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**BEFORE THE BOARD OF OIL, GAS AND MINING  
DEPARTMENT OF NATURAL RESOURCES  
STATE OF UTAH**

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<b>Living Rivers,</b>	:	
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	:	<b>Docket No.</b> _____
Petitioner,	:	<b>Cause No. M/047/0103</b>
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<b>Division of Oil, Gas and Mining,</b>	:	
	:	
Respondent.	:	

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**REQUEST FOR AGENCY ACTION  
AND REQUEST FOR A HEARING BY  
PETITIONER LIVING RIVERS**

Living Rivers files this Request for Agency Action to seek review of the decision of the Division of Oil, Gas and Mining (Division) approving the application of Red Leaf Resources, Inc. (Red Leaf) to conduct oil shale mining and reclamation operations at the Southwest #1 mine. Living Rivers respectfully requests a formal hearing on this matter.

As explained more fully below, the Division failed to follow applicable state law, including its own regulations, in approving Red Leaf’s inaccurate and incomplete permit application. Accordingly, Living Rivers urges the Board to vacate the Division’s approval of Red Leaf’s permit application and enter an order denying approval of the permit application as

inaccurate, incomplete, or both. Alternatively, Living Rivers requests that the Board vacate the approval decision and remand the matter to the Division to allow Red Leaf to correct identified permit deficiencies, if it can.

## **I. LEGAL AUTHORITY, JURISDICTION AND STANDING**

This Board has legal authority and jurisdiction to review approval of the Earth Energy permit application pursuant to Utah Code Ann. § 40-10-14(3), Utah Admin. Code R641-100 *et seq.*, and R647-5-106.17. Living Rivers is an interested party in this action.

Living Rivers is a nonprofit organization of approximately 300 members and supporters dedicated to restoring river ecosystems by mobilizing public support and involvement for river restoration; to educating and enlisting humanity to protect and restore the quality of the natural river ecosystems; and to using all lawful means to carry out these objectives. The main focus of Living Rivers is restoration of the Colorado River. Living Rivers is a member of the New York-based Waterkeeper Alliance. Living Rivers members use and enjoy public lands in and throughout Utah, including the Tavaputs Plateau area, which encompasses the exact site of the proposed Red Leaf mine. Living Rivers members use these lands for a variety of purposes, including: recreation, solitude, scientific study, and aesthetic appreciation. Living Rivers members visit and recreate (e.g., study, hunt, camp, bird, sightsee, and enjoy solitude) throughout the lands that are the subject of this request for agency action, including the Tavaputs Plateau and surrounding public lands. Living Rivers members have a substantial interest in resources affected by this matter, including wildlife, plant communities, night skies, air quality, water quality, and cultural and historic sites. Living Rivers members also have a substantial interest in ensuring that the Division complies with the terms and requirements of state law and its own regulations.

Living Rivers brings this action on its own behalf as well as on behalf of its members – aggrieved parties who have participated in a hearing before the Division. Utah Admin. Code R647-5-106.17. Living Rivers members use the biological, recreational, cultural/historic, aesthetic, water, air, and other environmental resources located within and adjacent to the Tavaputs Plateau area to stargaze, hike, hunt, camp, and sightsee. They view the wildlife, plant communities and archeological sites there and enjoy the unique solitude of these undeveloped lands. Living Rivers members have enjoyed and hope to continue to enjoy the resources of the Tavaputs Plateau area. The Division’s unlawful decision to approve the proposed oil shale mining and reclamation operations in these largely untrammelled areas will have a direct adverse effect on these resources and on the interests of Living Rivers members. Each of the affected members of Living Rivers relies upon Living Rivers, as an organization, to bring actions such as this one to protect the member’s potentially affected interests. *See* Weisheit Declaration, Exhibit A, attached.

## **II. SUMMARY OF THE ARGUMENT**

The Division acted arbitrarily, capriciously, and contrary to law in approving Red Leaf’s inaccurate and incomplete Notice of Intention (NOI). Accepting Red Leaf’s premise that the EcoShale capsule design was flawless, the Division granted approval of the NOI without requiring Red Leaf to account properly for either ground water in the area of the mine or possible impacts to that ground water from its mining operation. The Division granted this approval despite being notified in advance of making its decision that the Division of Water Quality (DWQ) rejected Red Leaf’s position – as expressed in the NOI – that it would be unnecessary for the company to apply for a ground water permit. Compounding what was already a fatal flaw in its decision-making process, the Division has since refused to defer a final

decision on the NOI pending a complete review of Red Leaf's proposal by DWQ, even though the Division has acknowledged that it does not have the expertise to review properly the possible impacts to ground water.

Specific to Division regulations, the Division acted arbitrarily, capriciously, and contrary to law in failing require Red Leaf to account adequately for: the possible existence of susceptible ground water resources in the area of the mine, the flaws in and inadequate testing of the design of the EcoShale capsules, and the impacts to ground water in the area of the mine due to leakage of deleterious materials from the improperly designed and untested capsules. As a corollary to the deficiencies of the capsule design, the Division also failed to account for the presence of these unconfined deleterious materials in the NOI, including the operations and reclamation plans, thereby making the NOI and its description of ground water impacts and mitigation necessarily incomplete and inaccurate. As a result, the Division's permitting decision is not adequately supported by the NOI or the record.

### **III. PROCEDURAL HISTORY**

On April 28, 2011, Red Leaf submitted the first draft of the Southwest #1 NOI to the Division.

On July 20, 2011, the Division submitted its initial review of the NOI to Red Leaf, noting several deficiencies that required correction.

On September 6, 2011, Red Leaf submitted a second draft of the NOI, addressing the concerns raised by the Division in its initial review. In the September 6 NOI, Red Leaf made the following statement: "Based on pre design conference review, Red Leaf interprets that the Division of Water Quality (DWQ) is satisfied that the project does not impact water. A formal statement from DWQ is pending." September 6 NOI at 42. The September 6 NOI also

contained a letter in Appendix N from Red Leaf's consultant, JBR Environmental Consultants, to DWQ stating that "Red Leaf Resources has concluded that its proposed facility is not subject to the permit requirements of the Utah Ground Water Quality Protection Rules," and that "Red Leaf does not believe that it has a duty to apply for a Ground Water Discharge Permit."

In contrast to the statements in the September 6 NOI that a ground water discharge permit would not be required, on October 6, 2011, DWQ notified Red Leaf that it would need to submit an application for a ground water discharge permit for the proposed mine.

On October 7, 2011, Red Leaf submitted an amendment to the NOI totaling 14 pages. Nothing in the amendment, which included Appendix K, referred to or addressed DWQ's requirement that Red Leaf submit a ground water permit application for its project or contained any reference to communications with DWQ. Appendix K, part of the 14 pages, entitled "Executive Summary of Water Strategy for Red Leaf Resources," did not address impacts to either surface or ground water, but rather evaluated "the feasibility of developing surface and groundwater resources around the site as a means of supplementing the water that is generated by the process to provide the remaining water necessary for facility operations." Appendix K at 1.

On October 20, 2011, the Division published a Notice of Tentative Decision to Approve the Southwest #1 NOI. This Notice did not contain language specifying that the Tentative Decision was conditional on obtaining documentation from DWQ regarding a ground water discharge permit. Nothing in the record as of the October 20 decision reflected DWQ's requirement that Red Leaf submit a ground water permit application.

On November 18, 2011, Living Rivers filed a protest of the Division's Tentative Decision to approve the Southwest #1 NOI. In its protest, Living Rivers made four major

contentions: 1) that the NOI does not account adequately for local ground water resources; 2) that the NOI fails to account adequately for potential impacts to ground water resources; 3) that it would be arbitrary and capricious for the Division to approve the NOI prior to final approval of the ground water permit process; and 4) that the NOI failed to address the inadequacies of the EcoShale capsule design. It is critical to note that at the time Living Rivers filed its protest, Red Leaf had not submitted its application for a ground water discharge permit. Needless to say, Living Rivers had not seen this document and this document was not part of the record when the organization protested the tentative NOI.

On December 20, 2011, Red Leaf submitted its application for a ground water discharge permit.

On February 10, 2012, DWQ requested additional information from Red Leaf regarding its ground water permit application.

On February 24, 2012, an informal hearing was held before John Baza, Director of the Division. At the hearing, Living Rivers again reiterated its position that the Division did not have adequate information to approve the NOI and that, at a minimum, final approval of the NOI should be deferred until completion of the ground water permit process for the mine so that the Division could incorporate the information and analysis resulting from the process into the NOI.

On March 9, 2012, the Division granted final approval of the NOI, conditioned on Red Leaf obtaining a ground water permit, or a certification from DWQ that a permit was not required. No provisions were made in the order to incorporate the findings and requirements of the ground water permit into the NOI.

#### **IV. STATEMENT OF FACTS**

Red Leaf holds State Institutional Trust Lands Administration (SITLA) leases on 16,838 acres approximately 55 miles southwest of Vernal, Utah.

The Red Leaf leases are located in Indian Country. This means that the U.S. Environmental Protection Agency (EPA) is the appropriate authority to issue permits, take enforcement actions and otherwise implement federal environmental laws such as the Clean Air Act, Clean Water Act, Safe Drinking Water Act and Resource Conservation and Recovery Act.

Previously, Red Leaf held an exploration permit on 5.8 acres within its lease area, on which it conducted process testing and drilling. In January 2011, Red Leaf converted its exploration permit to a small mining operation permit, consisting of approximately 5 acres. Within the permit area, Red Leaf constructed two small test structures associated with its EcoShale process, each approximately 1 acre in size.

The company now proposes to convert its small mining operation to a large mining operation encompasses 1,477 acres. Within that area, Red Leaf proposes to construct a total of one hundred eighteen 10-acre capsules, covering a total of approximately two square miles. Each capsule will be 500 by 900 feet in size, and will be 136 feet tall before heating. The capsules and supporting structures will be constructed largely of materials mined on site.

The NOI describes a “capsule method” for processing oil shale which relies on the construction of large piles of run-of-mine material on a bentonite-amended soil (BAS) lined facility. According to this method, the pile is then sealed and heated in order for the pile to act as a retort and mobilize the contained petroleum. The crushed ore will be placed in the capsule in layers with heat conducting pipe. The liberated oil will be collected in pipes and in a pan at the bottom of the capsule and directed to a sump. Red Leaf claims that all of the oil and volatile hydrocarbons will be contained within the capsules by a 3-foot BAS layer. Surrounding the BAS

layer on the inside of the capsule will be a 13-foot layer of gravel, which the company claims will provide a layer of insulation between the BAS and the heated ore. During the heating and extraction process, the ore in the capsules loses approximately 40 to 45 feet in total height (initial thickness of ore in each tier is 100 feet). The giant capsules would be located within the mined areas and be stacked two high. The method anticipates that after the capsules cool and settle, the area will be reclaimed.

## **V. ARGUMENTS AND BASES OF REQUEST FOR REVIEW**

The Division acted arbitrarily, capriciously, and contrary to law in approving Red Leaf's inaccurate and incomplete NOI because it accepted Red Leaf's premise that the EcoShale capsule design was flawless and therefore failed to require Red Leaf to account adequately for either ground water in the area of the mine or possible impacts to that ground water from its mining operation. The Division granted its approval despite being notified in advance of making its decision that DWQ's Ground Water Protection Section disagreed with Red Leaf's position on this matter, and that the agency would require the company to submit a complete ground water permit application. Specific to Division regulations, the Division failed to require Red Leaf to account adequately for the possible existence of susceptible ground water resources in the area of the mine, the flaws in and inadequate testing of the design of the EcoShale capsules, and the impacts to ground water in the area of the mine due to leakage of deleterious materials from the improperly designed and untested capsules. As a corollary to the deficiencies of the capsule design, the Division also failed to account for the presence of these unconfined deleterious materials in the NOI, including the operations and reclamation plans, thereby making the NOI and its description of ground water impacts and mitigation necessarily incomplete and



inaccurate. As a result, the Division's permitting decision is not adequately supported by the NOI or the record.

**A. The Division's Approval Was Based on the False Assumption that There Will Be No Impact to Ground Water as a Result of the Mine.**

As an initial matter, the Division's decision to approve the NOI is fundamentally flawed because it is based on the false assumption by Red Leaf that its proposal will not result in impacts to ground water in the vicinity of the mine. Because there is no basis for such an assertion, because the Division was fully aware that this assertion was incorrect before it issued its tentative approval of the mine, and because the Division has refused to defer its final approval of the mine pending the completion of DWQ's analysis of possible ground water impacts, the Division failed to fulfill its legal obligations in approving the mine.

In the September 6 NOI approved by the Division, Red Leaf claimed that “[b]ased on pre design conference review, Red Leaf interprets that the Division of Water Quality (DWQ) is satisfied that the project does not impact water.” September 6 NOI at 42. The company also claimed that “Red Leaf Resources has concluded that its proposed facility is not subject to the permit requirements of the Utah Ground Water Quality Protection Rules,” “the retort capsules are designed to be fully contained...and to be fully isolated from the environment by design both during operation and following reclamation,” and that “Red Leaf does not believe that it has a duty to apply for a Ground Water Discharge Permit.” Letter from JBR Environmental Consultants to DWQ, NOI Appendix N.

Rather than question these statements by Red Leaf, the Division accepted them at face value and failed to require the company to provide supporting evidence that the mine would not impact ground water quality. On October 6, 2011, the Manager of DWQ's Ground Water Protection Section notified both Red Leaf and the Division that, contrary to Red Leaf's assertions, the company would be required to submit a completed application for a ground water discharge permit. *See Living Rivers' Protest, Exhibit A.* In other words, DWQ rejected Red

Leaf's claim that the agency was satisfied that the project would not impact ground water and disagreed with Red Leaf's position that the proposed facility was not subject to the Utah Ground Water Quality Protection Rules.

In spite of being notified in advance of DWQ's decision that the agency disagreed with Red Leaf's assertions regarding possible impacts to ground water, on October 20, 2011, the Division issued its tentative approval of the NOI. There is no evidence in the record that the Division factored DWQ's notification regarding the requirement to submit an application for a ground water permit into its decision.<sup>1</sup>

Although DWQ and the Division have separate regulatory responsibilities regarding oversight of possible impacts to ground water as a result of mining activities, there is significant overlap between those responsibilities. The Division has admitted that it does not have the expertise to analyze all possible impacts to ground water from mining proposals such as the one from Red Leaf and that the Division, in fact, depends on DWQ's expertise to compliment the Division's analysis of possible impacts to ground water pursuant to its obligations under R647-4-109(1).

For that reason, it was premature, under any circumstances, for the Division to approve Red Leaf's NOI before DWQ had completed its review of the proposal and before that agency had shared its analysis with the Division. It was especially egregious for the Division to approve of the NOI after being notified by DWQ that it did not agree with Red Leaf's assertions regarding possible impacts to ground water from the project. Further compounding its error, the

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<sup>1</sup> In the March 9, 2012 Record of Decision, the Division states that on October 7, 2011, Red Leaf submitted an amendment to the NOI that reflected DWQ's notification from the day before that a ground water discharge permit application would be required. However, a review of the public record, including the October 7 amendment, fails to support the Division's assertion that Red Leaf or the Division acknowledged or addressed, in any way, DWQ's notification as part of the October 20 decision.

Division issued its final Decision approving the NOI even though it was fully aware that DWQ had notified the Division and Red Leaf that it had not completed its review process and required additional information from Red Leaf in order to complete the application process. DWQ Completeness Review, February 10, 2012, Exhibit B, attached. Because the Division has admitted that it depends on DWQ to help inform its decision regarding possible impacts to ground water for mining project, the Division acted arbitrarily, capriciously, and contrary to law in failing to withhold approval of Red Leaf's NOI under these circumstances.

**B. The NOI Does Not Adequately Account for Local Ground Water Resources.**

In approving the Red Leaf NOI, the Division violated its regulations that require an applicant to account adequately for the location of ground water resources in the impacted area. Specifically, R647-4-106(8) requires the Division to ensure that the NOI contains a sufficient description of the location of water resources, as well as a calculation of the depth at which any such resources are found in the area of the mine. As outlined below, the NOI fails to meet those requirements.

The Parachute Creek Member of the Green River Formation is the surface bedrock formation that exists throughout most of the Red Leaf parcels. This formation contains the Mahogany Oil Shale zone from which the raw ore would be extracted. Open-pit mining operations would extend to a depth of 250 feet below the ground surface. Underlying the Parachute Creek Member is the Douglas Creek Member of the Green River Formation.

The Ground Water Permit Application (GWPA) states that the depth to the shallowest known occurrence of ground water is 600 feet below the ground surface and 350 feet below the bottom of the open pit. However, there is insufficient information in the NOI to support this statement, and in fact some information that contradicts it.

The NOI states that it is unlikely that the Parachute Creek and Douglas Creek contain “significant” quantities of ground water, though its presence in these rocks cannot be ruled out. NOI at 38. Taking a regional perspective, the GWPA states that the Douglas Creek Member potentially contains the upper most aquifer in the Green River Formation in the eastern Uinta Basin. GWPA at 16. In fact, as reported in both the NOI and the GWPA, the BLM considers both the Parachute Creek and Douglas Creek Members as key aquifers in the general Uinta Basin area. NOI at 37-38; GWPA at 20.

Additionally, the GWPA acknowledges the presence of ground water in the Douglas Creek Member and discusses the movement and areas of discharge in the southern and northern parts of the Uinta Basin. GWPA at 20. Finally, the GWPA provides data from nearby wells that have identified ground water occurrences that “likely reflect localized, perched aquifers associated with lenses of permeable bedrock in the Douglas Creek Member of the Green River Formation.” GWPA at 21.

Despite this contrary evidence contained in the GWPA – submitted subsequent to approval of the NOI – the Division approved an NOI which provides three lines of evidence in support of the conclusion for the absence of ground water in the Parachute Creek and Douglas Creek. This purported analysis is inadequate.

First, the NOI reports that there are no USGS-mapped springs issuing from either of these formations in or near the parcels. This is insufficient evidence upon which to conclude that there are no aquifers that will be impacted by this mine. Not all springs are mapped by the USGS, and, for this and other reasons, reference to such maps is not the standard for determining the presence or absence of ground water. More importantly, the NOI does not contain the results of a thorough, systematic seep and spring inventory of the parcels and nearby area. NOI at 38.

Additionally, the NOI states that Price and Miller report springs issuing from the Green River Formation. *Id.*

Second, the NOI contends that exploration drilling by Red Leaf did not encounter ground water. NOI, Appendix N at 8. Not only is this an inadequate basis on which to conclude that there is no ground water that will be impacted by this mine, because six holes for a proposed 1,477-acre mine is insufficient to establish the presence or absence of ground water, but the statement is directly contradicted by the ground water permit application – submitted two months after approval of the NOI by the Division. The GWPA reports that water was encountered during drilling in RL-1, in fractures near the top of the hole. GWPA at 16. This confirms the presence of ground water in the Parachute Creek Member of the Green River Formation, and refutes the assertions made in the NOI.

Because the NOI does not contain drill logs, it is impossible to know what was or was not recorded during the drilling operations. Often, during exploratory drilling, the driller simply does not make observations regarding the presence or absence of ground water. If this were the case here, the lack of observation of ground water does not allow the Division to conclude that there is an absence of ground water in the areas drilled. In fact, the GWPA reports that the holes were drilled with water as a circulation medium and that small quantities of water might not have been observed. GWPA at 16. While the GWPA reports water at 600 feet below the ground surface in “the Red Leaf water well,” neither the NOI nor the GWPA provide information about this well, such as its location, a geologic log, how the well was completed, or the results of aquifer tests, if conducted. GWPA at 22.

Third, the NOI provides a summary of nearby water wells on file with the Utah Division of Water Rights. This provides little pertinent information on the question of aquifers in the

parcels to be mined by Red Leaf because there is no information on the location of the wells (distance from the area of proposed mining), no drill logs, no information on the geologic formations in which the wells were completed, and no information on ground water that was encountered at shallower depths.

### **C. The NOI Fails to Account Adequately for Potential Impacts to Ground Water Resources.**

In approving Red Leaf's NOI, the Division violated its regulations that require an applicant to account for the impacts of a mining operation on local ground water resources. Specifically, R647-4-106(8) and R647-109(1) require the applicant to include in the NOI an adequate description of both the location of, and projected impact to, ground water resources in the area of the mine. As outlined below, this NOI fails to meet those requirements.

With regard to projected impacts to ground water, the NOI states that "groundwater is not susceptible to any impacts from the mining and retorting operations because it is isolated from these operations by several hundred feet of low permeability marlstones." NOI at 42. However, the NOI reports that the first porous unit occurs approximately 50-100 feet below the Mahogany in the Douglas Creek Member. *Id.* Figure 5 of the GWPA supports this contention, showing the Douglas Creek Member approximately 55 feet below the Mahogany oil-shale zone. Texaco Seep Ridge Unit #2 well, less than two miles west of the Red Leaf operation, reports the Douglas Creek Member 49 feet below the Mahogany zone. GWPA at 18.

The record is incomplete with regard to the location of ground water resources in the area of the mine and what information exists indicates that there is the potential for ground water in localized perched aquifers, in the Douglas Creek Member, approximately 50 feet below the floor of the proposed mine, and/or in fractures in the Parachute Creek Member.

The bottom line is that Red Leaf failed to conduct an adequate assessment of potential impacts to local ground water resources because the company is convinced that the design of its EcoShale capsule will prevent ground water contamination of any residual petrochemicals resulting from this process. Red Leaf relies on the presumption that the capsule design, particularly the BAS layer, will prevent the migration of fluids from the ore. This presumption is key to the company's belief that there will be no impacts to ground water resources.

In support of its GWPA, Red Leaf evaluated seepage of precipitation through the upper BAS layer that will occur after the mining has ceased and the capsules are reclaimed with a cover of overburden and vegetated topsoil. The seepage was evaluated using the Hydrologic Evaluation of Landfill Performance (HELP) computer program from the U.S. Army Corps of Engineers. GWPA at 40; Appendix F.

The results of RLR's analysis indicate that seepage through upper BAS layer into the spent ore will be:

- Base Reclaimed Case = 1,683 gal/yr per capsule;
- Non Vegetated Case = 73,772 gal/yr per capsule;
- Increased Precipitation = 44,319 gal/yr per capsule.

These results highlight several deficiencies in the NOI's accounting of possible impacts to ground water.

First, the NOI does not discuss any of these seepage results. In fact these results completely contradict statements made in the NOI that "the capsules are designed to be fully contained," and "fully isolated from the environment by design both during operation and following reclamation," and "water will not enter the hydrocarbon recovery zone of the capsules." NOI, Appendix N.



Second, and more importantly, Red Leaf did not evaluate the quantity of leachate that will percolate through the **lower** BAS layer. Clearly the BAS layer is not impermeable, and it is therefore logical to conclude that water will seep down through the spent ore and ultimately through the lower BAS layer. In fact, DWQ recognizes that this is possible and in its February 10, 2012 Completeness Review, the agency instructed the company to conduct additional analysis using the HELP model to evaluate this exact scenario. *See* DWQ Completeness Review, Exhibit B.

It is clear that even under the best-case conditions – that in which the BAS layer remains intact during the heating and extraction process – Red Leaf’s underlying presumption in the NOI that the capsules are sufficient to prevent migration of fluids is unsupported by their own data and analysis.

Rather than take a conservative approach that recognizes the uncertainties and potential failings of the EcoShale design, Red Leaf relied on a best-case scenario in drafting the NOI. Not only is such an approach unjustified by the record, but moreover, as a result, the NOI fails to fulfill even the basic requirements of R647-4-106(8) and R647-109(1). In any case, and as outlined in detail below, the information presented in the NOI related to the EcoShale capsule design is insufficient to meet DOGM’s regulatory requirements and inadequate to serve as a reasonable basis for any conclusion regarding whether local ground water resources will be impacted by the proposed mining operation. Thus, under the circumstances, it would be arbitrary and capricious for DOGM to approve the NOI.

**D. The NOI Fails to Contain Sufficient Evidence that the EcoShale Design is Adequate to Prevent Contamination of Local Ground Water Resources.**

The NOI fails to provide information that the BAS will remain intact. The NOI describes a “capsule method” for processing oil shale which relies on the construction of large piles of run-

of-mine material on a BAS-lined facility. According to this method, the pile is then sealed and heated in order for the pile to act as a retort and mobilize the contained petroleum. The crushed ore will be placed in the capsule in layers with heat conducting pipe. The liberated oil will be collected in pipes in a pan at the bottom of the capsule and directed to a sump.

Red Leaf claims that all of the oil and volatile hydrocarbons will be contained within the capsules by a 3-foot BAS layer. Surrounding the BAS layer will be a 13-foot layer of gravel, which the company claims will provide a layer of insulation between the BAS and the ore. During the heating and extraction process, the ore in the capsules loses approximately 40 to 45 feet in total height (initial thickness of ore in each tier is 100 feet). NOI at 17 (stating the loss at 40-45 feet); GWPA at 32 (stating the loss at 39 feet). The giant capsules will be located within mined areas and be stacked two high. According to the NOI, after the capsules cool and settle, the area will be reclaimed.

This method of recovering hydrocarbons from oil shale is a new concept that has never been demonstrated at the scale that Red Leaf proposes. In order to evaluate this new and untested design, the Division and the public must rely on either the results of a pilot project using the same construction and operation, or on the results of sufficient and appropriate laboratory analysis and modeling. Unfortunately, the NOI fails to provide information on either of these.

Red Leaf has constructed a test facility under its exploration permit. However, the NOI contains no information about the results from this test facility. Specifically, there is no report of the evaluation of the capsule design, no discussion of potential scaling effects, no discussion of the liner or liner systems that were used and how they might differ from what is currently being proposed, no discussion of the geometry of the test capsules, no discussion of the BAS and how it was constructed, no analysis of the integrity of the BAS during heating and extraction, and

most importantly, no evaluation of any seepage from the capsules. The information in the NOI and the record regarding the capsule method for processing oil shale is insufficient to meet the requirements of an NOI and/or reclamation and is inadequate to support the Division's approval of the Red Leaf mine and operations for the following reasons.

***Subsequent Information and Analysis***

First, the Division made its decision to approve the mine without the benefit of the information in the Ground Water Application and the information further requested by DWQ as that agency considered the Application, and without the benefit of DWQ's analysis of and decision on that Application. By making its approval "contingent" on DWQ's permitting of the mine and operations, the Division did not rectify its violation of the law.

***Inadequate Information and Analysis***

Second, the information in the NOI and the record does not meet the requirements of an NOI and/or reclamation and does not support the Division's approval of the Red Leaf mine and operations because the information is incomplete and insufficient and is not based on the actual process, facilities or materials that will be implemented and employed at the site.

For example, the stability analysis of the mining process, operations and facility and other information in the record has been deemed "a preliminary analysis" and lacks sufficient detail, depth and data and is not adequately site-specific. The analysis is based on assumptions and references to experience with similar materials in addition to literature review, rather than on site-specific materials information. In addition, the evaluation of the backing wall stability fails to include site-specific analysis of the BAS and insulating gravel units that will actually be employed on site. Similarly, the analysis does not consider sufficiently the strength of the

bedrock foundation, risk of failure and potential impact on the wall stability and BAS liner integrity.

The analysis also neglects to address the impact of heat, pressure and chemical reactions on wall stability and the BAS liner integrity and does not provide data or analysis to support the effectiveness of its knuckle design. The analysis does not discuss the effect that volatile organics, gas pressure, or degradation by steam and/or saline or alkaline fluids will have on the BAS. Similarly missing is information on the viability, effectiveness and stability of the metal liner and the collection pipe system, as well as quality assurance and quality control measures to ensure proper installation of this equipment.

Also absent from the record is information on and analysis of the significant potential that the predicted settling of the capsules will result in failure, increased infiltration and release of deleterious materials, and will prevent reclamation. By the same token, the record contains no information to suggest that the capsules will remain intact as and after they settle, particularly over the course of several years or more. The analysis also fails to consider operational shut-down and subsequent drain-down and handling of petroleum containing liquids in the event of an unplanned closure.

In addition, although Red Leaf claims its mining is a zero-discharge operation that will include primary and secondary containment, the analysis fails to include a flow mass balance to demonstrate how zero-discharge will be achieved and neglects to cite detailed information on secondary containment. While the proposal relies on “proprietary fabrications” to address BAS seal function in a retort environment, this unsupported contention is highly problematic given the substantial likelihood of failure that liner seals have exhibited in other similar designs. Finally,

the record lacks sufficient lab testing of actual site materials and of proposed processes and facilities.

### ***Leakage and Failure***

Third, the information in the NOI and the record does not support the Division's approval of the Red Leaf mine and operations because that information indicates that the capsules will leak and/or fail, thereby resulting in the release and abandonment of uncontained deleterious materials, the contamination of the site and of surface and ground water and the frustration of any effort to reclaim the land affected by mining operations.

For example, the record indicates that, under a variety of circumstances, precipitation will seep through the upper BAS layer, including after the mining has ceased and the capsules are reclaimed with a cover of overburden and vegetated topsoil. Moreover, as noted above, for the same reason that precipitation will leak through the upper BAS layer, it will leak, or has the potential to leak through the lower BAS layer. This leakage and infiltration will be exacerbated by the fact that the NOI calls for the creation of areas designed to collect precipitation. This, in turn, will encourage ponding of water and increase the potential for infiltration of water into, and seepage from, the capsules.

The NOI and the record do not address this leakage, and indeed the NOI contradicts the data demonstrating that the BAS layer will leak by making and relying on statements to the contrary. Moreover, even should the BAS layer remain intact during the heating and extraction process and during settling, the contention that the capsules are sufficient to prevent migration of fluids is unsupported.

### ***Lack of Real Data on Untested Technology***

Fourth, the information in the NOI and the record does not meet the requirements of an NOI and/or reclamation and does not support the Division's approval of the Red Leaf mine and operations because the record contains no data or analysis based on the actual implementation of the proposed mining operations. Indeed, although the mine and operations set forth in the NOI and approved by the Division differs substantially from the pilot project, the information in the record does not even include data or analysis from this test project. Alternatively, the proposed project is not supported by sufficient and appropriate laboratory analysis and modeling.

Red Leaf has constructed a test facility under its exploration permit. However, the NOI contains no information about the results from this test facility. Specifically, there is no report of the evaluation of the capsule design, no discussion of potential scaling effects, no discussion of the liner or liner systems that were used and how they might differ from what is currently being proposed, no discussion of the geometry of the test capsules, no discussion of the BAS and how it was constructed, no analysis of the integrity of the BAS during heating and extraction, and most importantly, no evaluation of any seepage from the capsules.

Moreover, the proposed technology is untested and unproved. As noted by the Oil Shale and Tar Sands Programmatic EIS (PEIS)<sup>2</sup>, the technology for surface retorting, the only technically viable process method so far demonstrated, has not been successfully applied at a commercially viable level in the United States. Shell Oil is currently developing an *in situ* conversion process, although the process is currently unproven at a commercial scale. It is notable that the capsule method is not recognized in the PEIS, it has not been developed by a

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<sup>2</sup> <http://ostseis.anl.gov/index.cfm>

major company such as Shell Oil, and both its technical and economic viability are questionable, particularly given the history of oil shale development in the U.S.

Research has not shown any similar proposed approach to oil shale production or production of other commodities using a similar approach from either a retort or a general containment design under these conditions, making the proposed project unique. Given the history of similar endeavors in the mining and oil and gas industry, it is reasonably possible that the project will prove to be uneconomic and could cease operations within 2-3 years of start-up or otherwise during the expected course of operations.

Given the results of similar technological developments, it is likely that initial efforts to capture and contain liquid petroleum containing products will be less than ideal and it is reasonably possible that unexpected forces will be exerted within the capsules, leading to leaking and loss of integrity. The degree to which the retorting process might result in deformation or reaction with the capsule materials, as well as settling of the pile, makes long-term effectiveness of the containment questionable and short-term reclamation of the surface of the capsule potentially problematic.

### ***Faulty Assumptions***

Fifth, the information in the NOI and the record does not meet the requirements of an NOI and/or reclamation and does not support the Division's approval of the Red Leaf mine and operations because this information is based on the presumption that the capsule design, particularly the BAS layer, will prevent the migration of fluids from the ore. However, as stated throughout this pleading, the record does not support this presumption. Similarly, the NOI, reclamation and the Division's decision are founded on the contention that capsules will remain

intact and that oil and volatile hydrocarbons will be contained by the capsules. However, as stated throughout this pleading, the record does not support this assertion.

***No Risk Assessment***

Sixth, The NOI and the record lack a Failure Modes and Effects Analysis (FMEA) or similar analysis and the Division has failed to require such an assessment. As a result, there is no determination of the “risk” associated with the mine and its operations to assess the potential for, or likelihood of, failure of structures, equipment or processes and the effects of such failures on the larger systems, of which they form a part, and on the surrounding ecosystem, including ground water and human health and safety. Without an identification of the failure modes and measures with the highest risk, it is not possible to provide a description of the impacts of operations or to consider mitigation or alternative designs to reduce risks from the proposed methods.

***No Plan***

Seventh, the NOI and Division approval lack an adaptive management plan or similar plan to address the water resource issues identified in the permit and elsewhere. The record fails to describe and mitigate for the likelihood that the capsules will fail and/or leak, that mitigation will be ineffective and that leachate will be created. The NOI lacks a plan to address increases in reclamation costs and decrease in reclamation effectiveness due to differential subsidence in the capsule piles. To be adequate, such a plan should have a clear and detailed process linking monitoring with on-the-ground actions and agency enforcement.

***No Monitoring***

Eight, the NOI and the Division approval fail to require monitoring of the effectiveness of the containment systems necessary to ensure they are performing as expected. A variety of



techniques can be used to monitor containment system integrity including: exhumation and recovery of samples of BAS material and tests for degradation of properties, *in-situ* moisture content monitoring in soil layers above and below the barrier system, electrical and leak detection surveys, geophysical techniques and temperature monitoring.

***Settling, Heating and Other Forces***

Ninth, the information in the NOI and the record does not support the Division's approval of the Red Leaf mine and operations because the information is insufficient to conclude that the integrity of the BAS will not be compromised during the settling, heating and extraction process. Similarly, the record lacks an evaluation of the consequences of a compromised BAS.

For example, although the ore will be heated to a temperature of 725 °F, the NOI does not discuss the impact that this will have on the BAS. Moreover, a loss of 40 to 45 feet in thickness in the ore will exert stresses on the BAS. While Red Leaf asserts that the knuckle design will keep the BAS in compression during and after settling, the company has not provided the results of any geotechnical analysis or testing to support this assumption. Likewise, there is no information in the record to demonstrate how compressive stresses will extend from the sides of the BAS to the center over distances of up to 900 feet. Although the BAS layer is predicted to stay intact in part due to the surcharge load from the weight of the second tier capsule, this load would not exist for the uppermost tier, and thus compression of the BAS would be significantly reduced.

In addition, it is not possible to reduce the volume of the ore by 40 to 45 feet and not cause displacement of the BAS. The BAS would have to undergo an approximate 6 percent volumetric change in order to remain intact. Yet, the record does not contain an analysis of how this volumetric change, if it actually occurs, will affect the integrity of the BAS. If the BAS does

not undergo a volumetric change, there will be cracks as a result of differential settlement and movement to accommodate the displacement of the BAS. This movement of the BAS will compromise its integrity. Nor does the record discuss how the differential settlement of the ore in the capsules and the resulting stresses will affect the integrity of the BAS. The record also neglects to discuss the affect that the volatile organics, gas pressure, or degradation by steam and/or saline or alkaline fluids will have on the BAS.

## **VI. CONCLUSIONS AND PRAYER FOR RELIEF**

As a result of the foregoing, the NOI and the reclamation plan do not meet the requirement of Utah law and regulation including, but not limited to: Utah Code Ann. § 40-8-12(1)-(3); Utah Code Ann. § 40-8-12.5; Utah Code Ann. § 40-8-13; Utah Code Ann. § 40-8-13(1)(d); Utah Admin. Code R647-4-106; Utah Admin. Code R647-4-106(2); Utah Admin. Code R647-4-109; Utah Admin. Code R647-4-109(1); Utah Admin. Code R647-4-109(4); Utah Admin. Code R647-4-110; Utah Admin. Code R647-4-110(4); Utah Admin. Code R647-4-110(6); Utah Admin. Code R647-4-111; Utah Admin. Code R647-4-111(4); Utah Admin. Code R647-4-111(5).

By the same token, the Division's reliance on the NOI, the reclamation plan and the record to approve the Red Leaf mine and operations is arbitrary and capricious and otherwise unlawful, and the decision is not supported by the evidence record or by alternative means. Moreover, as described in the NOI and the record, the land affected by the mine and mining operations will not and cannot be reclaimed; proper operation and reclamation practices will not and cannot be followed; deleterious materials will be abandoned on site; the public health and safety will be compromised; ecological values will be harmed; and the reclamation plan will not be successful. In addition and as a result, the Division has not met its obligation to require an

adequate description of impacts to ground water and other resources and of mitigation measures intended to address those impacts.

For the foregoing reasons, Living Rivers respectfully requests that this Board determine that the Division failed to follow it's the law and its own regulations in approving Red Leaf's NOI for the Southwest #1 mine and accordingly vacate the Division's approval of Red Leaf's permit application and enter an order denying it as inaccurate, incomplete, or both.

Alternatively, Living Rivers requests that the Board vacate the approval decision and remand the matter to the Division to allow Red Leaf to correct identified deficiencies, if it can. Living Rivers further requests that this Board provide such other and further relief as may be appropriate.

Respectfully submitted this 19th day of March, 2012.



ROB DUBUC  
JORO WALKER  
Attorneys for Living Rivers

## CERTIFICATE OF SERVICE

I hereby certify that on this 19th day of March, 2012, I served a true and correct copy of Request for Agency Action and Request for a Hearing by Petitioner Living Rivers by email and via first-class mail to Julie Ann Carter, Secretary to the Board of Oil, Gas and Mining,

Julie Ann Carter  
Utah Oil, Gas and Mining  
1594 W North Temple, Ste 1210  
PO Box 145801  
Salt Lake City, UT 84114  
juliecarter@utah.gov

and to each of the following persons via email:

Dana Dean  
Associate Director of Mining  
Division of Oil, Gas & Mining  
1594 West North Temple, Ste 1210  
Salt Lake City, UT 84116  
danadean@utah.gov

Denise A. Dragoo  
Snell & Wilmer, LLP  
15 West South Temple, Ste 1200  
Salt Lake City, UT 84101  
ddragoo@swlaw.com

Steven Alder  
Utah Assistant Attorney General  
1594 West North Temple  
Salt Lake City, UT 84114  
stevealder@utah.gov

  
ROB DUBUC

# Exhibit A

## **DECLARATION OF JOHN WEISHEIT**

I, John Weisheit, based upon my personal knowledge and belief, state:

1. I reside in Grand County near Moab, Utah.
2. I am of sound mind and body and competent to make this Declaration.
3. I am the Conservation Director of Living Rivers and the Colorado Riverkeeper, an affiliate of the Waterkeeper Alliance.
4. Living Rivers is a non-profit corporation headquartered in Moab, Utah, dedicated to the preservation, protection, and restoration of rivers and watersheds in the Colorado Plateau. Living Rivers works to insure the long-term health and viability of human, animal and plant species, as well as environmental quality, threatened by mining operations in the region.
5. In my capacity as Living Rivers' Conservation Director, I was informed of the Division of Oil, Gas & Mining's (Division) Tentative Approval of Red Leaf's proposed NOI to commence Large Mining Operations at the Southwest #1 mine. On November 18, 2011, Living Rivers protested the Division's approval of the Red Leaf mine. On February 24, 2012, the Division held an informal hearing on our protest, and on March 9, 2012 denied our protest and issued a final order determining that Red Leaf had met the relevant Division rules and that a Final Notice of Intention should be approved.
6. I use and enjoy the land where the Red Leaf project is proposed. I also use and enjoy the lands adjacent to and nearby the proposed project land.
7. I have visited the land where the Division has approved Red Leaf's mining operations, and the lands immediately adjacent and nearby. I visit those lands to watch birds and wildlife, hike, enjoy the solitude and views, take photographs, and otherwise use and enjoy the public lands in this area.
8. Living Rivers' members also use the land in the area for hunting, hiking, spiritual, and recreation purposes.
9. My recreation, aesthetic, spiritual, conservation and other interests will be significantly and adversely affected if Red Leaf's proposed activities are allowed to proceed. These uses and

interests will be immediately and irreparably harmed if Red Leaf commences its proposed activities.

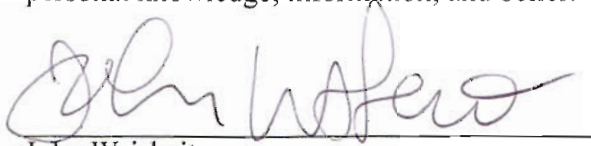
10. The potential groundwater contamination resulting from the proposed mining operations as well as subsequent surface manifestations of that contaminated groundwater will degrade the environment and irreparably alter my use and enjoyment of the area as described above.

12. My uses are totally incompatible with Red Leaf's proposed uses, including vegetation clearing, road building, construction of mining facilities, impairment of downstream uses and groundwater by mining operations, and proposed reclamation requirements that will not restore the area to its original state.

13. I intend to visit and use the lands at and near the proposed project for the aforementioned purposes at least three times in the next year.

14. The only way to protect my interest and uses of the proposed mine site and other lands and waters affected by the mine, and to protect the similar interests and uses of Living Rivers' members, from irreparable injury is to withdraw Red Leaf's permit approval or vacate the approval and allow Red Leaf to rectify, if possible, the permit inadequacies.

I declare under penalty of perjury that the foregoing is true and accurate to the best of my personal knowledge, information, and belief.

  
\_\_\_\_\_  
John Weisheit

3/15/12  
Date

# Exhibit B





State of Utah

GARY R. HERBERT  
Governor

GREG BELL  
Lieutenant Governor

Department of  
Environmental Quality

Amanda Smith  
Executive Director

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

M/647/0103  
cc: Leslie

Water Quality Board Tom  
Paula Doughty, Chair  
Steven P. Simpson, Vice-Chair  
Myron E. Bateman  
Clyde L. Bunker  
Merritt K. Frey  
Darrell H. Mensel  
Leland J. Myers  
Neal L. Peacock  
Gregory L. Rowley  
Amanda Smith  
Daniel C. Snarr  
Jeffery L. Tucker  
Walter L. Baker  
Executive Secretary

February 10, 2012

Rec'd  
2/13/2012

Mr. Robert J. Bayer, P.G.  
JBR Environmental Consultants, Inc.  
8160 Highland Drive  
Sandy, Utah 84093

Dear Mr. Bayer:

Subject: Completeness Review Comments and Request for Information  
Red Leaf Resources, Inc. Ground Water Discharge Permit Application

The Division of Water Quality (DWQ) has completed a review of the Ground Water Discharge Permit Application for the Red Leaf Resources (Red Leaf) Southwest #1 Project, which we received on December 21, 2011. The application is for a proposed oil shale mining and hydrocarbon extraction project at the Red Leaf SITLA lease site located approximately 55 miles south of Vernal in Uintah County, Utah. The proposal involves mining and crushing oil shale, and constructing "capsules" using the crushed shale and overburden, along with bentonite-amended shale (BAS) liners, to provide an in-situ no-discharge structure for thermal hydrocarbon extraction, and subsequent in-place reclamation. Based on our review, we have the following comments.

**Spent Shale Management**

Analysis of spent shale from a pilot test of Red Leaf's capsule retort technology using the Synthetic Precipitation Leaching Procedure (SPLP) suggests that natural precipitation coming into contact with the spent shale would dissolve minimal amounts of contaminants at concentrations below Utah ground water quality standards. One exception is antimony, which was slightly above the ground water quality standard. The SPLP results indicated a pH of 10, which suggests that water from precipitation exposed to the spent shale could generate leachate with high pH. Red Leaf has not provided information to indicate that the potential for the spent shale to generate high-pH leachate will diminish over time. Because high-pH leachate has the potential to harm beneficial uses of surface and ground water, the spent shale must be managed in a way to prevent the potential release of high pH leachate to surface or ground water.

Under Red Leaf's plans for mining and reclamation, it would take a considerable amount of time for precipitation to accumulate and react with buried spent shale in quantities large enough to affect ground water resources. Therefore, DWQ's concerns are related to long-term management of the spent shale. Following are several deficiencies we have identified in the Red Leaf ground water discharge permit application dated December 20, 2011.

Comment 1: Red Leaf asserts that the upper layer of BAS to be installed on top of the stacked shale and an insulating layer in a capsule will retain a  $1 \times 10^{-7}$  cm/sec saturated hydraulic conductivity after the shale is heated and undergoes compaction of nearly 40 feet in the capsule. Red Leaf should either provide a field demonstration that the hydraulic conductivity will not be adversely affected by capsule compaction, or provide additional modeling results using higher hydraulic conductivity values that might be expected post-compaction to show that surface and ground water quality will be protected after reclamation.

Comment 2: The application should provide a more complete justification for the input parameters and climate data used in the HELP model to assure that the values chosen are appropriate for this site. In particular, the justification should address the values chosen for hydraulic conductivity of the upper BAS layer, as mentioned above, the initial moisture content of the various model layers, and the climate data chosen for the growing season and precipitation. There should also be a statement of limitations inherent to the HELP model. Also, Red Leaf only ran the model for thirty years, while DWQ is interested in long-term performance of the waste containment. In particular, Red Leaf should estimate the time it would take for the spent shale in an upper, "Tier 2" capsule to reach field capacity, at which point it could possibly discharge leachate. The estimate should be done for two scenarios, one in which the upper BAS layer and capping materials are intact; and another scenario where they have been removed by erosion. Model input parameters and limitations should be explained as with the HELP modeling described above.

Comment 3: Surface drainage off of the reclaimed capsules could potentially come into contact with the spent shale as the upper cap and BAS layer erode over time. Red Leaf's plans for reclamation include collecting some of this water in ponds within the mine pit, and other streams would discharge to the regional surface drainage. Red leaf should demonstrate how this planned drainage will be protective of surface and ground water resources in the long term, in case the water becomes alkaline due to contact with the spent shale.

### **Capsule Engineering Comments**

Comment 1: The second to last sentence at the bottom of page 5 states: *The permeability of the BAS layer will be  $10 \times 10^{-07}$  cm/sec or less.* This is incorrect and should be  $1.0 \times 10^{-07}$  cm/sec or less.

Comment 2: Sheets 1 and 2 of Figure 7 (Capsule Life Cycle Sections) are drawn to scale and show the knuckles and sides of the capsules. However, it would be appreciated if dimensions were placed on the drawings for the knuckles (slope, thickness of ore, thickness of overburden, etc.).

Comment 3: The following statement is made in Section 11.6 (Process Wall Penetrations): *Proprietary fabrications have been designed and will be installed to enable BAS protection from heating.* Although these fabrications may be proprietary, the information is still required for our engineering review and can be marked "confidential" to ensure that DWQ does not make the proprietary information available to the public.

Comment 4: The following statement is made in Section 11.13.2.1. (Shale): *The ANSYS "multi-linear elasticity" model was used to approximate consolidation properties of rubblized shale at varying temperatures.* Please provide the entire report and model with all input parameters so we can review them.

Comment 5: Sections 11.13.2.2. (Gravel) and 11.13.2.3 (BAS) reference a Drucker-Prager plasticity model. Please provide the entire report and model with all input parameters so we can review them.

Mr. Robert J. Bayer  
February 10, 2012  
Page 3

Comment 6: Section 12.2. (Bottom Liner Fill) of the Construction Quality Control Plan states that BAS will be placed and bladed to a maximum loose lift thickness of 18 inches. Although 20 feet by 40 feet test pads will be constructed using BAS manufactured on site, we have never seen a clay liner constructed with an 18-inch loose lift thickness. Typically, the loose lift thickness is between 8 and 12 inches.

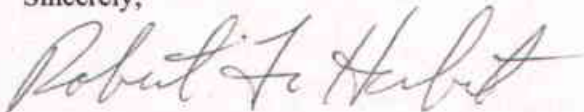
Comment 7: Section 12.3. (Side Liner) indicates that the test pad will be constructed without the gravel side liner. However, a test pad should be built just as it would be with the actual construction, which would mean construction of the BAS with the gravel side liner.

Comment 8: Based on the SPLP results, potential leachate generated by percolation of precipitation through the spent shale could have a high pH. Please provide information that addresses potential adverse effects of high pH leachate on the BAS bottom liner.

We realize that some of the information we are requesting may be proprietary or business confidential. Please indicate when requested information is proprietary or business confidential so we can keep this information separate from the publicly accessed files.

If you have any questions about the Spent Shale Management comments, please contact Mark Novak at (801) 536-4358 or [mnovak@utah.gov](mailto:mnovak@utah.gov). For questions on the Capsule Engineering comments, please contact Woodrow Campbell at (801) 536-4353 or [wwcampbell@utah.gov](mailto:wwcampbell@utah.gov).

Sincerely,



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

RFH/WWC/MTN:

cc: Laura Nelson, Red Leaf Resources  
Paul Baker, DOGM  
Scott Hacking, Tri-County District Engineer  
Tri-County Health Department  
Sonja Wallace, SITLA