

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

## Application for Mineral Mine Plan Revision or Amendment

<b>Operator:</b> <i>Red Leaf Resources, Inc.</i>	<b>File Number:</b> <i>M/047 /0103</i>
<b>Mine Name:</b> <i>Southwest #1</i>	

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

DETAILED SCHEDULE OF CHANGES TO THE MINING AND RECLAMATION PLAN			
			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
<input type="checkbox"/> ADD	<input checked="" type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	<i>Appendix D of Ground Water Discharge Permit, <sup>APP.</sup> page 11</i>
<input type="checkbox"/> ADD	<input checked="" type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	<i>Appendix F of Ground Water Discharge Permit App, text</i>
<input type="checkbox"/> ADD	<input checked="" type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	<i>Ground Water Discharge Permit Application, March 5, 2013</i>
<input type="checkbox"/> ADD	<input type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	<i>(Appendix S) submitted for information only</i>
<input type="checkbox"/> ADD	<input type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	<i>Reviews is being done by Utah Division of Water Quality</i>
<input type="checkbox"/> ADD	<input type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	<i>Note: Appendix F of GWDP Application is Confidential</i>
<input type="checkbox"/> ADD	<input type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	<i>Business information.</i>
<input type="checkbox"/> ADD	<input type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	<i>Submitted per R647-4-119, using this form</i>
<input type="checkbox"/> ADD	<input type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	<i>as requested by DOGM letter.</i>
<input type="checkbox"/> ADD	<input type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	<i>GWDP application replaces application</i>
<input type="checkbox"/> ADD	<input type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	<i>dated December 20, 2011 as a supplemental</i>
<input type="checkbox"/> ADD	<input type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	<i>submission.</i>
<input type="checkbox"/> ADD	<input type="checkbox"/> REPLACE	<input type="checkbox"/> REMOVE	

**I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments and obligations, herein.**

<i>Jay Vance</i>	<i>Jay Vance, Manager, Environmental / Permitting</i>
Print Name	Sign Name, Position
	<i>01-April-2013</i>
	Date

**Return to:**

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

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<b>FOR DOGM USE ONLY:</b>
File #: <u>M/</u> / <u>  </u>
Approved: _____
Bond Adjustment: from (\$) _____
to \$ _____

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### Early Production System Capsule Design

The EPS capsule will be approximately three quarters the size of a full-scale commercial capsule. The location of the EPS capsule and related facilities is shown on Figure 13 in the Ground Water Discharge Permit Application (GWDPA) text. The relationship of the EPS capsule to the future full-scale production capsules is shown on Figure 14 in the GWDPA text.

The part of the lease block where the EPS capsule will be located is at the southern margin of the oil shale reserve where the Mahogany Zone has been partly eroded. As a result, the area to be mined for production of sufficient ore to fill the EPS capsule is several times larger than the capsule footprint itself. The mined area will be used for ore and overburden and ore stockpiling, material sizing operations, and related activities. The existing office, maintenance shed, and test capsule area will remain. In addition, production-related staging and materials storage areas, crude oil storage tanks, water storage tanks, topsoil storage areas, the fuel depot, and laydown areas will be located to the northwest of the mined area (Figure 13 in GWDPA text).

As Figure 14 in the GWDPA text shows, much of the disturbed area created during the EPS will be mined in the future during full-scale commercial operations. The remaining disturbed area created during EPS will be used for staging and other production-related activities.

The EPS capsule will be approximately 385 feet wide, 695 feet long and 80 feet high at the capsule edge (and approximately 176 feet high at the top of each capsule crown). Figure C-1 is an isometric image of the capsule. The orientation of the capsule is such that the lower left side of the rendering faces north. The brown surface shown on Figure C-1 depicts the bedrock floor of the surface from which the ore was mined. The pit floor slopes to the north at approximately three degrees toward the CSS (Collection, Separation and Storage) plant.

Unlike the commercial scale capsules, the EPS capsule will be buttressed on all four sides by engineered fill. The tan color on the isometric drawing in Figure C-2 represents this engineered fill. Above the marginal fill, the upper part of the production capsule itself is depicted.

The EPS capsule has the same principal design elements described in Section 10.1 of the GWDPA: an outer three-foot rind of bentonite amended soil (BAS) surrounds the insulated ore retorting zone. The insulation zone will be 13 feet thick and will be comprised of mine overburden and interburden screened and crushed if necessary to a specified size gradation. Run-of-mine ore (uncrushed) will be placed inside the insulation zone. The arrangement of the earthen components of the EPS capsule is shown in cross section on Figure C-2. In the EPS capsule roadbase will be placed on top of the basal BAS layer to protect it from the potential effects of mining equipment placing insulation and ore (see sections, detail on Figure C-2).

The retort zone and the basal BAS layer are depicted in red and the heating pipes in grey on Figure C-2. The heating pipes are arrayed at intervals horizontally in the ore zone. Vapor recovery pipes are located in the upper most part of the ore zone but below the insulation layer. Recovery of liberated liquid hydrocarbon will occur along a steel-plate floor pan placed within the lower insulating layer throughout the capsule. Liquids will flow northward (down slope) along the floor pan to a collection channel built into a bulkhead near the north end of the capsule, as shown on Figure C-2. The bulkhead ties the heating and product recovery pipes in the capsule to six conveyance tunnels that move ore-heating gases and recovered petroleum product to and from the CSS plant, respectively.

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The bulkhead is located at the southern end of the six above-referenced collection tunnels (Figure C-2) that carry heated gases into the capsule from the CSS plant and recovered hydrocarbon vapor and liquids from the capsule to the CSS plant. Each of the six tunnels contains two 72-inch heat inlet pipes, a 36-inch off-gas (petroleum vapor recovery) pipe, and an 8-inch prompt fluid (liquid product) recovery pipe. The tunnels also house a forced-air temperature control system intended to maintain temperatures of 200° F or less in the area of the BAS penetration to prevent degradation of the lower BAS layer in the vicinity of the penetration. Thermal isolators at the flanges for heating pipe bulkhead penetrations are intended to reduce heat flow through the bulkhead to the BAS that abuts the bulkhead.

Heated gas will be supplied by natural gas-fired heaters to the heat distribution pipes in the capsule via the above-referenced 72-inch pipes that extend through each of the six utility tunnels. The vapor recovery pipes (36-inch-diameter) withdraw hydrocarbon gases from the collection pipes in the upper part of the capsule and return it to the CSS for dehydration, as necessary, condensation and combustion. Condensed liquids are pumped to product tanks. Recovered water will be used on site for production and dust control purposes. Prompt fluid (liquid hydrocarbon product) will be carried in 8-inch lines from the collection channel in the bulkhead to product storage tanks.

The capsule floor penetrations are supported by the engineered bulkhead, which is in turn supported by the bedrock foundation of the capsule between each of the tunnels. The south ends of the six tunnels excavated in the bedrock of the mine pit floor (Figures C-1 and C-2) intercept the bulkhead penetrations. Precast concrete slabs cover the tunnels and structural support for the tunnel roof is provided by steel I-beams and girders as depicted in Figure C-2 (piping underside view).

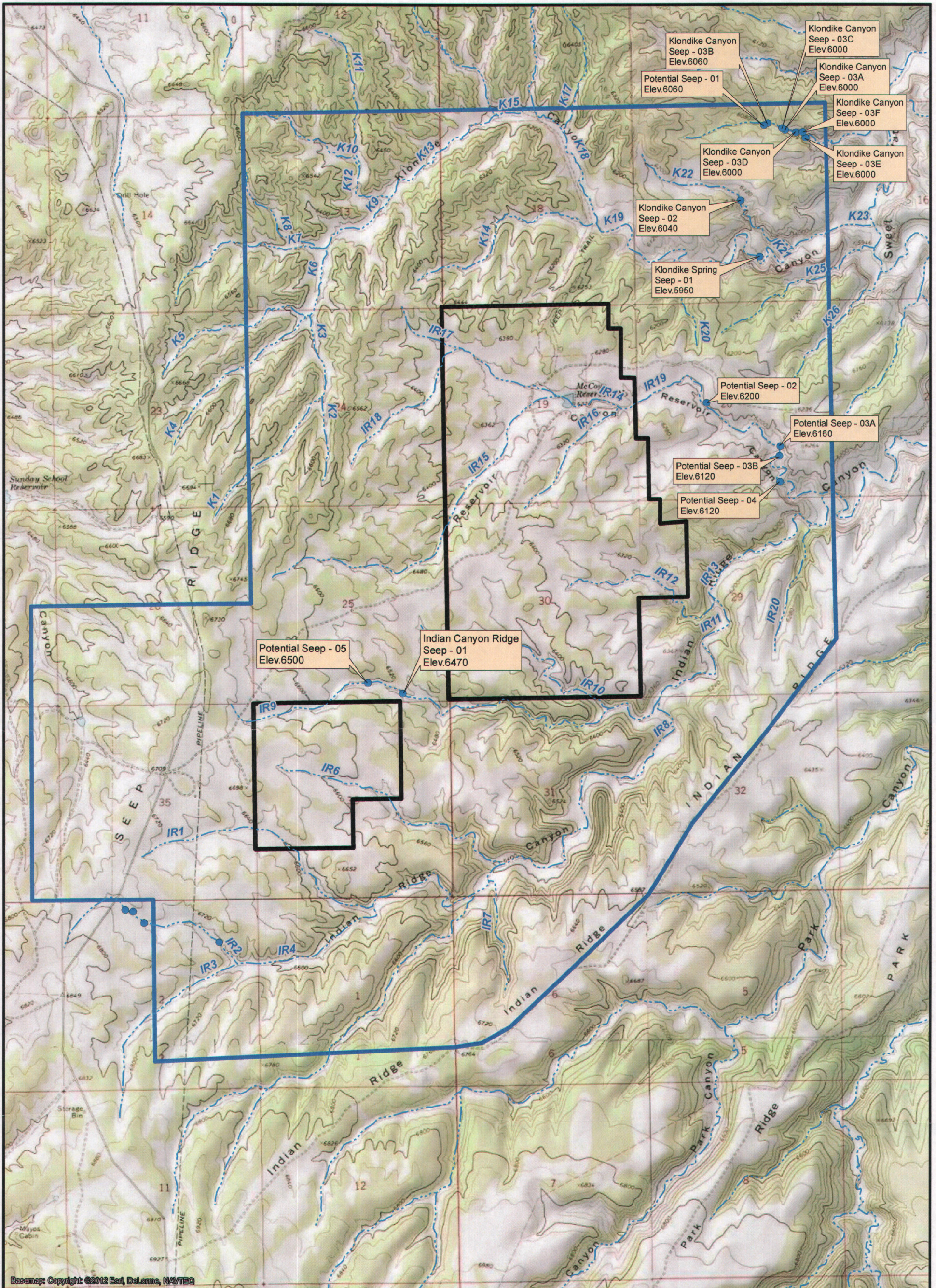
A 36-inch vent stack located above the bulkhead at the south end of each tunnel extends above the capsule fill-buttress surface as shown in the section on Figure C-4. The vent is intended to provide natural ventilation of hot air from the vicinity of the bulkhead floor penetrations to facilitate cooling in the tunnels.

The compliance sampling plan discussed in Section 14, Compliance Monitoring Plan, of the GWDPA includes monitoring fluid collection in the conveyance tunnels following capsule heating and through the cooling and post-cooling stages. Details of the precise sample collection points and their design will be included with the detailed engineering plans to be submitted for DWQ review prior to commencement of construction. The prompt fluid collection channel in the penetration bulkhead will be monitored similarly.

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Basemap: Copyright © 2012 Esri, DeLorme, NAVTEQ

<b>Legend</b> 		<b>RED LEAF RESOURCES, INC.</b> Southwest #1 Project	
		APR 01 2013 FIGURE 1 SEEP AND SPRING SURVEY	
2,500 0 2,500 Feet			
		DRAWN BY CP SCALE 1:30,000 PROJECT B.A10319.00/07/1	DATE DRAWN 2/8/2013