00
14 H Grader	$ 11,700.00	$ 64.90	0.1	$ 74.15	$ 131.38	1	$ 206.00	$/HR					60	HR	$ 12,360.00
5,000 gal water truck	$ 5,210.00	$ 49.00	0.1	$ 57.30	$ 78.60	1	$ 136.00	$/HR					60	HR	$ 8,160.00
Pickup Truck Crew	$ 940.00	$ 10.70	0.1	$ 84.07	$ 200.89	1	$ 285.00	$/HR					60	HR	$ 17,100.00
Scraper 657G	$ 41,435.00	$ 281.25	0.1	$ 76.75	$ 516.68	3.5	$ 785.00	$/HR	220000	LCY	402.6	LCY/HR	480	HR	$ 376,800.00
															$ 564,360.00

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Scarifying roads															
14 H Grader	$ 11,700.00	$ 64.90	0.1	$ 74.15	$ 131.38	1	$ 131.00	$/HR	11	ACRES	2.9	AC/HR	4	HR	$ 524.00
															$ 524.00

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
*Cat D8 Dozer	$ 19,485.00	$ 100.65	0.1	$ 74.15	$ 211.36	1	$ 211.00	$/HR	87500	LCY	276	LCY/HR	316.75	HR	$ 66,834.25
Excavator	$ 9,700.00	$ 65.15	0.1	$ 74.15	$ 120.26	1	$ 120.00	$/HR	175000	LCY	276	LCY/HR	633.5	HR	$ 76,020.00
*Dozer at half the time and material as excavator.															
Subtotal															$ 142,854.25

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
4' of clay liner over tailings															
Scraper 657G	$ 41,435.00	$ 281.25	0.1	$ 76.75	$ 516.68	3.5	$ 785.00	$/HR	703416	LCY	402.6	LCY/HR	502	HR	$ 394,070.00
Cat D8 Dozer	$ 19,485.00	$ 100.65	0.1	$ 74.15	$ 211.36	1	$ 286.00	$/HR					251	HR	$ 71,786.00
14 H Grader	$ 11,700.00	$ 64.90	0.1	$ 74.15	$ 131.38	1	$ 206.00	$/HR					251	HR	$ 51,706.00
															$ 517,562.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Seeding Cost	Standard Vegetation costs	Std Veg	$ 1,000.00	acre					160										$ 160,000.00
	Reseeding - assume 25%	Standard Vegetation costs	Std Veg	$ 1,000.00	acre					48										$ 48,000.00
	Subtotal																			$ 208,000.00
	Subtotal																			
	Subtotal																			
	Subtotal																			
	Subtotal																			
	Total																			$ 208,000.00

* Standard $1000/acrea, DOGM quote

Equipment Operating and Labor Rates

Hourly Rates	Equipment costs	Hourly Operating Costs	Equipment Hourly Rates Blue Book Rate	Labor Hourly Rates	Labor Type	Total Cost per unit	Unit
Cat D8R Dozer	$ 19,485.00	$ 100.65	$ 211.36	$ 74.15	Equip. Oper-Heavy	$ 285.51	hour
Cat 14 Grader	$ 11,700.00	$ 64.90	$ 131.38	$ 74.15	Equip. Oper-Medium	$ 205.53	hour
Cat Excavator 329D	$ 9,700.00	$ 65.15	$ 120.26	$ 74.15	Equip. Oper-Medium	$ 194.41	hour
Water Truck 5000 gal	$ 5,210.00	$ 49.00	$ 78.60	$ 57.30	Equip. Oper-Medium	$ 135.90	hour
Water Truck 10,000 gal	$ 13,110.00	$ 126.40	$ 200.89	$ 84.07	Foreman Average Outside	$ 284.96	hour
Pickup Truck 4x4	$ 940.00	$ 10.70	$ 16.04	$ 53.85	Common bldg. Laborers	$ 69.89	hour
Laborers							
Scrpaer 637G	$ 33,740.00	$ 238.80	$ 430.50	$ 76.75	Operator	$ 507.25	
Scrpaer 657G	$ 41,435.00	$ 281.25	$ 516.68	$ 76.75	Operator	$ 593.43	

* Equipment Hourly Rates include ownership and operating cost from Blue Book 2014
** Labor Hourly Rates include overhead and profit from DOGM 2014

Dozing Cat Handbook Edition 41

Ripping/Scarifying		
D-10		
Ripper width (ft) (3 shank)	9.58	1-69
Ripper Penetration (ft)	2.88	1-69
Speed (mi.hr)	1	1-22
Maximum Production (ac/hr)		
Correction Factors	1.2	Jan-56
Operator	0.75	1-56
Efficiency (50 min/hr)	0.83	1-56
Corrected Production (ac/hr)		

Grading		
Grading		
Cat 14		
Grader Blade width (ft)	14	2-15
Speed (mi/hr)	3.7	2-16
Maximum Production (ac/hr)		
Correction factor		
Operator	0.75	2-21
Efficiency (50 min/hr)	0.83	2-21
Corrected Production (ac/hr)		

Scrapers			
Top Soil Replacement and Stockpile Spreading			
Alluvial, Quartzite, Railroad Embankment and Stockpile			
Cat 623 Scraper			
Capacity (cu yd)	23	8-6	
Average Haul Distance (ft)	800		
Cycle Time (min)			
Loading time (min)	0.9	8-17	
Spreading time (min)	0.7	8-17	
Loaded haul time (min) 2%	0.5	8-25	
Empty haul time (min) 0%	0.4	8-25	
Cycle time (min)			
Cycles per hour			
Production rate (lcy/hr)			
Correction Factors			
Operator	0.75		1-56
Job efficiency (50 min/hr)	0.83		1-56
Material	0.9		
Load Factor			
Total Correction Factor	0.6		
Corrected Production Rate (lcy/hr)			

Project: GRR Bruin Point Mine
Date: 01/15/15
Prepared by: A. Withers

WORKSHEET 12
PRODUCTIVITY AND HOURS REQUIRED FOR MOTORGRADER USE

Earthmoving Activity:

Scarifying roads, and rip plant and stockpile areas.

Characterization of Grader Used (type, size capacity, etc.):

Cat 14, 14' wide blade, Ripper width 8'6" wide.

Description of Grader Route (push distance, grade, effective blade width, operating speed, etc.):

Approximately 11 acres to scarify. 160 acres to be ripped.

Productivity Calculations:

Grading

Hourly Production = 3.7 mi/hr (average speed) x 8.5 ft (effective blade width) x 5280 ft/mi x 1 ac

÷ 43560 ft^2 x 0.75 (efficiency factor) = 2.9 ac/hr

Hours Required = 160 ac (area to be graded and) ÷ 2.9 ac/hr (hourly production) = 56.0 hr

Scarification

Hourly Production = 3.7 mi/hr (average speed) x 8.5 ft (scarifier width) x 5280 ft/mi x 1 ac

÷ 43560 ft^2 x 0.75 (efficiency factor) = 2.9 ac/hr

Hours Required =	11	ac	÷	2.9	ac/hr	=	3.8	hr
	area to be scarified			hourly production				

Total Hours Required

Total Hours =	56.0	+	3.8	=	59.8	hr
	grading hours required		scarification hours required			

Data Source(s):

Project: GRR Bruin Point Mine
Date: 01/15/15
Prepared by: A. Withers

WORKSHEET 10
PRODUCTIVITY FOR HYDRAULIC EXCAVATOR USE (BACKHOE OR POWER SHOVEL)

Earthmoving Activities:

Portal Closure

Characterization of the Excavator Used (type, size, etc.):

329 D 1.5-2.6 cyd bucket

Description of Excavator Used (loading geometry, materials, etc.):

175,000 cubic yards to backfill the 4 portals and shape/grade the portal face up area for a length of 800 feet.

Productivity Calculations:

Net Bucket Capacity = 2.6 LCY (heaped bucket capacity) x 1 (bucket fill factor*) = 2.6 LCY

Hourly Production = 2.6 LCY (net bucket capacity) x 60 min/hr ÷ 0.48 min (cycle time**) x 0.85 (efficiency factor) = 276.3 LCY/hr

Hours Required = 175000.0 LCY (volume to be handled) ÷ 276.3 LCY/hr (net hourly production) = 633.5 hr

* See loader section of the equipment manual.
** See excavator section of equipment manual.

Data Source(s):

Project:	GRR Bruin Point Mine
Date:	01/15/15
Prepared by:	A. Withers

WORKSHEET 6
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE - GRADING

Earthmoving Activity:

Spreading Stockpiles, roads and plant area.

Characterization of Dozer Used (type, size, etc.):

D8

Description of Dozer Use (% grade, effective blade width, operating speed, etc.):

Total Acres to be affected 160. D% dozer, operating at 2 miles/acre, 22ft 3 in blade.

Productivity Calculations:

Operator Adjustment Factor = 0.75 (operator factor) x 1.20 (material factor) x 0.83 (efficiency factor) x 1.00 (grade factor) x 1.00 (weight correction factor)

x 1.00 (production method/blade factor) x 1.00 (visibility factor) x 1.00 (elevation factor) = 0.75

Hourly Production = 2.0 mi/hr (average speed) x 22.3 ft (effective blade width) x 5280 ft/mi x 1 ac

÷ 43560 ft^2 = 5.4 ac/hr

Net Hourly Production = 5.4 ac/hr x 0.75 (operating adjustment factor) = 4.03 ac/hr

Hours Required = 160 ac (area to be graded) ÷ 4.03 ac/hr (net hourly production) = 39.7 hr(s)

Data Source(s):

Project:	GRR Bruin Point Mine
Date:	01/15/15
Prepared by:	A. Withers

WORKSHEET 5
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity:

Characterization of Dozer Used (type, size, etc.):

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):

Productivity Calculations:

Operator Adjustment Factor = 0.80 (operator factor) x 1.00 (material factor) x 0.83 (efficiency factor) x 1.00 (grade factor) x 1.00 (weight correction factor) x 1.00 (production method/blade factor) x 1.00 (visibility factor) x 1.00 (elevation factor) = 0.66

Net Hourly Production = 750 LCY/hr (normal hourly production) x 0.66 (operating adjustment factor) = 498 LCY/hr

Hours Required = 220000 LCY (volume to be moved) ÷ 498 LCY/hr (net hourly production) = 441.8 hr(s)

Data Source(s):

Project:	GRR Bruin Point Mine
Date:	01/15/15
Prepared by:	A. Withers

WORKSHEET 11B
PRODUCTIVITY OF DOZER PUSH-LOADED SCRAPER USE

Earthmoving Activity:

Place compacted clay on tailings.

Characterization of Scraper Used (type, capacity, etc.):

(2) 657G CAT self loaded scraper.

Description of Scraper Use (origin, destination, grade, haul distance, capacity, etc.):

Approximatley 109 acres will need 4 feet of compacted clay.

List Pusher Tractor(s) Used:

Self load tandem engine

Describe Push Tractor Loading Method (see figure on next page):

Scraper Productivity Calculations:

Cycle Time = 1.1 min (load time) + 2 min (loaded trip time) + 0.6 min (maneuver and spread time) + 1.0 min (return trip time)

= 4.7 min

Hourly Production = 38.0 LCY (capacity*) x 60 min/hr ÷ 4.7 min (cycle time**) x 0.83 (efficiency factor)

= 402.6 LCY/hr

Hours Required =	703416.0	LCY	÷	402.6	LCY/hr	=	1747.0	hr
	volume to be handled			hourly production				

* Use the average of the struck and heaped capacities.

Push Tractor Productivity Calculations:

Pusher Cycle Time =	0.9	min	x	1.5		=	1.35	min
	scraper load time			pusher factor				
Scrapers/Pusher =	4.7	min	÷	1.4	min	=	3.5	scrapers
	scraper cycle time			pusher cycle time				
Pusher Hours Required =	1747.0	hr	÷	3.5		=	502.0	hr
	scraper hours			scrapers per pusher			(round up)	

Data Source(s):

WORKSHEET 11B (continued)
PRODUCTIVITY OF DOZER PUSH-LOADED SCRAPER USE

PUSHER FACTORS	Single Push
A. Back Track Loading	1.5
B. Chain Loading	1.3
C. Shuttle Loading	1.3

Modified from Terex, 1981.

(Note: Illustration's were removed for this spreadsheet.)

The following disclaimer pertains to the above illustration from Terex, "Production and Cost Estimating of Material Movement and Earthmoving Equipment."

This manual is a fundamental text on estimating the production and cost of moving materials. It is intended for people associated with the construction industry who prepare job estimates or who evaluate the performance of earthmoving equipment and related costs.

The manual can be used as a supplementary text in those schools and colleges offering formal training in earthmoving techniques. A metric version of this manual is also available.

It will also serve as a reference for those professional consulting engineers who prepare complete job analyses, of which the earthmoving fundamentals covered in this text are only one element.

Estimating the production and costs of earthmoving equipment is not an exact science. While this manual outlines the basic factors or parameters on which estimates can be made, the user must make judgments, and must apply his own experience and know-how to temper the estimate.

This manual, prepared by TEREX, deals with rubber-tired and track-laying equipment, and does not attempt to deal with other forms of earthmoving or production. While the formulas and other guides in this manual are entirely satisfactory for most earthmoving jobs, the reader should note that more sophisticated haulage analyses can be quickly accomplished through the use of a computer.

While efforts have been made to utilize percentages, formulas, and other notations in this manual which reflect actual on-the-job conditions, none of the statements in this manual, or the illustrative figures given for machine life, or the costs for owning and operating earthmoving equipment, or the production of such earthmoving equipment should be construed as any form of guarantee that these machines will have any such specific service life, or production capabilities, or that costs related to their ownership and operation will be as indicated.

Data Source(s): TEREX AMERICAS, Tulsa, OK 74107, (918) 445-5802.

Assumptions
foundation depth 8 in
Concrete 150 lbs/ft^3
Mixed Material 20 lbs/ft^3

Demolition

ITEM	MATERIAL	MEANS REFERENCE NUMBER	UNIT COST	UNIT
Building Demolition - Large urban project, incl. 20 mi. haul. No foundation or dump fees, C.F. is vol of building standing	Steel Bldg. Large	02 41 16.13 0020	0.33	/CF
	Concrete Bldg. Large	02 41 16.13 0050	0.46	/CF
	Masonry Bldg. Large	02 41 16.13 0080	0.35	/CF
	Mixed Materials Bldg. Large	02 41 16.13 0100	0.35	/CF
Steel Tanks, single wall, above ground, not infludeing foundations, pumps and piping	275 gallon	13 05 05.75 0510	395	Ea
	550 thru 2,000 gallon	13 05 05.75 0520	1,150	Ea
	5,000 thru 10,000 gallon	13 05 05.75 0530	1,475	Ea
	15,000 thru 30,000 gallon	13 05 05.75 0540	3,075	Ea
Steel Tanks, double walled, above ground, not infludeing foundations, pumps and piping	550 thru 2,000 gallon	13 05 05.75 0620	1,250	Ea
Remove sludge, water and remaining product from tank bottom	500 gal	02 65 10.30 0813	87	Ea
	3,000 gal	02 65 10.30 0823	104	Ea
	5,000 gal	02 65 10.30 0833	113	Ea
	8,000 gal	02 65 10.30 0843	130	Ea
	10,000 gal	02 65 10.30 0853	152	Ea
	12,000 gal	02 65 10.30 0863	165	Ea
Haul tank to certified salvage dump, 100 miles round trip	3,000 gal to 5,000 gal tank	02 65 10.30 1023	830	Ea
	6,000 gal to 8,000 gal tank	02 65 10.30 1026	960	Ea
	9,000 gal to 12,000 gal tank	02 65 10.30 1029	1,150	Ea

ITEM	MATERIAL	MEANS REFERENCE NUMBER	UNIT COST	UNIT
Steel Tanks, double walled, above ground, not infludeing foundations, pumps and piping	550 thru 2,000 gallon	13 05 05.75 0620	1,250	Ea
	5,000 thru 10,000 gallon	13 05 05.75 0530	1,575	Ea
	15,000 thru 30,000 gallon	13 05 05.75 0540	3,225	Ea
Disposal Costs	Steel			
	Non Steel	City Services ECDC	12	CY
	Equipment			
	Concrete	City Services ECDC	14	/CY
	On site disposal	02 41 13.33 4450	10.2	/CY
Loading costs	Front end loader, track mtd.,1-1/2 c.y.cap = 70 c.y./hr.	31 23 16.42 1200	2.35	/BCY
	Front end loader, track mtd.,2-1/2 c.y. cap. =95 c.y	31 23 16.42 1250	2.32	/BCY
	Front end loader, track mtd.,3 C.Y. cap=130 C.Y./hr	31 23 16.42 1300	1.92	/BCY
	Front end loader, track mtd.,5 C.Y. cap=160 C.Y./hr	31 23 16.42 1350	1.85	/BCY
Transportation Cost	12 C.Y. dump truck, cycle 1/2 mile, 20 MPH ave.	31 23 23.20 1026	3.54	/LCY
	12 C.Y. dump truck, cycle 1 mile, 20 MPH ave.	31 23 23.20 1028	3.95	/LCY
	12 C.Y. dump truck, cycle 2 mile, 20 MPH ave.	31 23 23.20 1030	4.47	/LCY
	12 C.Y. dump truck, cycle 4 mile, 20 MPH ave.	31 23 23.20 1032	5.7	/LCY
	12 C.Y. dump truck, cycle 6 mile, 20 MPH ave.	31 23 23.20 1034	7.35	/LCY
	12 C.Y. dump truck, cycle 8 mile, 20 MPH ave.	31 23 23.20 1036	8.55	/LCY
	12 C.Y. dump truck, cycle 10 mile, 20 MPH ave.	31 23 23.20 1038	9	/LCY
	12 C.Y. dump truck, cycle 6 mile, 40 MPH ave.	31 23 23.20 1072	4.46	/LCY
	12 C.Y. dump truck, cycle 8 mile, 40 MPH ave.	31 23 23.20 1074	4.96	/LCY
	12 C.Y. dump truck, cycle 10 mile, 40 MPH ave.	31 23 23.20 1076	5.6	/LCY
	12 C.Y. dump truck, cycle 20 mile, 40 MPH ave.	31 23 23.20 1078	8.9	/LCY
	12 C.Y. dump truck, cycle 30 mile, 40 MPH ave.	31 23 23.20 1080	11.15	/LCY
	12 C.Y. dump truck, cycle 40 mile, 40 MPH ave.	31 23 23.20 1082	14.9	/LCY
	12 C.Y. dump truck, cycle 50 mile, 40 MPH ave.	31 23 23.20 1084	17.85	/LCY
Concrete Demolition	Concrete Demolition	Concrete Demo1	12.13	/CY
Disposal Costs	Steel	City Services ECDC	28	TON
	Non Steel	City Services ECDC	28	TON
	Equipment			
	Concrete	City Services ECDC	28	TON
Production Rate 150 CY/DAY				
Production Cost			11.38	/CY