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November 17, 2010

Mrs. Melissa Bautz
State of Wyoming
Department of Environmental Quality
Land Quality Division
510 Meadowview Drive
Lander, WY 82520

Re: Submittal of Responses to 4th Round Comments
TFN 4 6/268

Dear Mrs. Bautz,

Please find behind this cover, responses to the Department of Environmental Quality – Land Quality Division's (WDEQ-LQD) October 29 and November 5, 2010 5th round technical review comments regarding the Lost Creek Project. An index sheet is also included with the responses to assist with insertion of replacement pages into the Permit to Mine Application.

If you have any questions regarding this submittal, please feel free to contact me at the Casper Office.

Sincerely,
Lost Creek ISR, LLC
By: Ur-Energy USA Inc., Manager

John W. Cash
Director of Regulatory Affairs

Enclosures: Responses to comments
Index sheet
Replacement pages to place in Permit to Mine Application

Cc: Ms. Ramona Christensen, WDEQ-LQD Records Manager, Cheyenne Office
Mrs. Nancy FitzSimmons, Ur-Energy, Littleton Office
Ms. Tanya Oxenberg, PhD, Project Manager, U.S. NRC Rockville Office

RESPONSES TO OCTOBER 2010 WDEQ/LQD COMMENTS
ON
THE MAIN PERMIT DOCUMENT

for the
LOST CREEK PROJECT
Wyoming

November 2010

The responses are organized as follows:

If a comment has been resolved, that comment is no longer included; or
If a comment has not been resolved, then the complete series of comment and response text is included. The initial LQD comment is italicized, and the most recent LQD comment is in bold font.

This document combines outstanding comments from the following:

August 2008:	LQD Comments on Appendices D5 and D6 of the Main Permit Document;
January 2009:	LQD Comments on the Main Permit Document;
November 2009:	New LQD comments on the Main Permit Document;
February 2010:	LQD comments, on the Mine Unit 1 Application, relevant to the Main Permit Document;
February 2010:	New information provided by LC ISR, LLC;
March 2010:	New LQD comments on the Main Permit Document;
April 2010:	New LQD comments, on the Mine Unit 1 Application, relevant to the Main Permit Document;
July 2010:	New LQD comments on the Main Permit Document;
October 2010:	New LQD comments on the Main Permit Document; and
November 2010:	New LQD comments, on the Mine Unit 1 Application, relevant to the Main Permit Document.

The responses are separated first by permit section and then chronologically, as outlined below:

APPENDIX D5 (GEOLOGY)
- August 2008: LQD Comments on Appendices D5 and D6 of the Main Permit Document

APPENDIX D6 (HYDROLOGY)
- August 2008: LQD Comments on Appendices D5 and D6 of the Main Permit Document

OPERATIONS PLAN
- January 2009: LQD Comments on the Main Permit Document
- February 2010: LQD Comments, on the Mine Unit 1 Application, relevant to the Main Permit Document
- November 2010: New LQD Comments, on the Mine Unit 1 Application, relevant to the Main Permit Document

RECLAMATION PLAN
- January 2009: LQD Comments on the Main Permit Document
- February 2010: LQD Comments, on the Mine Unit 1 Application, relevant to the Main Permit Document

APPENDIX D5 (GEOLOGY)

AUGUST 2008 - LQD REVIEW OF APPENDICES D5 AND D6 OF THE MAIN PERMIT DOCUMENT

4) LQD (8/08) - *Plates D5-1a - D5-1e. These plates provide one generalized and several detailed geologic cross sections down the centerline of the ore body, and across the centerline of the ore body. In addition, Figure D5-2a provides a very generalized geologic cross section across the northern portion of the permit area. LQD Non-Coal Rules, Chapter 11, Section 3(a)(viii) requires cross sections that show geologic features within the entire permit area, and how they relate to the production zone. Extending cross sections F, G, and H to the boundaries of the permit area with any available drill hole data, will help to provide this information.*

LC ISR, LLC (4/09) - The cross sections have been updated with the information from new borings and wells completed in 2008. As noted on the Index Sheet for the changes to Appendix D-5, Plates D5-1b through D5-1e have been replaced, and two new plates (Plates D5-1f and D5-1g) have been added. The references in the text to these plates have also been updated.

b) LQD (6/09) - *The piezometric surfaces are indicated for the DE, LFG, HJ and UKM aquifers, though it is not clear if there are any monitoring wells on the cross sections from which the water tables were derived. Please designate any monitoring wells on the cross section, and indicate their screened intervals and water levels with date.*

LC ISR, LLC (11/09) - A reference to the cross-sections and an explanation of how the potentiometric surfaces were projected onto the cross-sections has been added to D6.5.2.2 (Potentiometric Surface, Groundwater Flow Direction and Hydraulic Gradient).

LQD (12/09) - *As stated previously, the cross section should indicate where specific groundwater elevation data is available from monitoring wells, and if the data points are close enough it can be extrapolated, otherwise projecting a potentiometric surface across an entire cross section could be misrepresentative. For example, on Plate D5-1e, cross section F-F', there are two clusters of monitoring wells that fall on the cross section yet are not indicated. Wells MB-01, MB-02, MB-03A, and MB04 lay in a cluster approximately 312 feet south of the North Fault. There is no groundwater data north of the fault yet the cross section assumes that the water level across the fault is consistent. Similarly, there is a well cluster (LC21M, LC22M, LC23M, and LC30M approximately 250 feet south of the Lost Creek Fault (Subsidiary) yet these wells are also not indicated on the cross section. The potentiometric surface is projected on the cross section, an additional 1.5+ miles to the south, with no data available. Granted, the surfaces appear* *as dashed lines or implied, however, please add the known groundwater elevations on the cross section for each available monitoring well, and indicate the screened interval and the date for the water elevation. Extrapolation should be limited to those areas on the cross sections where there is enough data available. Please also revise Section D5.2 by deleting the statement that "Depiction of these (potentiometric) surfaces on the cross sections were generated by tracking the intersection of the plane of the cross section profile with potentiometric contours plotted for the given horizons ... ".*

LC ISR, LLC (2/10) - The original focus of the cross sections was to provide information on the stratigraphy in the Permit Area, so no monitor wells were included on the cross-sections. Illustration of water levels on the cross sections was requested by NRC (*see* LC ISR, LLC's December 2008 Response to NRC's November 2008 Comment #2 on Section 2.7.2 of the Technical Report) and subsequently included in documents submitted to WDEQ-LQD for consistency. The location of monitor wells with relation to cross sections is shown on Plate D5-3, 'General Location Map – Geology'. The data requested to be illustrated from adjacent monitor wells [water elevations, screened intervals, measurement dates] is available in tables, appendices and Completion Logs elsewhere in the application therefore LC ISR, LLC does not believe that adding this specific information onto the cross sections is necessary.

Additionally, as with the potentiometric surface contour maps (Figures D6-11e through 11h), the potentiometric surfaces which are illustrated on the cross sections are generated from raw data collected from the monitor wells. The method of projecting this data onto the cross sections is explained in the statement: " Depiction of these (potentiometric) surfaces on the cross sections were generated by tracking the intersection of the plane of the cross section profile with the potentiometric contours plotted for the given horizons..." Where monitor wells are in close proximity to the plane of a cross section, this projection can be considered reasonably accurate. In regions of sparse data, the projection of the potentiometric surface can be considered more interpretive. In either case, the potentiometric surfaces illustrated on the cross sections can be considered as valid and accurate as those depicted on the potentiometric surface contour maps.

The DEQ comment stating that "There is no groundwater data north of the northern fault, yet the cross section [F-F'] assumes that the water level is consistent." makes a valid point. Therefore, Cross-Section F-F' has been revised by removing the potentiometric surfaces as shown north of the fault.

LQD (3/10) - Specific water level elevations were not provided, as LC does not believe it to be necessary, yet if there are precise points along a cross section where specific information is known, then that information should be on the cross section, and not an interpolation from a potentiometric surface map. Since the scale of the cross sections would not easily incorporate the monitoring wells and their screened intervals, please add a note and/or sticker to the legends which indicates that the potentiometric surfaces are interpolated from the regional potentiometric surface map, and not based on real data points along the cross sections. In closer examination of trying to correlate known *groundwater elevations, there is a significant discrepancy on Plate D5-1e, the F-F' cross section. It shows the DE potentiometric surface at approximately 6750 ft., yet Figure D6-11e, the DE Potentiometric Surface Map shows the water level in nearby monitoring well MB-1 as 6,853 ft., a 100 ft. difference. In attempting to find the correct elevation of the water table in MB-01 it was noted that the MB well water elevations were not provided on Table D6-6. Please revise this Table to include the MB wells. However, when looking at the completion log for MB-01 it appears that the water elevation should read 6,752.9 and it is most likely that Figure D6-11e needs to be corrected. (AB)*

LC ISR, LLC (6/10) - The explanation that the piezometric surfaces shown on the cross-sections (Plates D5-1a through D5-1g) are based on interpolation from regional monitor wells (and not from the drill holes shown on the cross sections) will be added to the cross-sections in conjuction with the changes requested in Comment D5 #4(c).

The water level for well MB-1 in Figure D6-11e has been corrected.

Table D6-6 was revised to include the available water level data for the MB wells, and the revised table was submitted to LQD in May 2010. Three quarters of data are currently available, and the table will be updated once the fourth quarter of data is collected.

LQD (7/10) - Item unresolved. Stickers for Plates D5-1a through D5-1g, which indicate that the potentiometric surface shown on the cross sections is based on interpolation and not the drill holes shown, are to be provided. An updated Table D6.6 will be submitted once all of the wells have four quarters worth of baseline monitoring data. A revised Figure D6-11e was provided with the correction to the water elevation in MB-1. (AB)

LC ISR, LLC (9/10) - The cross sections in Plates D5-1a through g were revised to clarify that the potentiometric surfaces are based on interpolation from other wells. Table D6-6 was updated with four quarters of monitoring data.

LQD (10/10) - Item partially resolved. The cross sections were revised with a footnote added regarding the interpolation of the potentiometric surface. Table D6-6 was updated yet MB-1 and MB-8 only have three viable measurements of water level. LC ISR, LLC has indicated that the data can not be located and a 4th round of water level for these two wells will be obtained, and the Table updated accordingly. **(AB)**

LC ISR, LLC (11/10) - The fourth round of data was collected on November 1, 2010, and incorporated into Table D6-6.

APPENDIX D6 (HYDROLOGY)

AUGUST 2008 - LQD REVIEW OF APPENDICES D5 AND D6 OF THE MAIN PERMIT DOCUMENT

14) LQD (8/08) - *Section D-6. Detailed stratigraphic and well completion logs should be provided within the permit document for all monitoring wells. It is preferable if this information can be compiled on one log form. Notation of each horizon within the stratigraphic column would also be helpful. LQD Guideline 8, Appendix 5 describes the information to be included for each well.*

LC ISR, LLC (4/09) - A new attachment has been added with the well completion logs for the permit area monitoring wells. The existing Attachment D6-3 (Groundwater Quality Laboratory Results) has been renumbered to Attachment D6-4, and the title page and CD changed. Attachment D6-3 is now titled Well Completion Logs. A list of the wells for which logs are included in the attachment is at the beginning of the attachment.

Cross references to the new attachment have been added at the end of Section D6.2.2 and in Attachment D6-2a (Comment #44). Because of the size of the new Attachment D6-3 (Well Completion Logs), Volume 3 of the application has been separated into Volume 3a, which contains all of Appendix D6 through Attachment D6-2b, and Volume 3b, which contains Attachments D6-3 and D6-4.

LQD (6/09) - *The following comments have been generated from a review of the well logs:*

i) LQD (6/09) - *There are many wells where there is additional footage between the base of the well screen and the bottom of the hole, yet it is not indicated on the well diagram (e.g. LC29M, MBOl, MB07, MBIO, HJMO-I05, HJMO-I06, HJMO-112, HJMO-113, MB-02, MB-05, MB-08, HJMP-IOl, HJMP-I02, HJMP-I09, HJT-I02, MB-06, MB-09, HJMU-I05, HJMU-113, HJMU-114, UKMP-I02, UKMP-I03, MB-04, UKMU-IOl, UKMU-I03). Please indicate on the schematic if the boring caved into this level, if there is a sump below the screen, or if it is an open hole.*

LC ISR, LLC (11/09) - Notes on the well completion logs have been added at the beginning of Attachment D6-3.

LQD (12/09) - *LC added a page at the beginning of Attachment D6-3 to explain some of the drill log discrepancies. The page is titled "Notes on the Well Completion Logs in Attachment D6-3".. In the first paragraph, please explain in further detail the penetration into the EF shale at wells MB-1 and MB-7. Specifically, how far into the shale did each drill hole penetrate, and what is the approximate thickness of the shale at the location.*

LC ISR, LLC (2/10) - The page titled "Notes on the Well Completion Logs in Attachment D6-3" has been updated with the requested information.

LQD (3/10) - Discussion regarding an additional shale layer below the EF shale at MB-01 was provided, yet no discussion regarding the potential of MB-07 penetrating the EF was provided. Please specifically discuss MB-07. In addition, in the discussion, please note how far these wells may have penetrated into the EF shale, and what the thickness of the EF shale was at these locations. (AB)

LC ISR, LLC (6/10) - A detailed review of the stratigraphy of well MB-7 indicates that the EF shale had been improperly fully penetrated by the pilot hole. LC ISR, LLC has no records to indicate that the rat-hole below the well screen has been back-plugged. Although well MB-07 has insufficient water to sample, it is important that the well's completion is correct. Therefore, LC ISR, LLC will pull the screen and back-plug the rat-hole with grout and then re-set the screen. Water levels will continue to be collected to see if sufficient water is available for well development and sampling. If sufficient water is available, the well will be sampling in accordance with the standard presented in the Operations Plan.

LQD (7/10) - Item unresolved. There were no records to indicate that the rat hole at the bottom of MB-07 was backfilled, therefore this monitoring well may be penetrating below the EF Shale. Lost Creek is committed to pull the screen and back plug the rat hole. Depending on the water quality and quantity after this effort, new baseline may be required. (AB)

LC ISR, LLC (9/10) - LC ISR, LLC plans to physically check the completion of well MB-07 during the 2010 drilling season and will inform WDEQ-LQD of the results of this check.

LQD (10/10) - MB-07 was checked and cleaned out and the rat hole was cemented in on October 28, 2010. A new well completion report will be submitted. This item is unresolved. **This item is unresolved. (AB)**

LC ISR, LLC (11/10) - The rat hole in well MB-07 was plugged and the new completion report is included with this submittal for insertion into the Permit to Mine Document. An e-line reading taken after the rat hole was cemented indicates that there is no water in the well.

OPERATIONS PLAN

JANUARY 2009 - LQD COMMENTS ON THE MAIN PERMIT DOCUMENT

9) *LQD (1/09) - Plate OP-1: The pond designs are unacceptable for several reasons including, but not limited to the following:*

- *No location map was provided; Plate OP 1 is not considered a location map as it is of unacceptable scale and is not tied to any coordinate system;*
- *No contour interval is provided on schematics;*
- *No description or detail as to what part of the pond is above and below existing grade;*
- *No details concerning the piping system for the supply of water to the ponds and transfer of water between ponds;*
- *No specifications concerning seaming of the liner system and QA/QC procedures to be employed to evaluate the seaming; and*
- *Pond sizing calculations to address evaporative loss, inflows, etc. under a variety of conditions to demonstrate that adequate redundancy in disposal exists.*

Please present a complete set of designs and specifications for the two proposed ponds. ***(BRW)***

LC ISR, LLC (10/09) - Plate OP-1 has been updated and revised to show the Plant and pond locations relative to the Permit Area as a whole. Plate OP-2 has been added to show more detail in the area of the ponds, including topographic contours. Design details for the ponds are included in Attachment OP-A6 to the Operations Plan. The two reports in the attachment are "Design Report, Ponds 1 & 2", dated January 2009, and "Technical Specification", dated April 2008, both by Western States Mining Consultants. Appendix B of the Design Report provides the results of the geotechnical investigation at the proposed pond location ("Subsurface Exploration and Geotechnical Engineering Report" by Inberg Miller Engineers dated September 2008).

The storage ponds will be filled from the plant waste water tank(s) via a buried line except where it is above grade to cross the storage pond embankment. The storage pond fluid will be transferred between Ponds 1 and 2 by above grade transfer pumps and piping with suctions in the storage pond fluid. Fluid will be transferred back to the waste water tank(s) for disposal via the same methods.

The primary purpose of the storage ponds is to allow for maintenance of the disposal wells not for evaporation of waste water. (The "Operations Plan, Sections OP 2.9.4 and

OP 5.2.3.1 detail that purpose.) Therefore, evaporative loss is not included in the water balance calculations, and any evaporative losses will simply enhance the disposal capacity of the waste water system. See Figures OP-5a through OP-5f for water balance diagrams.

Pond sizing was based on a normal maintenance or testing schedule for the disposal wells, or two weeks of 1% bleed from the production stream at maximum design capacity (6,000 gpm).

Single Pond Capacity = 1% x 6000 gpm x 1440 min/day x 14 days
= 1,209, 600 gallons / 7.48 gal/cu. ft.
= 161,711 cubic feet

Pond Fluid Depth = 161711 cu. ft. / (160 ft. wide x 260 ft. long)
= 3.9 feet deep

The ponds are redundant in capacity allowing for maintenance of the ponds in the event of a liner problem.

<u>LQD (11/09)</u> - Response not acceptable. The original comment stated that the pond designs were not acceptable for several reasons, but not limited to several items identified above. The proposed designs do not meet the criteria as outlined in 40 CFR 264, SubPart K (see attached). In addition, no details were provided concerning QA/QC criteria that would be used to evaluate seam quality, only that a factory representative would be on hand. Please make the appropriate revisions to the designs. (BRW)

<u>LC ISR, LLC (2/10)</u> - It is unclear what WDEQ-LQD's authority is to regulate pond design under 40 CFR 264, Subpart K, especially since this portion of regulations applies only to the storage of hazardous waste and not to 11e(2) byproduct material pursuant to the RCRA Beville Amendment. Nor did the reviewer specify with what portion of the cited regulation the pond design does not comport. Nonetheless, Attachment OP-7 has been revised to include a new Pond Design Report, Technical Specifications, slope stability calculations, and engineering drawings. The Technical Specifications address the ASTM Standards that will be used for QA/QC of the liner installation.

<u>LQD (3/10)</u> – Response not acceptable. Thank you for revising the design specification regarding the storage ponds. The reviewer understands that the design sheets provided are limited in terms of as there is insufficient detail for bidding as well as guidance for construction. However, in the reviewer's opinion the detail provided on the design sheets is a little too limited. For example, there is no indication as to where and how the liners are tied into the embankment, no indication of three feet of sub-excavation to install a prescriptive clay liner (a three-foot zone where K = 10-7 cm/sec or less), and no indication of the cutoff key depth. Please make the appropriate revisions to the design sheets. (BRW)

LC ISR, LLC (6/10) - Attachment OP-7 details the construction specifications for the Lost Creek storage ponds. Section TS 3.3.4 in Report 0802 (Lost Creek ISR – Ponds 1&2, Technical Specifications) details the foundation preparation, and Figure 0802.103 R2 details the liner key location and depth (5 feet deep and 10 feet wide at the base).

LQD (7/10) - Response not acceptable. LC's response references a Figure 0802.103 – Revision 2. No additional material concerning pond design was included in the June 2010 submission. Reviewing the previously submitted material (March 2010), the drawing presently found in the application is labeled Figure 0802.103 – Revision 1. The reviewer has checked all superseded materials to ensure there was not an error during the insertion process; no drawing identified as Figure 0802.103 – Revision 2 was located. Therefore, it is assumed that LC inadvertently submitted the wrong drawing with the March 2010 submission. Please see the reviewer's previous comment-response and provide the requested information. (BRW)

LC ISR, LLC (9/10) - LC ISR, LLC failed to include the material in its previous submission and regrets any inconvenience the over-site caused. The material has been included as requested. Figure 0802.103 – Revision 1 of Attachment OP-7 has been replaced with the revised Figure 0802.103 – Revision 2.

LQD (10/10) - Response partially acceptable. The reviewer's March 2010 comment indicated that there was insufficient detail on the plan sheets specific to various construction items. These details were to be addressed in a revised Figure 0802.103 – Revision 2. It appears that details regarding the key have been addressed, however, there are no details concerning subexcavation (except in the specifications) and no details provided concerning how the liners are to be keyed into embankment, etc., as requested. A review of the files indicates that the Nuclear Regulatory Commission (NRC) has asked many of the same questions posed by the reviewer concerning pond construction. It appears that LC has furnished responses to latest round of NRC comments earlier in 2010, but there is no indication that the NRC has accepted the responses regarding pond construction. Once LC provides documentation of the NRC's acceptance and ensures that all design drawings and specifications submitted to the NRC are incorporated into the LQD's permit application, the reviewer will consider LC's response acceptable. **(BRW)**

LC ISR, LLC (11/10) - On November 3, 2010, representatives from LC ISR, LLC and WDEQ met to discuss several outstanding issues including this item (OP-9). LC ISR, LLC informed WDEQ that they had been provided with exactly the same pond design information as the NRC. Mr. Mark Moxley will confirm that that is the case and will consider this item closed if NRC confirms they have received the same information and that they find the pond design acceptable.

84) *LQD (1/09) - Section OP 3.2 Mine Unit Design. The last paragraph of this section states that the operator has made an effort to properly abandon historic drill holes or wells. As* *noted earlier regarding Section D5.2.4 Historic Uranium Exploration Activities, all historic drill holes must be located and a determination made if they were properly abandoned. If they were not, then they must be re-entered and grouted from the bottom up to the surface. All of this effort must be clearly documented in the permit, on a hole by hole basis.* ***(AB)***

LC ISR, LLC (10/09) - Pursuant to discussions during the June 22, 2009 meeting in Casper between WDEQ and LC ISR, LLC, the letter from Don McKenzie to the Wyoming Mining Association dated February 25, 2009 will serve as the guidance document with regard to re-abandonment of historic holes. Item 1 of this memo states, "Re-entering and re-plugging old drill holes within a proposed mine unit boundary area is not warranted unless there is evidence of poor plugging practices determined either through record review or pump tests results." In order to satisfy this requirement two separate issues must be satisfactorily addressed: a record review and a pump test.

LC ISR, LLC has submitted to WDEQ-LQD all records in its possession with regard to historic abandonment of holes and wells at the Lost Creek Project. Included within the records is a Notice of Violation issued to Texasgulf on May 20, 1982 for improper hole abandonment and surface capping as well as memos from Texasgulf to WDEQ-LQD describing their corrective actions. The Texasgulf memos describe the depth to water and drill mud in each hole they could locate. Although the specific details of the corrective actions are unknown, it appears that WDEQ-LQD and Texasgulf agreed to re-abandon all holes where the mud depth was greater than about 200 feet below the water surface. A review of these memos reveals that Texasgulf attempted to locate and collect subsurface data on a total of 261 historic holes. This number does not include holes where a surface cap was replaced but no subsurface data is provided in the historical record. Of these 261 holes, 230 (88%) were located. Of the 230 located, a total of 16 were re-plugged with grout because the grout level was greater than about 200 feet below the water surface. The above statistics are based only on those holes for which we have complete and reliable records. Texasgulf also installed new surface caps on a large group of holes. WDEQ-LQD subsequently approved the corrective work and released the bond for the entire project. Based on WDEQ-LQD approval, one could conclude that the record clearly demonstrates the historic holes were abandoned using acceptable plugging practices and further effort is not warranted.

Additional efforts to relocate historic holes will likely meet with limited success. The historic holes in question were mostly drilled between 1968 and 1980. After 29 to 41 years of vegetation growth and additional drilling disturbance, only a portion of the holes are locatable. Today it is rare to find the wooden markers placed so many decades ago. Any attempt to relocate the historic holes will result in considerable surface disturbance will little to no benefit.

Pump tests performed to date, including the 2008 Mine Unit One pump test, reveal that there is minor communication between the overlying and underlying aquifers and the HJ Horizon. The drawdown in the overlying and underlying aquifers is on the order of one magnitude or less than the drawdown in the HJ Horizon The majority of hydrologic communication is likely through the displacement of the Lost Creek Fault and not through improperly abandoned drill holes. LC ISR will employ engineering controls to prevent migration of mining solution through the fault and into a USDW.

The historical record suggests the holes were properly abandoned by the original operator pursuant to regulations that were in place at that time. LC ISR, LLC believes WDEQ-LQD, as the agency with regulatory authority over uranium exploration, should have enforced existing regulations and required the grout column to extend above the water table. If WDEQ-LQD approved improper hole abandonment, the WDEQ-LQD is now transferring the liability onto a company with no responsibility, and in fact WDEQ-LQD's actions may jeopardize one of the state's uranium resources.

Today's WDEQ-LQD comments suggest improper oversight by WDEQ-LQD in the past. LC ISR, LLC understands WDEQ-LQD's request for the holes to be re-abandoned and hereby proposes the following path forward. This proposal is intended to provide a framework for this situation, which will undoubtedly be encountered at this and other sites as uranium resources are developed in the future. LC ISR will agree to re-abandon and re-surface cap all historic holes within pattern areas that have not already been re-abandoned by a previous operator or by LC ISR, LLC and which may impact LC ISR, LLC's operations in a given mine unit, based on pumping test results for that mine unit. For other historic holes, LC ISR, LLC will agree to re-abandon and re-surface cap all historic holes within pattern areas that have not already been re-abandoned by a previous operator or by LC ISR, LLC; however, WDEQ-LQD must take on the responsibility of locating each of the holes and either perform surface reclamation or advance funds for LC ISR, LLC to conduct surface reclamation. WDEQ-LQD and BLM must agree in writing that LC ISR, LLC takes on no liability, financial or otherwise, for the re-abandonment and associated work. Nor shall LC ISR, LLC have to bond for the work since it is being performed largely for the benefit of the state and BLM.

WDEQ-LQD will have the following responsibilities and absorb the associated costs:

- Locate the holes based on historic survey records before November 30, 2009.
- Either perform surface reclamation at the appropriate season or reimburse LC ISR, LLC to perform the surface reclamation work. Surface reclamation includes leveling of the site and reseeding with an approved mixture of native seed.

LC ISR, LLC will perform the following tasks and absorb the associated costs:

- Provide WDEQ-LQD with a backhoe and one backhoe operator for a total of 40 hours at no charge for the purpose of locating the holes. Any use of the backhoe and operator above 40 hours will be charged at a rate of $75/hour;
- Excavate the surface cap;
- Enter the hole with HDPE tremmie and go as deep as possible without drilling or washing out the hole.
- Tremmie grout into the hole until the hole is filled to surface;

- Return to the hole no sooner than two days later and top the hole off to approximately 17 feet below ground surface;
- Dump two bags of bentonite chips into the hole;
- Dump one bag of cement or concrete into the hole;
- Backfill the final two feet of hole with native vegetation;
- Mark the hole with a piece of HDPE pipe with a metal name plate.

WDEQ-LQD must agree that its inability to locate all holes will not result in the denial of the permit to mine or subsequent mine unit packages.

The commenter states that the re-abandonment effort must be documented in the permit on a hole by hole basis. This request is unreasonable since the work will take place over a number of years as additional mine units are brought into production and the permit will have to be revised accordingly. LC ISR, LLC proposes that the information regarding re-abandonment efforts be documented in the annual reports.

LQD (11/09) - Response not acceptable. Drilling currently taking place in the Battle Springs formation has illustrated the problem with plug gel loss down the hole. The plug gel will fall 100-300 feet, often exposing the water table. If past practices were to inject plug gel to the surface and cap the hole then there is no documentation of the plug gel falling back down the hole. The Tg NOV provides some documentation that historically the holes were left in various stages of abandonment. It can be stated with fair certainty that many of the historic drill holes are open more than a hundred feet below any surface cap, and many of them most likely are in at least the first water table. Ur Energy has made an effort to locate these holes, without much success (only finding 2 out of 20 which were searched). The DEQ will make an independent effort to locate the holes within the first mine unit, with the commitment by Lost Creek to plug them if we find them. (AB)

LC ISR, LLC (2/10) - LC ISR, LLC appreciates the WDEQ-LQD's willingness to assist with this issue. It is important that work on this project begin during the spring of 2010 so the holes can be plugged in a timely manner that does not impact the operations schedule. We look forward to discussing this schedule with you in the coming weeks.

LQD (3/10) - This item is unresolved. (AB)

LC ISR, LLC (6/10) - In the interest of resolving this item for the purposes of the application review, LC ISR, LLC suggests the following language be inserted into the permit as a condition:

> "Prior to injecting mining solutions in a wellfield, LC ISR, LLC will attempt to locate and properly abandon all historic drill holes that may be improperly abandoned within the pattern area. WDEQ-LQD will assist LC ISR, LLC in the process of locating the historic holes. The failure to locate 100% of the holes will

not be the sole justification for LQD denying LC ISR, LLC the ability to mine the wellfield in question."

<u>LQD (7/10)</u> - Item unresolved. Location and abandonment of the historic drill holes within the area of the first mine unit has not been addressed in the field beyond a demonstration of Ground Penetrating Radar. LC is proposing a Permit Condition stating that prior to injection of any mining solution, an attempt will be made to locate the historic drill holes. Failure to locate the holes will not be justification for LQD denying LC to move forward with mining.

From the ongoing discussions on this topic the LQD's understanding has been that the holes within the first mine unit would be located and properly abandoned. A new pump test would then be conducted to determine if there was an improvement in the amount of leakage observed in the overlying and underlying aquifers. If there was no improvement then it would indicate that the leakage was not from the improperly abandoned historic drill holes, but from lack of geological controls. A proposal should be submitted which outlines how this effort will be undertaken, the pump test specs, and how the new test will be correlated to the results of the previous pump test. (AB)

<u>LC ISR, LLC (9/10)</u> – The failure of the WDEQ-LQD to act in coordinating and executing their committed role (see LQD 11/09 comment) to make an independent effort to locate the historic holes during the summer of 2010 leaves the applicant in a difficult position. LC ISR, LLC cannot make the desired demonstration of the relationship of confinement and the historic holes without WDEQ-LQD's appropriate involvement and cooperation.

In the letter of July 28, 2010, from WDEQ-LQD Administrator D. McKenzie to W. Heili (LC ISR, LLC), McKenzie indicated an interest in pursuing issues under permit conditions as long as they are not statutory or regulatory requirements to obtain a permit. LC ISR, LLC believes this item clearly fits within that framework. The permit condition language proposed in LC ISR, LLC's 06/10 response is revised herein to state:

> "Upon receipt of a permit to mine and prior to injecting mining solutions in Mine Unit 1, LC ISR, LLC, with the assistance of WDEQ-LQD, will attempt to locate and properly abandon all historic drill holes documented to be improperly abandoned within the pattern area. In the event that the majority of the identified holes are located and abandoned such that there is an expectation that a definitive conclusion can be obtained from additional testing, a pump test will be performed to determine the effect of the hole abandonment effort. This pump test will be designed to mimic the initial wellfield pump test (length of test, pump rate, wells monitored, and pump rate).
>
> In future mine units, assuming plugging efforts in Mine Unit 1 resulted in a substantial improvement in confinement, an effort to locate and re-abandon historic drill holes will be made prior to the mine unit pump test."

When considering this permit condition, WDEQ-LQD should analyze the level of surface disturbance associated with locating and plugging historic holes prior to the issuance of a permit. Also, WDEQ-WQD recently implemented restrictions on the discharge of pump-test water from in situ projects. These restrictions make pump testing from many wells impossible unless a water treatment system is in place. Therefore, the pump test described above may not be feasible until the Plant and associated water treatment system is in place.

LQD (10/10) - Item unresolved. The Division is in agreement that the effort to locate the drill holes can take place following the permit approval, but prior to the well field activation. However, the commitment to locate, and properly abandon the historic drill holes should be added to the permit document. The text should outline how the holes will be located, and the steps that will be taken to properly abandon them. In addition, the specifications for the follow-up pump test for the first mine unit should be presented. **(AB)**

LC ISR, LLC (11/10) – On November 3, 2010, representatives from LC ISR, LLC and WDEQ met to discuss several outstanding issues including this item (OP-84). LQD stated that this issue would be resolved if the previous language proposed by LC ISR, LLC for a permit condition would be inserted into the application. LC ISR, LLC finds this resolution acceptable and has inserted the language into Section D6.2.2.3 and Section D5.2.4.1.

105) *LQD (1/09) - Section OP 3.6.3.3, Cumulative Drawdown: W.S. 35-11-428(a)(iii)(E) requires an assessment of impacts to water resources on adjacent lands and the steps that will be taken to mitigate the impacts. Section OP 3.6.3.3 should include drawdown projections for all aquifers that could potentially be affected by the operation for the life of the mine, including drawdown maps to illustrate the horizontal and vertical extent of projected drawdown. **(MM)***

LC ISR, LLC (10/09) - The parameters necessary to provide an estimate of drawdown during life of the mine include transmissivity, storativity, net extraction rate, and duration of operation. Transmissivity of the HJ Production Zone has been determined from pumping tests, conducted on either side of the Lost Creek Fault. Because of the influence of the fault, the transmissivity determined from this pumping test is viewed as an 'effective" transmissivity.

A value of transmissivity that is not influenced by the fault can be estimated using the principle of superposition and image well theory (Stallman 1952). The principle of superposition simply states that the total effect resulting from pumping multiple wells simultaneously is equal to the sum of the individual effect caused by each of the wells acting separately. The principle of superposition is commonly used to evaluate well interference problems by summing the drawdown determined using the Theis equation for a homogeneous, isotropic, infinite extent aquifer. Image well theory is used to address hydraulic impacts of a bounded (non infinite extent) aquifer for either no flow or recharge boundaries (Domenico and Schwartz 1990). In the application of image well theory for a no flow barrier, an imaginary well is placed directly across the no flow boundary at an equal distance from the boundary as the pumping well. The image well is assigned a pumping rate equal to that of the real pumping well. Then the drawdown can be calculated at any point within the aquifer (on the side with the real well) by summing the impacts from both the real and image well, using a modification of the Theis equation:

$s = -s_p + s_i = Q/(4\Pi T) \times [W(u)_p + W(u)_t]$

where:

- s is the observed drawdown at any point;
- s_p - drawdown resulting from pumping the real well;
- s_i - drawdown resulting from pumping the image well;
- Q - the pumping rate;
- T - aquifer transmissivity;
- $W(u)_p$ - well function for the real well;
- $W(u)_t$ - well function for the image well;

and:

$(u)_p - r_p^2 S/4Tt$

$(u)_t - r_t^2 S/4Tt$

where:

- r_p is the distance from the pumping well to the observation point;
- r_i is the distance from the image well to the observation point; and
- S - aquifer storativity.

In the case of the Lost Creek Project, image well theory was applied using the drawdown resulting from the LC19M pump test. The pumping well LC19M is located 482 feet from the fault, based on mapped data. An image well was assumed at a distance of 964 from the pumping well, on the other side of the fault. The drawdown at the end of the pump test at three wells were used to back calculate the transmissivity and storativity of the aquifer. The LC19M pump test was run for a period of 8,252 minutes at an average rate of 42.9 gpm. The wells and respective drawdown (at the end of the test) used to solve the Theis equation for transmissivity and drawdown were LC19M (93.32 ft), HJMP111 (35.56 ft) and HJMP104 (36.44 ft). The distance from LC19M to HJMP-111 is 473 ft and from LC19M to HJMP104 is 637 ft. The distances from the image well to HJMP-111 and HJMP-104 are 1,043 and 847 feet, respectively. A series of calculations were performed varying the transmissivity and storativity to find the best fit to the observed drawdown at the end of the test. Results of the effort indicate that a transmissivity of 144 ft2/d and a storativity of 7e-05 provide a very good fit to the data with residuals (difference between the observed and calculated drawdown) of 0.06 ft at LC19M, -1.04 ft at HJMP-111 and 1.00 ft at HJMP-104. Although this calculation does not account for the partial penetration effects of the pumping and observation wells or the minor leakage from overlying and underlying aquifers (as evidenced by the slight drawdown response in overlying and underlying observation wells during the test), it does provide a reasonable estimate of the aquifer properties within the vicinity of Mine Unit 1 (by removing the effects of the fault on the pump test results). Table OP-9 shows the best-fit drawdown calculations. Figure OP-10a shows the location of the wells used to calculate transmissivity with the image well method.

The transmissivity and storativity values 144 ft2/d and 7E-05, respectively were used to predict drawdown at distances of 2 and 5 miles from the centroid of production after 8 years of production and restoration activities, for two scenarios. One case assumes that the impacts of the Lost Creek Fault are negligible at distances of 2 miles or greater. This case is supported by data from site borings that indicate that the Lost Creek Fault appears to extend less than 1 mile on either side of the centroid. The other case assumes that the fault acts as a no flow boundary. The second case assumes that the fault is of infinite extent (which it is not) and all of the production will occur on the same side of the fault (which it will not because the projected mine units are on both sides of the fault). This case would provide a maximum drawdown estimate. For both cases the average pumping rate is assumed to be 89 gpm for the 8-year mine life.

The predicted drawdown at the end of production/restoration operations at an average pumping rate of 89 gpm for the first scenario (neglecting the impacts of the fault) will be 45 ft at 2 miles from the centroid of production and 28 ft at 5 miles. A projection of drawdown at the end of production and restoration under that scenario is shown in Figure OP-10b. Note that the drawdown is less at 2 miles and 5 miles from the Permit Boundary than from the centroid of production which is near the center of the Permit Area. For the scenario where the fault is assumed to be of infinite extent and acting as a no flow boundary, the aquifer is essentially reduced by half and the drawdown is doubled to 90 ft at 2 miles from the centroid of production and 56 ft at 5 miles. A projection of drawdown at the end of production and restoration under that scenario is shown in Figure OP-10c. Note that if the infinite acting fault scenario is utilized, the drawdown would only occur on the side of the fault where pumping is occurring. While the fault will have substantial impacts on localized drawdown in the vicinity of the mine units, the effect at great distance will be noticeably reduced. Therefore, the calculated drawdown using the infinite extent fault should be considered as a worst case (maximum) value These two calculations provide a reasonable bounding limit to the drawdown that can be expected as a result of ISR activities at the projected rates. The drawdown at the 2 mile radius from the centroid of production should be between 45 and 90 ft, and the drawdown at the 5 mile radius should be between 28 and 56 ft.

The depth to water for the HJ Horizon in the vicinity of MU1 is generally 170 to 180 feet. The depth to the top of the HJ Horizon in the same area averages 360 feet. Based on these values, there is approximately 180 to 190 feet of hydraulic head above the top of the HJ Horizon at MU1. Assuming that 150 to 200 feet of head are present within 5 miles of the center of the projected mining, the estimated drawdown from production and restoration should not result in dewatering of the HJ Horizon within that same area. A projection of drawdown at the end of production and restoration is shown in Figure OP-10b.

A calculation of the time required for water levels to recover to pre-mining or near pre mining levels following completion of the ISR project was also performed.

The analysis of recovery is based on the principle of superposition which was described previously. For this case it is assumed that after the pump has been shut down (at the centroid of production), the well continues to be pumped at the same discharge as before and that an imaginary recharge equal to the discharge is injected into the well. The recharge and discharge thus cancel each other resulting in a well that is effectively no longer being pumped. The recovery of the well is measured as "residual" drawdown. Applying the Theis equation to this problem the residual drawdown is

$s' = (Q/4 \quad T)\{W(u)-W(u')$

where

$u = (r^2S)/(4Tt)$ and $u' = (r^2S')/(4Tt')$

where

- s' = residual drawdown in ft
- r = distance from well to observation point in ft
- T = transmissivity of the aquifer in ft2/d
- S' = storativity of the aquifer during recovery, unitless
- S = storativity of the aquifer during pumping, unitless
- t = time in days since start of pumping in days
- t' = time in days since the cessation of pumping in days
- Q = rate of recharge = rate of discharge in ft^3/d

The calculated residual drawdown (in feet) using the equation above for various times at 2 miles and 5 miles from the centroid is shown in the table below.

Residual Drawdown After End of ISR Operations

Distance	Time Since End of Operations			
	1 yr	2 yr	4 yr	8 yr
2 miles	20.5 ft	15.1 ft	10.3 ft	6.5 ft
5 miles	18.9 ft	14.4 ft	10.0 ft	6.4 ft

Average pumping rate of 89 gpm (or 17,134 ft3/d).
Distance measured from centroid of production.

LQD (11/09) - Response partially acceptable. Impacts to the HJ aquifer have been projected to extend well beyond five miles from the permit area. Other aquifers that may be affected must also be addressed. Drawdown maps must be provided to show the extent of projected drawdown in each affected aquifer. All known water resources (wells, lakes, wetlands, springs, etc.) within the projected 5 foot drawdown area must be identified on the maps. Monitoring plans must be presented for monitoring of impacts to these water resources. Actions to be taken to mitigate the impacts must be described. (MM)

LC ISR, LLC (2/10) - Please see Response to Comment V5, RP#5.

LQD (3/10) - Response partially acceptable. A drawdown map is required to illustrate the extent of the five foot drawdown and all of the water resources within that area that may be affected. It is requested that this be a USGS topographic map on a scale of 1"=2,000'. Mitigation measures also need to be addressed. (MM)

LC ISR, LLC (6/10) - Please see Response to Comment RP#5. (See also Comment OP#114.)

LQD (7/10) - Response not acceptable. Comment stands as written. (MM)

LC ISR, LLC (9/10) - Please see response to Comment RP#5.

LQD (10/10) - Response partially acceptable. Revised Plate OP-4 illustrates the potential area of drawdown as well as the water resources that may be impacted within that area. However, the legend on Plate OP-4 is incomplete in that it does not describe the symbols and numbering for the wells or the units (feet) that are used to define the amount of drawdown. The main deficiency at this point is the lack of any discussion of steps to be taken to mitigate impacts to water resources, in particular the Sweetwater pit lake. Definitive commitments are needed in the permit to address the requirements of W.S. 35-11-429 (a)(iii)(E). Please also see Comment RP-5. **(MM)**

LC ISR, LLC (11/10) - LC ISR, LLC has recognized that the estimate of regional hydrologic drawdown previously presented in text in Section OP 3.6.3.3 and associated Plate OP-4 is too conservative and, therefore, is not realistic. Therefore, LC ISR, LLC had a numerical model of the project generated by Petrotek Engineering Corporation. The results of the modeling are presented in Section OP 3.6.3.3 and Section OP 3.6.3.4. Plate OP-4 has also been replaced with Plates OP-4a and OP-4b to account for the model.

The numerical model estimates that the drawdown in the HJ Horizon in the area of the Sweetwater Pit Lake will be less than 5 feet. Given that the Sweetwater Pit Lake is a relatively shallow feature at approximately 220 feet total depth (conversation with Amy Boyle of Lander-LQD), it is unlikely that the HJ Horizon (the top of which is located at 337 feet below the ground surface in well MB-06 in the extreme southwest corner of the Permit Area), which dips at 3 degrees to the northwest, will intercept the pit lake. It is also noteworthy that the pit lake is about 5.5 miles from the center of MU1.

LC ISR, LLC has also added a commitment in Section OP 3.6.3.3 to work with the owner of the Sweetwater Pit Lake to resolve any drawdown greater than 2 feet that can be attributed to operations at the Lost Creek Project. Determination of the cause of pit lake drawdown will be based on a review of all available regional monitor well water levels and stratigraphic cross-sections.

Section RP 4.6 was also revised to reflect the more realistic length of recovery determined by the numerical model.

119) LQD (1/09) - *The operations plan should include a section detailing procedures and a schedule for locating, investigating and properly abandoning all historical drill holes on the permit area.* ***(MM)***

LC ISR, LLC (10/09) - Please see Response to Comment V5, #84.

LQD (11/09) - Response not acceptable. The issue of how to address old abandoned drill holes is one that will obviously require continuing evaluation and discussion. Questions relating to who is responsible for the old holes are irrelevant at this point. We are not blaming LC for the existence or the condition of the holes. We would not be asking LC to plug the holes, except for the fact that LC is proposing an ISL operation on a site that resembles Swiss cheese. ISL operators are responsible for controlling their production fluids and for restoring the groundwater affected by their operations. We believe that the old improperly abandoned drill holes will seriously impair these efforts and thus affect LC's ability to conduct a successful operation. LQD cannot ignore this issue. We acknowledge that locating old abandoned drill holes is problematic and that efforts involving extensive surface disturbance are not desirable. LQD will continue to evaluate information (e.g. pump tests) as it becomes available. It is hoped that we can jointly arrive at a reasonable approach to address the problem. (MM)

LC ISR, LLC (2/10) - Please see Response to Comment V5, #84.

LQD (3/10) - This remains an open item. (MM)

LC ISR, LLC (6/10) - Please see Response to Comment OP #84.

LQD (7/10) - This remains an open item. (MM)

LC ISR, LLC (9/10) - Please see the revised Response to Comment OP #84.

LQD (10/10) - This remains an open item. Lost Creek should outline a plan within in the permit operations plan, including a time schedule, for locating and remediating the historic drill holes within the boundaries of the mine units. It would be acceptable for this work to be accomplished following the issuance of the permit and prior to the start of production. **(MM)**

LC ISR, LLC (11/10) - Please see the Response to Comment OP #84.

FEBRUARY 2010 - LQD COMMENTS, ON THE MINE UNIT 1 APPLICATION, RELEVANT TO THE MAIN PERMIT DOCUMENT

MU1-4) *LQD (2/10) - The following comment was part of the permit application review, and the response from LC indicated that it would be addressed through the Mine Unit Package submittal. Figure OP-2a Site Layout: A much more detailed Mine Plan map will need to be included in the permit. It should indicate all roads, fencing, topsoil pile locations, stormwater diversion structures, chemical storage areas, lay down yards, easements, utilities, pipelines, monitor well locations, air and weather monitoring stations, etc. There should be one comprehensive map that indicates where any surface disturbance or feature is planned. (AB) Figure MU1 1-3 Surface Facilities provides details for the Mine Unit, but greater detail is required as listed below:*

A larger scale map (e.g. 1" = 100')
All pipelines, powerline, roads, fencelines, staging areas, culverts and topsoil stockpiles (some of these are already included)
The proposed layout of the wellfield production and monitoring wells (The Division is interested in how the proposed wellfield layout will address the fault zone)
The wellfield layout should indicate which sand (UHJ, MHJ, or LHJ) is being mined or monitored based on screened interval)
The temporary vs. long term disturbances associated with the wellfield should be distinguished (well pad, header houses, pipelines, utilities)
The primary, secondary, and 2-track roads should be mapped out. (The Division is interested in how the proposed layout will minimize surface disturbances and travel ways) ***(AB)***

LC ISR, LLC (3/10) - As outlined below, LC ISR, LLC believes that the information requested in this comment has been provided to WDEQ-LQD in: the main permit document; the original MU1 application; or the updates to MU1 per these responses. As outlined below, the rest of the information has been provided in as much detail as possible prior to installation of the production and injection wells. Therefore the requested map has not been included with this submittal.

Figure MU1 1-3 provided in the MU1 application shows the locations of the following items:

- The main wellfield trunkline (pipeline);
- Powerlines;
- The fence surrounding the wellfield;
- The main access road, roads located within the wellfield and existing two track roads inside the monitor well ring;
- Staging area;

- Culverts; and
- Topsoil stockpile locations.

There will not be a chemical storage area, weather station, or air monitoring station within MU1.

Figures MU1 5-1 through MU1 5-4, which replace Figures MU1 5-1 and MU1 5-2, provide additional information on the proposed layout of the pattern areas and monitor wells, along with information on which sands are being mined and how the perimeter monitor wells are screened to monitor the those sands. Additionally, a discussion of the proposed pattern layout, which addresses monitoring across the Lost Creek Fault through the use of overlying and underlying monitor wells, has been added to Section 5.2.1 of the MU1 Application.

The information that has not and cannot be provided prior to the actual installation of the production and injection wells is the layout of travel ways within the pattern areas. The travel ways used for the construction and operation of the mine unit will be developed in accordance with the guidance provided in Section OP 2.6 (Roads) of the main permit document. This type of detailed information has never been presented in a mine unit package, before the wells are installed, simply because it is not possible to determine this amount of detail until the work begins. At that time, the engineers and geologists, actually walk the pattern area and stake well locations based on the most up-to-date surface and subsurface information. Even as the wells are installed, the information obtained from the early wells may influence the locations of the later wells. For this reason, LC ISR, LLC presented a generic wellfield layout on Figure OP-6b of the main permit document.

A discussion of topsoil management, which includes long-term and short-term topsoil protection, is provided in Section OP 2.5 (Topsoil Management) of the main permit document. Also, a discussion of vegetation protection during wellfield construction is provided in Section OP 2.7 (Vegetation Protection and Weed Control) of the main permit document. The amount of topsoil disturbance for the facilities shown on Figure MU1 1-3 is provided in Table MU1 3-1 of the Mine Unit 1 Application and is allocated by short-term and long-term stockpiles. Also provided in Table MU1 3-2 of the Mine Unit 1 Application is the amount of vegetation disturbance for the facilities shown on Figure MU1 1-3.

LC ISR, LLC will not construct a sedimentation pond or other permanent structures as sediment control measures for MU1. LL ISR, LLC will use alternate sediment control measures in accordance with WDEQ-LQD Guideline #15. Since the area surrounding the mine site is relatively flat-lying, LC ISR, LLC will use sediment control features such as silt fences and hay bales appropriately placed for erosion control. The locations of these sediment control units will be determined during construction.

<u>LQD (4/10)</u> - Response not acceptable. Due to potential changes in the as-built lay out of the well field during construction, the operator is reluctant to provide the level of detail requested. Much of the layout indicating soil and vegetation disturbance is outlined in Figure OP -6b. This schematic does not provide a true picture of the disturbed area within a typical pattern area. Please revise the schematic to show the total disturbance associated with each drill site, not just the mud pit. In addition, the trench layout is shown as a line on the drawing yet the actual width of disturbance associated with a 3' wide trench is more likely 20' wide. (given a 3:1 angle of repose for the topsoil and subsoil piles, as opposed to vertical). The actual footprint of these disturbances should be indicated on a revised Figure OP-6b and the square footages and percentages of disturbance re-calculated.

The attached site map (enclosure) of Mine Unit One is representative of the disturbance prior to any header houses, roads or pipelines and is indicative of how significant the surface impacts will be. Although long and short term disturbances are broken out separately on Figure OP-6b, the reality is that even the short term disturbances will have long term impacts due to the time it takes to reach reclamation success.

The 1"=100' map indicating the proposed lay out of the well field and the disturbances associated within the wellfield is still requested. In addition to the proposed wellfield layout, the existing disturbances caused by the exploration holes will also need to be indicated on the map. This map will need to also include the fencing around the large staging area, and the 2-track around the monitor well ring. In addition, the current staging area on the eastern part of the mine unit already appears to have approximately an acre or more of disturbance, far greater an area than that depicted on Figure MU1 1-3. The justification for this was presented in the March 11, 2010 clarification of comment letter. The as-built version of this map will then need to be included in the Annual Report each year. (AB)

<u>LC ISR, LLC (6/10)</u> - The original intent of Figure OP-6b was to show how operations will be designed in a generic sense. In fact, the actual wellfield layout will not be as symmetrical as that shown in the figure. Given the size of the equipment used, current state of knowledge and the density of drilling, it is impossible to define at this point in time where all disturbance will be other than to say that disturbance from construction and operations will be limited generally to the pattern area and utility routes.

Pursuant to guidance provided by LQD during several meetings and correspondence, LC ISR, LLC commits to maintaining the level of total disturbance from construction and operations to less than 50% of the area within each respective mine unit monitor ring. For example, the area within the monitor ring boundary of Mine Unit 1 is 212.8 acres while the entire proposed pattern area, including isolated areas where no wells are planned, covers 45.6 acres. Therefore, if 100 percent of the proposed wellfield pattern area is disturbed (including isolated areas where no wells are planned), the disturbed area will only equate to 21% of the area within the monitor well ring. It is worth pointing out that if LC ISR, LLC applied conventional open pit mining techniques, the area of the

Mine Unit 1 pit would be on the order of 200 acres plus a few hundred acres of overburden piles and tailings. It is unclear why LQD continues to require such fine detail for this ISR permit to mine when LC ISR, LLC has already made significant commitments to minimize disturbance.

LC ISR, LLC recognizes there are two types of disturbance associated with mine unit construction and operation. Those disturbances that are transient (temporary, minor) in nature and those disturbances that are long-term and repetitive in nature. Examples of transient disturbance include: drill pits; pipe lines; two-track roads; off road vehicle traffic, power-line installation; and installation of fences, Examples of long-term disturbance include: primary and secondary roads; header houses; and lay-down areas. Any time excavation or long-term disturbances are planned, topsoil will be properly segregated and stored until reclamation (Sections OP 2.5 and RP 4.5). Interim vegetation will be established if native vegetation is damaged during construction or operational activities (Section OP 2.7). Regardless of the nature of the disturbance, transient or long-term, all disturbance will be reclaimed during decommissioning of the area.

LC ISR, LLC believes that the long-term removal of topsoil in areas with transient disturbance would create significant problems with interim stabilization of subsoil, which in turn would result in challenges with airborne particulate and sediment loading of drainages. LC ISR, LLC understands LQD's concern with topsoil compaction but the sandy nature of the topsoil at Lost Creek will minimize compaction. LC ISR, LLC believes the most protective method for soil management, related to transient disturbances, is to leave the topsoil and root systems in place. This is consistent with current practices at existing ISR facilities in Wyoming as well as direction from a previous WDEQ Director (Dennis Hemmer letter to PRI, September 14, 1998).

In light of the above discussion, as well as clarification letters from LQD, LC ISR, LLC does not propose to amend Figure MU1 1-3 at this time as originally requested in the February 2010 comments from LQD. The response to item 5 should also be reviewed in response to this item. LC ISR, LLC would like to hold additional conversations with LQD with regard to revising Figure OP-6b and inclusion of a 1"=100' map.

LQD (7/10) - *This item is unresolved pending further discussion. (AB)*

LC ISR, LLC (9/10) - A new figure (Figure OP-6c) has been added to provide a more detailed presentation of the topsoil disturbance within the wellfield. Figure OP-6b shows the installation of lateral pipelines with the aid of a backhoe; however, LC ISR, LLC reserves the right to use a trenching device to install lateral lines from the wellheads to the header house. The use of a trencher will result in significantly less disturbance than that shown in Figure OP-6b.

Table OP-2 and Plate OP-1 describe in great detail the location of topsoil and vegetation disturbance as required. It is not possible at this time to provide any more detail than that already provided.

The information requested regarding the location of exploration disturbance and the location of the Mine Unit 1 monitor well ring road are new information requests beyond the completeness period and therefore should be retracted to comply with Wyoming Statute 35-11-406(e). Portions of the disturbance did not exist at the time the application was reviewed and determined to be complete. The current level of exploration disturbance occurred under WDEQ-LQD approval and review of DN334. LC ISR, LLC commits to providing a revised site map with each annual report that shows all existing disturbance in great detail.

LQD (10/10) - This item is unresolved. The Division agrees that during construction essentially 100% of the pattern area will be impacted by either excavation, or compaction. Through conversation with John Cash it was ascertained that the intent of the company is to reestablish vegetation across the pattern area following the wellfield construction. This is reflected in the disturbed acreages tabulated in Table OP2.2, Section OP2.7 Vegetation Protection and Weed Control, and Section RP4.5.2, Surface Replacement and Revegetation, Surface Preparation. In addition, LC ISR, LLC has agreed to revise the title of Figure OP-6b to reflect that the Vegetation and Soil Impacts shown are due to excavation and do not account for the added impacts from compaction. The figure should also drop the Typical Drill Pit layout schematic, since this is superseded by Figure OP 6c. Please submit a revised Figure OP-6b. **(AB)**

LC ISR, LLC (11/10) – As requested, the title to Figure OP-6b has been revised.

MU1-6) *LQD (2/10) - Neither the mine permit application nor this first mine unit package provide a thorough assessment of the projected impact of the operation on regional water resources or plans to mitigate such impacts. Please reference comment no. OP-105 from the 11/20/09 review (W.S. §35-11-428(a)(ii)(B) and W.S. §35-11-428(a)(iii)(E)). Additionally, WDEQ/LQD Non Coal R&R's Chapter 11 Sec 4(a)(x)(F) requires the following to be provided in the Mine Unit Package: Expected changes in pressure, native groundwater displacement, direction of movement of injection fluid and a drawdown projection, including a map, which describes the extent of groundwater drawdown in the ore zone aquifer for the life of the first wellfield, through restoration. And the MU 1 package must address the ROI in overlying and underlying aquifers. Several comments in this review have addressed portions of these requirements. However, LQD expects the entire suite of requirements in Chapter 11, Sec 4(a)(x)(F) and W.S. §35-11-428(a)(ii)(B) and W.S. §35-11-428(a)(iii)(E)to be addressed in the MU1 Package.18* ***(MM, BRW)***

LC ISR, LLC (3/10) - Per the discussion during the February 25, 2010 meeting between WDEQ-LQD and LC ISR, LLC, LC ISR, LLC believes the Response to Comment V5, RP#5 and the associated changes to Section OP 3.6.3.3, submitted in February 2010, address this comment as well. LQD will review that information in relation to this comment.

LQD (4/10) – Response partially acceptable. The reviewers will await acceptable responses to Master Permit Comments OP-111 and RP-5. (BRW)

LC ISR, LLC (6/10) – Please refer to Responses to Comments OP #111 and RP #5.

LQD (7/10) – Response not acceptable. Please see Comment RP-5. (BRW)

LC ISR, LLC (9/10) – Please see the response to Comment RP #5.

LQD (10/10) – Response partially acceptable. Please see Comment RP-5. **(BRW)**

LC ISR, LLC (11/10) – Please see the response to Comment OP #105.

MU1-20) *LQD (2/10) - Please describe how water level monitoring data will be collected and evaluated in the various operational situations. For example:*

e) *Section 5.1.3 (page MU1-25) states: "Sudden increase in water levels in overlying and underlying aquifers may be an indication of casing failure in a production, injection or monitor well." Are there other possible explanations, such as improperly plugged drill holes? Please describe the likely scenarios and how these will be addressed if increases in water levels are detected.*[5,13,21] ***(MM, BRW)***

LC ISR, LLC (3/10) - LC ISR, LLC does not believe that a sudden increase in water levels in overlying and underlying monitor wells would generally be caused by an improperly plugged drill hole. It is more likely that steady increases in water levels would occur due to an improperly plugged borehole. Therefore, LC ISR, LLC believes that the only credible scenario that would result in a sudden increase in water levels is a casing failure in a production, injection or monitor well. Increased water levels in overlying and underlying monitor wells, regardless of perceived cause or how suddenly it occurred, would result in an investigation to determine the cause. Please see Section 1.2.3 of Attachment OP-2 for a response to changes in water levels in overlying and underlying monitor wells.

LQD (4/10) - Response not acceptable – LC has provided several courses of action that maybe implemented to reverse water level changes that indicate that the potential for excursion exists. All of the procedures presented appear to be valid approaches to rectify the problem. The reviewers realize that there are a host of potential causes to water level rise and there is some "trial and error" associated with rectification, but it would seem that a more systematic approach to the solution would make the most sense. In other words, a particular condition is the most common cause of problems with water level rise, so this becomes the starting point for the effort. Please take the solutions presented in Section 1.2.3 of Attachment OP-2 and develop a systematic approach for the remediation of changes in water levels. Please also see Comment #20b. (BRW, MM)

LC ISR, LLC (6/10) - The attached flowsheet details the typical process involved in evaluating water level changes in the monitor well ring. This will become part of Attachment OP-2 when it is resubmitted. (See also Comments MU1-11, MU1-20b, MU1-24, and MU1-33).

LQD (7/10) – Response partially acceptable. The reviewer awaits the submittal of a revised Attachment OP-2 before making a final determination. Please note, the reviewer has looked at the attached flow chart that is to be incorporated into the revised Attachment OP-2. As the reviewer believes was stated in meetings and other correspondence, the WDEQ/LQD has a problem with using the term "significant change". It is understood that there is variability in the wellfield and 0.75' feet of change in a given well may be substantial and require attention while 3.5' of change in another be attributed to background noise and not a major cause for concern. Thus, there is no enforceability with this terminology, which is not acceptable, and conversely it is understood that utilization of a single prescribed value, such as 4.0' feet is not realistic. Perhaps a better way to look at the subject is in terms of baseline water surface elevation because once baseline elevation is exceeded then there is the potential for production fluid to migrate. Please, consider the above in the rewrite of Attachment OP-2. (BRW)

LC ISR, LLC (9/10) – The updated Attachment OP-2 is included with this submittal. Please see Response to Comment OP-99 for a summary of the changes to the attachment.

The inspectable or enforceable components associated with monitor well sampling are not the water levels, but are the chemical constituents detailed in Section 5.1.3 of the MU1 Application.

As stated in Attachment OP-2, the water level data are a tool that may indicate pattern imbalance, fluid migration or mechanical integrity issues. Use of these data allows adjustments to operational activities and flow rates to reduce the possibility of an excursion.

LQD (10/10) – This item is unresolved. The revised Attachment OP-2 does provide additional clarity in regards to engineering controls, however more rigorous and definitive "action levels' are needed in regards to monitoring and controlling water levels. Lost Creek states in section 1.2.3 and 1.3.1.5 that a 10 foot rise in water level above background that continues for more than one sample cycle in a monitor well would trigger a response. This seems excessive given that the operation is designed to create and maintain a cone of depression towards the wellfield in order to prevent excursions. Any rise in water level in a monitor well above baseline should be viewed as a red flag since this would represent a gradient away from the wellfield. Please tighten up this action level. A rise of more than one foot would seem to be cause for concern and definitely a reaction should not wait two weeks until the next sample cycle. **(MM)**

LC ISR, LLC (9/10) – Pursuant to an email from Mr. Mark Moxley dated November 5, 2010, the action levels presented in Attachment OP-2 are acceptable thus resolving this item.

MU1-22) *LQD (2/10) - Section 5.1.4: This section explains that the monitoring well ring distance was chosen to be 500' in the fall of 2008 because it was considered industry standard. Subsequent to the construction of the monitor well ring, the November and December 2008 pump tests were conducted. The results of the pump tests showed a minimum ROI after two days of pumping of approximately 2,600 feet (North Pump Test). The conclusion was essentially that any ROI greater than 500 feet would render the 500' monitor well ring viable. However, Guideline 4 asks that the location of the monitoring wells be based on gradient considerations, dispersivity of recovery fluids, the initial excursion recovery measures employed by the operator, the normal mining operational flare, and the recoverability with the allowable regulatory time frame. Monitor well locations should be based on a groundwater flow model or other technically justified methods. Please provide a scientific, site specific justification for the monitor well spacing.* ***(MLB, AB)***

LC ISR, LLC (3/10) - As discussed in Response to Comment MU1 #9, installation of the monitor well ring, including well spacing, was discussed with LQD staff during a meeting on June 25, 2008. The approval to install the monitor wells was received and bond posted prior to installation (see Update 3 of DN334 which was approved on May 14, 2008 in a letter from Don McKenzie). Approval of the plan was included with the approval of the Revision to Update 4 for Drilling Notification No. 334DN which was received on October 23, 2008. Therefore, based on this approval, the perimeter monitor wells were installed. At that time, two regional pump tests had been conducted; therefore, information on aquifer characteristics and anticipated well responses was available.

The MU1 pump tests confirm that the well spacing is appropriate in that all of the wells responded to pumping, as discussed in Response to Comment MU1 #16. (In some cases, the response was greater than required for other ISR operations.) Based on the discussion in Section 5.1.4 of the Mine Unit 1 Application concerning the radius of influence and the lack of the influence on groundwater flow due to paleochannels within the HJ Horizon LC ISR, LLC believes that the spacing of the monitor wells is appropriate for MU1.

LQD (4/10) - Response not acceptable. The LQD refers LC personnel to LQD's clarification letter dated March 11, 2010 with regard to the pertinence and applicability of LQD's approval of revisions to DN 334 as a mechanism for approval of monitor well ring wells. LC is directed to the original question which, restated, is as follows: Please *provide a scientific, site specific justification for the monitor well spacing. The justification should include Guideline 4, Section III C, 5(b), requirements listed above in the original comment. (AB and MLB)*

LC ISR, LLC (6/10) – Pursuant to the results of the May 6, 2010 meeting with the LQD Lander Field Office, LC ISR, LLC is currently assembling a model to support the placement of the monitor wells. The results of the model were not finalized at the time this response was submitted but will be provided as soon as possible.

LQD (7/10) – Item unresolved. Rationale was presented to the LQD during a July 6, 2010 meeting in Lander. A series of Figures showing the location of the wells relative to each of the ore zones in the four sands within the HJ horizon. These figures explain the geometry of the well spacing and are still under review. Beyond this demonstration, there will need to be a presentation of the scientific basis for the 500 feet based on hydrologic conditions, and not just because it is the 'industry standard'. As stated in the original comment, "the location of the monitoring wells must be based on gradient considerations, dispersivity of recovery fluids, the initial excursion recovery measures employed by the operator, the normal mining operational flare (the lateral and vertical extend of affected area under normal operating conditions), and the recoverability with the allowable regulatory time frame. Monitor well locations should be based on a groundwater flow model or other technically justified methods. Please provide a scientific, site specific justification for the monitor well spacing."

During a July 20th meeting between DEQ and EPA to discuss the approach for an aquifer exemption, the EPA continued to emphasize that there must be a scientific basis for the aquifer exemption boundary. It was conveyed that the monitor well ring location has a scientific basis, yet that information still needs to be presented for this application. Once presented those hydrologic parameters may then be utilized for establishing the aquifer exemption boundary.

Beyond the Monitoring Well Ring spacing of 490-500 feet, the LQD has ongoing concerns regarding the screened intervals of the wells. As conveyed during recent discussions, the LQD ideally would like each of the four sands monitored individually. This is based on the way the HJ horizon has been presented as having four discrete sand horizons, splitting rather than lumping the HJ aquifer. Screening across discrete multiple sands creates the potential for cross contamination; dilution of a plume limiting its detection; the inability to determine the source of the plume; and the misrepresentation of each horizon in the sample depending on the pump location down the well. The LQD and WQD are still discussing this issue internally. (AB)

LC ISR, LLC (9/10) – This response will be forthcoming in the Mine Unit 1 responses based on communications with WDEQ.

LQD (10/10) – Item unresolved. This item will be deferred to the Mine Unit 1 review. **(AB, MLB)**

LC ISR, LLC (11/10) – A response to this item will be deferred to the Mine Unit 1 review as stated above by LQD.

MU1-33) *LQD (2/10) - Attachment MU1 2-1, Section 8.0, Summary and Conclusions, Bullet 3: In the third bullet in the list in this section, it is concluded that despite the hydraulic connectivity revealed during the North and South Pump tests conducted in late 2008, that engineering practices have been used at other ISR operations with similar subsurface conditions to prevent lixiviant from entering overlying and underlying aquifers.*

Merely stating that "engineering practices" will be employed to protect the overlying and underlying aquifer from lixiviant is not sufficient to demonstrate that the overlying and underlying zones will be protected. W.S. §35-11-406(m)(v) states that a permit shall not be denied except for... (one or more of)... the following reason(s):

If the proposed mining operation will cause pollution of any waters in violation of the laws of this state or of the federal government;

To achieve the end of demonstrating that the overlying and underlying aquifers at the Lost Creek project will be protected from pollution in the form of lixiviant during ISR mining operations, LC ISR must provide a detailed groundwater model showing exactly how lixiviant will be controlled by engineering practices. This discussion must be very specific and should include volumes anticipated to be lost to the upper and lower aquifers (based on the pump tests) and pumping rate calculations projected through the life of the operation including unexpected down time from pumping. That is, this discussion must include more than merely a commitment to maintain a "bleed" on the operation. ***(MLB)***

LC ISR, LLC (3/10) - Per the discussion during the February 25, 2010 meeting between WDEQ-LQD and LC ISR, LLC, Attachment OP-2 (Summary of Engineering Controls) has been added to the main permit document. The focus is to identify: the specific practices (e.g., water level measurements); the operational limits (e.g., whether the rate of change in a parameter is of concern or an upper or lower limit); and the responses.

LQD (4/10) - Response not acceptable. The addition of Attachment OP-2 (Summary of Engineering Controls) does not adequately addresses concerns regarding control of production fluids. Chapter 11, section 10(a)(iii) and 11(d) require that the applicant demonstrate that mining fluids can be controlled and that movement into unauthorized zones (excursions) will be prevented. Simply monitoring to detect excursions is not adequate to control or prevent the movement of fluids out of the ore zone. Lost Creek has the burden of showing how the operation will be conducted to prevent excursions. It appears that Lost Creek is relying on the monitoring wells outside of the production zone as their primary source of operational data for managing the wellfield. Chapter 11 section 14.(a)(iii)(A) requires semi-monthly monitoring of the fluid levels in the production zone, yet there is no discussion of this in Attachment OP-2. Given the *marginal ore zone confinement at this site, it is appropriate for LC to directly monitor the water levels in the production zone. There are 13 existing MP wells in the production zone that would serve this purpose. It is requested that these wells be included in the monitoring program.*

Attachment OP-2, Summary of Engineering Controls, does not provide sufficient detail as to how the wellfield operations will be managed to prevent excursions. Figures OP-A2-1 and OP-A2-2 show examples of "mounding" conditions in a monitor ring well. An approximate 6 foot rise in water levels is shown in a time plot chart and in a monitor ring "rose" chart. Such examples are helpful but much more discussion is needed. There is no discussion of how and when such charts would be prepared and evaluated. The monitor wells are only sampled on a twice-monthly basis. There is no discussion of what would be considered significant water level changes (hopefully something less than 6 feet) that would trigger operational adjustments. There is no discussion of what operational measures would be taken as a result of these examples.

The "rose" charts would be more useful if the charts were presented on a somewhat larger scaled map of the wellfield rather than a circle as shown on Fig. OP-A2-2. This would also allow for data for the interior wells to be plotted, giving a more complete picture of the water level status in and around the wellfield.

The use of observation wells and permanent piezometers has been mentioned but no specific plans are provided for their use in mine unit #1. Much more specificity is required to demonstrate how Lost Creek will control their wellfields, aside from maintaining a bleed. (MM, MLB)

<u>LC ISR, LLC (6/10)</u> - LC ISR, LLC is expanding the information in Attachment OP-2. The results of this effort were not finalized at the time this response was submitted but will be provided as soon as possible. (See also Comments MU1-11, MU1-20b and 20e, and MU1-24).

<u>LQD (7/10)</u> – This item is unresolved. LQD awaits the submittal of the revised Attachment OP-2 in order to adequately review LC's response to this comment. (MLB, MM)

<u>LC ISR, LLC (9/10)</u> – The updated Attachment OP-2 is included in this submittal. Please see Response to Comment OP-99 for a summary of the changes to the attachment.

LQD (10/10) – Response partially acceptable. The revised Attachment OP-2 should incorporate more definitive "action levels" or "triggers". Revisions were suggested in terms to how the "rose diagrams" are presented (i.e. on a scale drawing of the wellfield). **(MM)**

LC ISR, LLC (11/10) – Pursuant to an email from Mr. Mark Moxley dated November 5, 2010, the action levels presented in Attachment OP-2 are acceptable thus resolving this item.

NOVEMBER 2010 - LQD COMMENTS, ON THE MINE UNIT 1 APPLICATION, RELEVANT TO THE MAIN PERMIT DOCUMENT

During the meeting with the applicant on November 3, 2010 in Cheyenne, the reviewer agreed to re-review the above comments and providing additional clarification. These comments center on the operator's plans for monitoring water levels in the well-fields, specifically as outlined in Attachment OP-2, Summary of Engineering Control.

A revised Attachment OP-2 was provided by the applicant on October 27, 2010. Section 1.2.3 discusses water levels. The second paragraph on page 5 contains the following revised language:

"Water level changes greater than 10 feet will be promptly investigated in order to determine the cause of the change and if corrective actions are warranted to prevent an excursion. Water level changes of this magnitude are significant enough to warrant an investigation without the need to see if the trend continues during the next sampling interval. If monitoring well data indicate that baseline water levels have been exceeded, an immediate investigation will be implemented."

These two commitments are reasonable and acceptable, however there is a need for some additional clarification and supporting information, as follows:

NC 51) *The decision tree in Figure OP-A2-5 does not reflect these commitments/action levels and should be revised to incorporate them.* ***(MM)***

LC ISR, LLC (11/10) - Figure OP-A2-5 has been revised to include the action level (10 feet) and water level increases above baseline.

NC 52) *There are statements in sections 1.2.3 and 1.3.1.5 that are not entirely consistent with the above commitments, requiring for example that the 10' water level increase be observed in a subsequent sampling event before action would be taken. Please revise for clarity.* ***(MM)***

LC ISR, LLC (11/10) - The language in Attachment OP-2 Section 1.2.3 and Section 1.3.1.5 has been revised to clarify that a ten-foot change in water level will cause the initiation of an investigation.

NC 53) *Please provide a commitment to include the baseline water levels in the water level graphs for all monitor wells and revise the example in Figure OP-A2-1 to reflect the baseline water level for this well.* ***(MM)***

LC ISR, LLC (11/10) - As requested, the baseline water level will be included in the water level assessment graphs for all types of wellfield monitor wells. The example in Figure OP-A2-1 has been revised to reflect the baseline water level for this well. These reviews will typically be performed electronically.

NC 54) *Please provide a commitment to include a line showing the baseline water levels in the well-field rose diagrams and revise the example in Figure OP-A2-2 to reflect baseline water levels.* ***(MM)***

LC ISR, LLC (11/10) - As requested, the baseline water level will be included in the water level assessment graphs for all types of wellfield monitor wells. The example in Figure OP-A2-2 has been revised to reflect the baseline water levels. These reviews will typically be performed on a computer monitor and not on paper.

NC 55) *Please describe a procedure (for example; using a rose diagram) for tracking water levels in overlying and underlying monitor wells and provide an example.* ***(MM)***

LC ISR, LLC (11/10) - Section 1.2.3 of Attachment OP-2 has been revised to include a commitment to use standard line plots to assess the long-term trends of overlying and underlying wellfield monitor wells. Figure OP-A2-1 provides an example of how the water levels in overlying and underlying monitor wells may be tracked. These reviews will typically be performed on a computer monitor and not on paper. Rose diagrams will not be used for overlying and underlying monitor wells because the distribution of the wells would not be appropriately shown on the plot.

NC 56) *Please consider using a scale drawing of the well-field for the rose diagrams (i.e. an elongated oval as opposed to a circle) as previously suggested. It is the reviewer's opinion that such a representation would be easier to understand by all parties.* ***(MM)***

LC ISR, LLC (11/10) - LC ISR, LLC has reviewed the capabilities of Microsoft Excel and found that Rose Diagrams cannot be scaled as requested. Despite the inability to scale the plots, LC ISR, LLC believes they will still be a useful tool for assessing water balance.

RECLAMATION PLAN

JANUARY 2009 - LQD COMMENTS ON THE MAIN PERMIT DOCUMENT

5) *LQD (1/09) - Please provide a hydrologic impact assessment (surface and ground water) of the final anticipated conditions. This should include recovery times ground water, potential changes in water chemistry, etc.* ***(BRW)***

LC ISR, LLC (10/09) -

Surface Water
As discussed in Appendix D6, Section D6.1.1, all of the surface water features at the site are ephemeral and relatively small. The only anticipated temporary impacts to the surface water system during operations may occur along roads, where it may be necessary to route drainages through culverts under the roads (Section OP 2.6) or route runoff around facilities (Operations Plan Attachment OP-4). These features should not affect flow rates or water quality because: of the low relief across the site and the limited surface water flows; only the drainage pattern in the immediate vicinity of the roads and structures may need to be altered (if at all); the culverts will be appropriately sized; and any disturbances associated with installation of the structures will be reclaimed immediately after installation (Section OP 2.7). The Stormwater Pollution Prevention Plan also has provisions for evaluating construction impacts and unanticipated impacts such as spills. Provisions for spill detection and response are also addressed in Section OP 2.9.

Once reclamation of the site is completed, no permanent impacts to the surface water system are anticipated. As discussed in Sections RP 3.0 and 4.0 of the Reclamation Plan, all of the surface facilities are scheduled for removal and reclamation. The landowner (BLM) could request that a road (and associated culverts) be left in place, which may mean a permanent change to the drainage pattern. However, by that time, any potential problems with the function of the culvert(s) should have been detected and repaired. As noted above, any spill-related impacts will be addressed at the time of the spill.

Groundwater
Please see OP 3.1 and Response to Comment V5, OP#105.

LQD (11/09) - Response not acceptable. While the reviewer admits there will generally be no measureable impacts to the surface water drainage system as described in the text above. However, the reviewer could not find the summary discussion provided as a response within the application text. The permanent postmine impoundment at the

Sweetwater Mill, whose source of supply is the Battle Springs aquifer, is not that far away from the proposed operation. There is no mention as to what impacts, if any, the project drawdown may have on this facility.

Regarding ground water, LC has provided some information in response to Comment OP #105. The majority of the response provided information could not be found in the application text. As requested, please provide maps that illustrate projected areal extent of five or more feet of drawdown. Please provide an estimated recovery time and include the methodology used to make the calculation. While the reviewer understands that wells within one-half mile of the projected disturbance will be plugged and abandoned, there are several wells, some of which are assumed to serve as stock water supply, that are outside one-half mile radius, but easily within two miles of the permit area boundary. No assessment has been provided regarding the potential impacts to these wells, nor a commitment to replace if the well is impacted. Please make the appropriate revisions to the application text and also see the response to Comment OP #105. (BRW)

<u>LC ISR, LLC (2/10)</u> -

<u>Surface Water</u> -
Section OP 2.11 was renamed and the discussion from the above response on the limited operational impacts to surface water has been incorporated into Section OP 2.11.1. The discussion from the above response on the limited reclamation impacts to surface water was incorporated into Section RP 4.5.2.

<u>Ground Water</u>
The discussion in Section OP 3.6.3.3 was updated in response to the above comment.

Ground water recovery rates are discussed in a new Section RP 4.6.

With respect to the BLM wells, please see Comment V2, D6#30, which was resolved as of December 2009 (letter of December 21, 2009 from A. Boyle (WDEQ-LQD) to J. Cash (LC ISR, LLC). As part of that resolution, monitoring of the wells was added to Attachment OP-8 and a replacement commitment was added to the last paragraph of Section D6.3. A cross-reference to that commitment has been added in Section 2.11.2.2.

LQD (3/10) – *Response not acceptable. Thank you for adding a section to address Cumulative Hydrologic Impacts to mining. There are some incorrect references on page OP-57; the references should be Section D6.3 and Plate D6-6A rather than Section OP 6.3 and Plate OP-6A. Two approaches are presented for analyzing drawdown within the production zone (HJ Snad): (1) Darcy Strip, and (2) Theis Analysis and both approaches have their limitations. The reviewer performed independent calculations using the Theis approach and produced estimates similar to those presented in the text.*

The reviewer understands that the aquifer should be dewatered by the proposed operation, rather that there should only be a decline in head. Therefore, in theory, no impact should occur to surrounding wells. Because the formation in which the wells in the surrounding area is unknown, not to mention pump elevation and capability, there could be an impact to well production. Figure OP-10B is not adequate to represent areal extent of potential impacts as the location of the surrounding water resources is not illustrated. Please provide a map similar to Plate D6-1B that illustrates areal extent of drawdown as it relates to adjacent water resources.

The reviewer admits the areal extent of the estimated / measured five-foot drawdown associated with mining activity will be limited. A much greater impact will be associated with the water supply needs for various operations at the mine. The predictions provided use the estimated transmissivity and storativity values for HJ sand as a means of predicting impact. The reviewer questions why this was done when transmissivity estimates for the FG sand (e.g., approximately 300 gpd/ft) and KM sand (e.g., approximately 550 gpd/ft) are available. Based on actual data, the estimates for areal extent of drawdown are less than predicted. Please revise the text and estimates in Section 3.6.3.4 to reflect, to the degree possible, the available aquifer test analysis results. (BRW)

<u>LC ISR, LLC (6/10)</u> - The response has been broken down into its major components, (numbered (a), (b), and (c)) to allow for more concise answers. (See also Comments OP#105 and OP #114.).

c. <u>LQD (3/10)</u> - 3rd paragraph - The transmissivity used for the drawdown assessment for the water supply wells was the most conservative of the available values, and it was easier to run all the calculations with the same number. As noted in the above response, LC ISR, LLC has committed to sampling the water supply wells of concern outside the permit boundary and working with BLM to ensure the water supplies from those wells are not interrupted. Therefore, it is not clear what benefit would be gained from running the calculations with less conservative numbers.

<u>LQD (7/10)</u> – Response not acceptable. A telephone conversation was held (between LQD and Petrotek personnel) regarding this comment. LC's response to this comment is contrary to what transpired during that telephone conversation. Some time ago the reviewer agreed not to require LC to go through an extended modeling exercise using a two-dimensional ground water model such as Visual Modflow. Rather, LC could take a much simpler approach to prediction of ground water impacts using Big-Well Theory (Theis analysis). The reviewer recognized and conceded that predictions would be conservative because there is no accounting for recharge.

The map provided, Figure OP-10b, is not acceptable as it represents nothing more than a plane floating in space. In other words, there is no attachment to the Public

Land Survey System or if the grid provided actually represents a known and accepted coordinate system. There is no identification of other water resources in the area that maybe potentially impacted.

Specific to comments made regarding sands other than production zone and the potential impacts of the water supply wells; again the response is not acceptable. Sometime ago, the reviewer agreed not to push for performing multi-well test on those aquifers above and below the production horizon, the purpose of which was to completely characterize each of these aquifers. Estimates of transmissivity values for both the FG and KM horizons are available from earlier single well pump tests completed by Hydro Engineering, yet were not even mentioned in the text. LC's response was "it was easier to run all the calculations with the same number". This is an unconvincing line of reasoning for not performing a relatively simple calculation. While the reviewer acknowledges that the results produced by the generic calculations are more conservative, some mention should be made concerning actual data. Please see the original comment (LQD 3/10) and make the appropriate revisions/updates to the text and mapping. (BRW, MLB)

LC ISR, LLC (9/10) – Figure OP-10b has now become Plate OP-4 and has been revised to include surface topography, surface water features and identification of water wells within the area of interest. The Sweetwater Pit is also indicated on the plate. Wells are identified by numbers that are cross referenced to Table D6-12b.

The estimates of drawdown from pumping of water supply wells during ISR operations at the Permit Area have been recalculated using transmissivity estimates provided in the Permit Application for the FG and KM Horizons. In addition, Section OP 3.6.3.4 has been revised.

LQD (10/10) – Response partially acceptable. The plate provided by LC and revised text are partially acceptable. The Plate's legend is incomplete as there is no identification of the symbols and "numbers" used to identify the wells. Please provide a "sticker" with these items that can be affixed to the map under the Legend Heading that identifies the remaining symbols utilized on the map.

Second, plate indicates 20+ feet of drawdown in the vicinity of the Sweetwater Pit Lake, which is an approved postmine feature. Water quality samples collected to date indicate that it has and continues to meet class of use standards. Pumping of the pit ceased in 1983 and reached "steady-state" conditions in late 1995. Over the next 15+ years, the fluctuation in water levels has been approximately two feet. As a result wetlands have become established along the pit lake's shoreline.

The reviewers recognize that the Theis analysis utilized is extremely conservative as there is no recharge consideration. Thus, the likelihood that 20+ feet of drawdown would ever be observed in the vicinity of the Sweetwater Pit Lake is in all probability quite low. The impoundment is ground water fed with the Battle

Spring Formation as it source. However, it is unknown which sands within the Battle Spring Formation are exposed by the pit and whether they are the same sands being proposed for mining by LC. Monitoring well M-1 is located between the Sweetwater Pit Lake and LC's proposed operation, has been monitored since 1979 and over the last 20 years water levels have remained relatively constant. Given that there is a level of uncertainty associated with the radius of influence and the degree of connectivity between the Sweetwater Pit Lake and LC's proposed operation is unknown, please provide a commitment to work with the Sweetwater Mill operator in the monitoring of well M-1 and the Sweetwater Pit Lake and to utilize the data collected in an annual assessment of the radius of influence. Second, as the Sweetwater Pit Lake is an approved postmine feature, please provide a commitment to work with the Sweetwater Mill operator and the DEQ/LQD in the development and implementation of a remediation plan should it be determined that the lake was impacted. Please also see Comment OP- 105. **(BRW, MLB)**

<u>LC ISR, LLC (11/10)</u> – Please see the response to item OP-105.

25) *<u>LQD (1/09)</u> - Section RP 5.0 Financial Assurance. Paragraph one. Please add the cost of groundwater monitoring and analysis to the list of costs. **(AB)***

<u>LC ISR, LLC (10/09)</u> - The costs associated with groundwater monitoring and analysis are dispersed within the existing bond estimate and are not just incorporated as the 0.5% allotted for on-site monitoring under the Miscellaneous Costs Associated with Third Party Contractors in the Bond Summary (Page 1 in Table RP-4). For example, in Worksheet 1 (Groundwater Restoration), there are entries in Item IV (Stability Monitoring) specifically for the samples collected during that phase and in Item V (Labor), there are costs for a Sampler and for a Chemist. The surety will be reviewed annually and adjusted to reflect changes in cost and in the Project.

<u>LQD (11/09)</u> - Response not acceptable. Aside from the monitoring during the stability period mentioned in the comment response, there does not appear to be any sampling and analysis cost included during the active restoration phase of the operation. (MM)

<u>LC ISR, LLC (2/10)</u> - Worksheet 1 of the bond calculation includes the following line items:

Groundwater Sweep Analysis ($/KGals)	$0.060	On site laboratory analysis	Unit Rate
Reverse Osmosis Sampling & Analysis ($/KGals)	$0.060	Estimate	Unit Rate

<u>LQD (3/10)</u> - Response not acceptable. Please provide an itemized cost estimate for all groundwater analytical costs associated with the site reclamation. Including an

accounting of the various types and number of wells that will be sampled, their respective sampling frequency, number of sampling events and analytical parameters. (MM)

LC ISR, LLC (6/10) - A detailed list of the sampling costs for each phase of restoration was performed at the WDEQ's request. That list has been incorporated into the Surety Estimate in Table RP-5.

LQD (7/10) – This item is unresolved. Section RP 5.0 still needs to be revised to address the requirements and costs associated with groundwater monitoring of the site from the potential timeframe of forfeiture at full production, to full site restoration. (AB)

Additionally, Table RP-5 (page 1 of 11) details the analytical costs associated with site reclamation, however the listing does not appear to be complete. Some discussion of time frames is needed to explain the discrepancies between this table and the reclamation timeline shown in Figure RP-4. The list of wells does not appear to be complete; for example, regional wells and public wells are not included. Sampling during the recirculation and stability phases is not included. Please expand on this table to cover all groundwater sampling and analysis for the entire reclamation period. Also, please clarify where these costs appear in Table RP-4. (MM)

LC ISR, LLC (9/10) – The response has been separated into 25a and 25b:

a) Wyoming Statute 35-11-417 paragraph (c)(i) requires:

"For an initial bond the amount equal to the estimated cost of reclaiming the affected land disturbed and restoring ... any groundwater disturbed by in situ mining during the first year of operation under each permit."

Therefore, the bond shown in the Reclamation Plan details the maximum amount of construction and operational activities that would occur during the 12 months immediately after receipt of the Permit to Mine. The first year includes construction of the Plant and all associated infrastructure as well as installation and operation of the first six header houses in Mine Unit 1.

Section 5.0 of the Reclamation Plan has been revised. Please also see the response provided for MU1-25(b).

b) Please refer to the response to Comment MU1-25(b) and the revised Table RP-5 and Figure RP-4. As for the regional wells, Attachment OP-8, Section IV, C details the requirements for sampling of regional wells during restoration. No samples are required, only water levels. Table RP-5 also details the samples, and their associated costs, required during Recirculation and Stabilization. The lone public well to be sampled during restoration requires quarterly analysis of Ra-226 and U_{nat}. Table RP-5 has been revised for these costs under the item: "**Disposal Stream to Deep Well(s) and Local Water Supply Well**".

The costs from Table RP-5 appear in unitized form in each associated category in Table RP-4, Worksheet 1. For instance, under "Groundwater Sweep", the line shown below is equivalent to Table RP-5.

Analysis (Cost per Kilogallon)	$0.745	From Table RP-5	Unit Rate

The same is true for the categories of "Reverse Osmosis", "Recirculation" and "Stabilization Monitoring".

LQD (10/10) – Response partially acceptable. Re: Table RP-4, Bond Estimate. It appears that analytical costs have been incorporated, although the calculations are somewhat difficult to follow since they are broken out on a per kilogallon basis. It would be more straightforward if the total analytical costs were simply listed as a line item for each phase of the restoration.

The bond estimate is viewed as a work in progress, in that it has been and will continue to revised as the operations plans and schedules continue to evolve. In general, the current bond estimate appears to be reasonably comprehensive, however there are a number of details that should be revised:

a) The labor workforce listed on page 12 of 37 should be incorporated into Figure RP-4.
b) There appears to be an error in the figure listed for kgal of WDW disposal on page 10 of 37.
c) The derivation of the demolition cost ($0.1474/cu.ft.) listed on page 15 of 37 should be explained in a footnote. It should be noted that LQD Guideline #12 currently lists this cost at $0.25/cu.ft.
d) The second line from the bottom on page 21 of 37 is currently labeled as "Total Equipment Cost per Well". It should be changed to "Total Abandonment Cost per Well".
e) In Worksheet 7 (pages 31-36 of 37) average topsoil thickness is listed as 12". Realistically, the mine-wide average topsoil thickness is on the order of 18".
f) Worksheet 7 (page 31 of 37) should include a cost for backfilling the pond excavations using the material in the pond embankments. The volume of material should be stated.
g) Table RP-4, p 2 of 37, lists 69 monitoring wells. The comment response gives a breakdown of the monitor wells, as 28 M wells, 13 MP wells, 14 MO wells, and 13 MU wells, totaling 68 wells. Yet, Table MU1 4-1a lists 28 M wells, 13 MP wells, 14 MO wells, 15 MU wells for a total of 70 monitoring wells. Please correct the Table and add a footnote which references Table MU1 4-1a for a breakdown of the wells to be monitored.
h) Worksheet 7(page 33 of 37) should include a cost for ripping or scarifying roads. LQD Guideline #12 currently lists this cost at $53.83 per acre.

Lost Creek should expect that the bond estimate will be reviewed again in the future to insure that it accurately reflects the most current plans for the operation. **(MM)**

LC ISR, LLC (11/10) – A number of revisions have been made:

a) *The labor workforce listed on page 12 of 37 should be incorporated into Figure RP-4.*

   Table RP-4 has been revised to include the costs for a lab chemist. In addition, the labor data in Table RP-4 has been incorporated into Figure RP-4.

b) *There appears to be an error in the figure listed for kgal of WDW disposal on page 10 of 37.*

   Table RP-4 has been revised to correct this error.

c) *The derivation of the demolition cost ($0.1474/cu.ft.) listed on page 15 of 37 should be explained in a footnote. It should be noted that LQD Guideline #12 currently lists this cost at $0.25/cu.ft.*

   Table RP-4 has been revised to the current guidance in Chapter 12, Appendix K of $0.25/cu. ft. The previous unit demolition cost was from a previously approved bond used as a guideline for this calculation when it was drafted in 2007.

d) *The second line from the bottom on page 21 of 37 is currently labeled as "Total Equipment Cost per Well". It should be changed to "Total Abandonment Cost per Well".*

   The requested item has been revised to read "Total Abandonment Cost per Well".

e) *In Worksheet 7 (pages 31-36 of 37) average topsoil thickness is listed as 12". Realistically, the mine-wide average topsoil thickness is on the order of 18".*

   Attachment OP-5a and Plate OP-3 indicate various topsoil depths for the plant, the storage ponds, the main access road and the mine unit. Worksheet 7 in Table RP-4 has been updated to reflect those topsoil thicknesses. In particular, the road has been modified to a topsoil thickness of 15" based on a weighted average of the thicknesses measured along the proposed road path.

f) *Worksheet 7 (page 31 of 37) should include a cost for backfilling the pond excavations using the material in the pond embankments. The volume of material should be stated.*

The cost and volume to backfill the ponds is detailed in Table RP-4, Worksheet 4, Section III:

III	POND BACKFILL				
	Backfill Required (Cubic Yards)	10,448	10,448		Data
	Backfill Cost per Cubic Yard	$1.13	$1.13		Unit Rate
	TOTAL POND BACKFILL COST	$11,806	$11,806	$23,612	Calculated

The cost and volume for the topsoil is detailed in Table RP-4, Worksheet 7, Section IIA:

II	PONDS		
	A. Topsoil Handling & Grading		
	Affected Area (Acres)	5.0	
	Average Affected Thickness (Inches)	20	
	Topsoil Volume (Cubic Yards)	13,444	Calculated
	Hauling/Placement Cost per Cubic Yard	$1.13	Unit Cost
	Topsoil Handling Cost	$15,192	Calculated
	Grading Cost per Acre	$56.28	Unit Cost
	Grading Cost	$281	Calculated
	Total Topsoil Handling & Grading Cost	$15,474	Calculated

g) *Table RP-4, p 2 of 37, lists 69 monitoring wells. The comment response gives a breakdown of the monitor wells, as 28 M wells, 13 MP wells, 14 MO wells, and 13 MU wells, totaling 68 wells. Yet, Table MU1 4-1a lists 28 M wells, 13 MP wells, 14 MO wells, 15 MU wells for a total of 70 monitoring wells. Please correct the Table and add a footnote which references Table MU1 4-1a for a breakdown of the wells to be monitored.*

The monitor wells are currently bonded for in the Drilling Notification Bond. Therefore, they have been removed from Table RP-4. Upon approval of the Permit to Mine the bond currently carried under the Drill Notice, which includes the monitor wells, will be attached to the Permit to Mine bond.

h) *Worksheet 7 (page 33 of 37) should include a cost for ripping or scarifying roads. LQD Guideline #12 currently lists this cost at $53.83 per acre.*

Table RP-4, Worksheet 7, Section IV has been revised to correct this omission.

26) *LQD (1/09) - Table RP-4 Reclamation / Restoration Bond Estimate. Groundwater sampling and analysis could be conducted for many years, and should not be handled as an overhead cost of 0.5%, but as a separate line item in the bond estimate. Please indicate the initial number of monitoring wells that will be in place at the initial start-up of the mine and calculate their cost for sampling and analysis based on real costs.* ***(AB)***

LC ISR, LLC (10/09) - Please see response to previous comment.

LQD (11/09) - Response not acceptable. See comment no. 25 above. (MM)

LC ISR, LLC (2/10) - Please see response to previous comment.

LQD (3/10) - Response not acceptable. See comment no. 25 above. (MM)

LC ISR, LLC (6/10) - Please see response to previous comment.

LQD (7/10) – This item is unresolved. Groundwater monitoring and analysis has reportedly been added to Table RP-5, the Reclamation Cost Estimate. This Table only assumes the monitoring well ring wells, deep disposal well, storage pond, and four storage pond wells will be monitored for 0.3 years, or four months. There is no continued monitoring of overlying, underlying or production aquifer wells. Groundwater monitoring will be required from the time the bond would be forfeited to the time that the site has ended stability monitoring and is approved for full restoration. Please add the additional wells, reasonable maintenance of the wells and pumps, MIT Testing, the labor cost associated with sampling and maintenance of the wells. The time required to release the site from full operations mode to the end of stability monitoring should be outlined. Also, refer to response in RP-25. (AB, MM)

LC ISR, LLC (9/10) - Please see the response to RP-25 for clarification of sampling costs and the revisions to Tables RP-4 and RP-5. Also please refer to the revised Figure RP-4. Table RP-4 also allows for additional expenditures for maintenance of all systems, including pumps and wells, on a per 1,000 gallon basis for each of the categories (Groundwater Sweep, Reverse Osmosis, Recirculation, and Stabilization and Sampling). Table RP-4 details the Labor required to complete all required activities through completion of reclamation (also shown in Figure RP-4).

Table RP-5 accounts for 55 monitor wells and 13 MP (production zone) wells. The Mine Unit 1 monitoring wells are broken down as follows:

- External Ring Wells (M): 28 wells completed in the production horizon
- Production Zone Wells (MP): 13 wells completed within the pattern area in the production horizon.
- Overlying Zone Wells (MO): 14 wells completed within the pattern area in the overlying horizon.

- Underlying Zone Wells (MU): 13 wells completed within the pattern area in the underlying horizon.
- Total Number of Mine Unit 1 Monitor Wells: 68 wells (55 wells plus 13 MP wells)

LQD (10/10) – Response partially acceptable. Please see response to previous comment (RP-25). **(MM)**

LC ISR, LLC (11/10) - Please see the response to Comment RP-25.

FEBRUARY 2010 - LQD COMMENTS, ON THE MINE UNIT 1 APPLICATION, RELEVANT TO THE MAIN PERMIT DOCUMENT

MU1-25) LQD (2/10) - *Section 6.1.1: Please provide an updated pore volume calculation specific to Mine Unit #1, including an evaluation of all of the inputs and assumptions used in the calculation, based on currently available information. Particular attention should be focused on the thickness and spatial distribution of the ore horizons and calculation of an appropriate flare factor. The MU1 PV calculation in section 6.1.1 assumes an average ore zone thickness of 12 feet. This does not appear to be an appropriate value given that the average screened interval in the 13 ore zone monitor wells (MP wells, which will be utilized as injection and production wells) is 17 feet. It is also noted that section OP 1.2 in the mine permit document (bottom of page OP-3) states that the MHJ mineralized zone is about 30 ft. thick. Data should be provided to define the ore zone thickness in mine unit #1. Additionally, it should be noted that the mine-unit-specific water balance and mining/restoration schedule may be affected by a change in pore volume.*[22,28] ***(MM)***

LC ISR, LLC (3/10) - The surety estimate submitted to WDEQ-LQD in February 2010 (Table RP-4) totaled $7,532,329 and included the most current estimate of the number of MU1 patterns and size of that pattern area at that time. It was also based on complete installation of MU1 within the first year. Table RP-4 of the main permit document and Section OP 6.1.1 have been updated to reflect the most recent information. As outlined below under the discussion of 'Area', the number of patterns has changed, and the approach to determining the size of the pattern area has also been changed to better account for stacked ore zones. In addition, it has been determined that only half of MU1 could be installed within the first year.

Area: is the area of the patterns projected to the ground surface. It is used in the pore volume calculations, but because of the presence of 'stacked' ore, it must be adjusted in those calculations to account for pattern overlap. The surety estimate was originally based on 180 patterns at 9,000 sq. ft. per pattern or 1,620,000 sq. ft. total. However, the pattern overlap within the HJ Sand was not taken into account in this approach. The updated estimate includes 241 patterns, and the actual surface area is 1,611,720 sq. ft. However, to account for pattern overlap in the pore volume calculations, it is has been assumed that the area is larger, i.e., the area of each pattern is taken into account in the pore volume calculation, even if it is stacked with another pattern. With this approach, the total MU1 total area has been revised to 2,115,594 sq. ft.. The surety estimate and schedule will be modified on an annual basis, and the estimated areal extent will be updated as necessary.

Thickness: is estimated to be 12 feet based on preliminary estimates for pattern completions. The average completion thickness for the MP monitor wells in MU1 is 17 feet. The MP monitor wells completions are considered 'gross' completions and are designed to capture all the ore in the immediate production horizon. The MP monitor wells also tend to be in the thickest part of the ore to insure water quality samples indicative of the ore zone. Therefore, these monitor well completion intervals are expected to be thicker than many of the actual production and injection well completions because many of the production and injection wells are located on the 'fringes' of the ore where the ore thickness is less. Because of the range of ore thicknesses, LC ISR, LLC maintains that the original estimate of 12 feet 'average' completion thickness is valid. Further, the surety estimate will be modified on an annual basis and the estimated ore thickness will be replaced with actual ore thickness as the production and injection wells are installed.

'Stacked Ore' in MU1: The HJ Sand is the production zone of interest in MU1. Production is planned from four horizons (UHJ, MHJ1, MHJ2 and LHJ) within the Sand. Production patterns will be completed with separate wells in each of these horizons and produced simultaneously regardless of whether they overlie each other or not. The surety estimate accounts for horizontal flare equal to 20% of each pattern's area and vertical flare equal to 20% of each pattern's thickness. This is regardless of continuity with other patterns either vertically or horizontally. Therefore, every pattern is fully accounted for in the surety estimate.

<u>LQD (4/10)</u> – Response partially acceptable. With these responses the stacked ore zones have been properly accounted for (i.e. the area of each ore zone has been summed, instead of simply looking at a vertical projection). This has increased the mine unit pore volume by 31%. Please incorporate the above discussion into section 6.1.1. Also, as noted in the original comment, please address what impact this may have on the water balance and the mine/reclamation schedule.

A revised bond estimate (Table RP-4) was provided, apparently to account for the revised mine unit development schedule and revised pore volume calculation. Review of the bond calculation will be deferred to the main permit document since there are a number of outstanding comments related to the bond calculation contained in LQD's review dated 3/26/10. (MM)

<u>LC ISR, LLC (6/10)</u> - The response has been separated into MU1-25a and MU1-25b:

MU1-25a) - The requested information has been incorporated into Section 6.1.1 of the Mine Unit 1 application. All of the responses specific to MU1 and the related changes to the MU1 application will be submitted in the near future.

<u>LQD (7/10)</u> – This remains unresolved pending the receipt of revision to the MU1 package. (MM)

LC ISR, LLC (9/10) - Responses specific to the Mine Unit 1 application will be provided by LC ISR, LLC in the near future.

LQD (10/10) – This remains an open item pending receipt of revisions to the MU1 package. **(MM)**

LC ISR, LLC (11/10) – This item will be deferred to the Mine Unit 1 application.

INDEX SHEET FOR MINE PERMIT AMENDMENTS OR REVISIONS

Date: 11/17/10
TFN: **4 6/268**

MINE COMPANY NAME: **Lost Creek ISR, LLC** MINE NAME: **Lost Creek ISR Project** PERMIT NO.: **N/A**

Statement: I, **Steve Hatten**, an authorized representative of **Lost Creek ISR, LLC** declare that only the items listed on this and all consecutively numbered Index Sheets are intended as revisions to the current permit document. In the event that other changes inadvertently occurred due to this revision, those unintentional alterations will not be considered approved. Please initial and date. 11/17/10

NOTES: 1) Include all revision or change elements and a brief description of or reason for each revision element.
2) List all revision or change elements in sequence by volume number; number index sheets sequentially as needed.

VOLUME NUMBER	PAGE, MAP OR OTHER PERMIT ENTRY TO BE REMOVED	PAGE, MAP OR OTHER PERMIT ENTRY TO BE ADDED	DESCRIPTION OF CHANGE
1 of 5 Adj File	Pages iv, ix, xviii, xxv through xxviii	Pages iv, ix, xviii, xxv through xxix	Updated Detailed Table of Contents.
2 of 5 Apps D1-D5	Pages iv, ix, xviii, xxv through xxviii	Pages iv, ix, xviii, xxv through xxix	Updated Detailed Table of Contents.
	Page D5-i	Page D5-i	Updated page numbers
	Pages D5-7 through D5-9	Pages D5-7 through D5-9a	Updated in response to LQD comments
3a of 5 App D6 through Attach D6-2b	Pages iv, ix, xviii, xxv through xxviii	Pages iv, ix, xviii, xxv through xxix	Updated Detailed Table of Contents.
	Pages D6-19 through 21	Pages D6-19 through 21	Updated in response to LQD comments
	Pages 16 through 18 of Table D6-6	Pages 16 through 18 of Table D6-6	Updated with new information in response to LQD comments
3b of 5	Pages iv, ix, xviii, xxv through xxviii	Pages iv, ix, xviii, xxv through xxix	Updated Detailed Table of Contents.
	MB-07 Well Completion Report of Attachment D6-3	MB-07 Well Completion Report of Attachment D6-3	Updated with new information in response to LQD comments
4 of 5 Apps D7-D11;	Pages iv, ix, xviii, xxv through xxviii	Pages iv, ix, xviii, xxv through xxix	Updated Detailed Table of Contents.

INDEX SHEET FOR MINE PERMIT AMENDMENTS OR REVISIONS

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VOLUME NUMBER	PAGE, MAP OR OTHER PERMIT ENTRY TO BE REMOVED	PAGE, MAP OR OTHER PERMIT ENTRY TO BE ADDED	DESCRIPTION OF CHANGE
5 of 5 Ops Plan & Rec Plan	Pages iv, ix, xviii, xxv through xxviii	Pages iv, ix, xviii, xxv through xxix	Updated Detailed Table of Contents.
	Pages OP-ii through iv	Pages OP-ii through iv	Updated Operations Plan Table of Contents
	Pages OP-54a through OP-61, OP-79	Pages OP-55 through OP-61, OP-79	Updated in response to LQD comments
	Figure OP-6b	Figure OP-6b	Updated in response to LQD comments
	Plate OP-4	Plate OP-4a	Updated in response to LQD comments
		Plate OP-4b	Updated in response to LQD comments
	Attachment OP-2	Attachment OP-2	Updated in response to LQD comments and reformatted
	Figure OP-A2-1 of Attachment OP-2	Figure OP-A2-1 of Attachment OP-2	Updated in response to LQD comments
	Figure OP-A2-2 of Attachment OP-2	Figure OP-A2-2 of Attachment OP-2	Updated in response to LQD comments
	Figure OP-A2-5 of Attachment OP-2	Figure OP-A2-5 of Attachment OP-2	Updated in response to LQD comments
	Page RP-i	Page RP-i	Updated with new figures
	Pages RP-23 through 27	Pages RP-23 through 27	Updated in response to LQD comments
	Figure RP-4	Figure RP-4	Updated in response to LQD comments
	--	Figure RP-5a	Inserted new figure in response to LQD comments
	--	Figure RP-5b	Inserted new figure in response to LQD comments
	Table RP-4	Table RP-4	Updated in response to LQD comments

TABLE OF CONTENTS – Detailed (continued)

MINE PERMIT VOLUME 2 of 5: Appendix D - Main Permit Area (D1 to D5) continued

MINE PERMIT VOLUME 3a of 5: Appendix D - Main Permit Area (D6)

TABLE OF CONTENTS – Detailed (continued)

MINE PERMIT VOLUME 5 of 5: Operations Plan and Reclamation Plan continued

TABLE OF CONTENTS – Detailed (continued)

FIGURES (continued)

TABLE OF CONTENTS – Detailed (continued)

PLATES (continued)

TABLE OF CONTENTS – Detailed (continued)

PLATES (continued)

TABLE OF CONTENTS – Detailed (continued)

ATTACHMENTS

TABLE OF CONTENTS – Detailed (continued)

ATTACHMENTS (continued)

TABLE OF CONTENTS – Detailed (continued)

ATTACHMENTS (continued)

TABLE OF CONTENTS

FIGURES

TABLES

Upon completion of the coring program, the sealed core was characterized by geologists and transferred to the laboratory. A single core composite of eight feet of core was selected for leach amenability, bicarbonate and oxidant studies. The selected core composite was chosen to represent a typical production zone for the Project. The composite splits were then subjected to "bottle roll" amenability testing in which each individual sample was placed in a plastic container with a hydrogen peroxide lixiviant in a measured volume estimated to be five pore volumes of the tested interval, and then rolled mechanically for 16 hours. The lixiviant was extracted and tested for uranium content in the solution and new lixiviant was added and the process was repeated. Each sample was subjected to five additional periods of leaching, to represent the total volume of fluid that would leach uranium from the host over the life of an in situ recovery operation. These six roll sets, each being leached with five pore volumes of lixiviant, replicates a total of 30 pore volumes of lixiviant passing through the deposit, thus closely simulating an actual in situ leach operation. Once the six sets of rotation were completed, the core was analyzed to determine the amount of uranium remaining, in order to establish the efficiency of the leaching system. This allows a determination of the potential in situ leachability of the uranium-bearing sandstone and the potential rate of recovery.

A total of seven tests were conducted. The first test, LC-2001-01, showed low recovery without a bicarbonate addition, which demonstrated the requirement for bicarbonate addition to the lixiviant and the effectiveness of the sample preparation for the test. The other six samples (LC-2001-02 through -07) successfully demonstrated the ore's wide range of amenability to varying chemical conditions. The results of these tests demonstrate that uranium is easily mobilized for production and that the chemical conditions utilized in the tests will be equally effective under both low and high oxidant injection rates. The results of this testing are summarized in **Table D5-2**.

D5.2.4 Exploration and Production Activities

D5.2.4.1 Uranium

Historic and current uranium explorations exist in several areas of the Basin; however, uranium mining has been limited. The closest production was at the Kennecott Uranium Project, located about five miles south-southwest of the center of the Project, with about two miles separating the permit boundaries. (NRC License No. SUA-1350; WDEQ-LQD Permit No. 481). The project includes the Sweetwater Mill, a conventional mill which is currently on stand-by, a mill tailings disposal area, and reclaimed surface mining areas.

There has been no uranium production within the Permit Area. Historic exploration activities in the Permit Area can be summarized as follows:

- Pre-1976: Numerous companies held the property; uranium mineralization was discovered by Climax Uranium and Conoco.
- 1976: Texasgulf optioned property from Valley Development Inc.1977 through 1979: Texasgulf optioned property from Valley Development Inc., delineated the main trend of the mineralization, obtained a 50-percent interest in the Conoco claims on the trend to the east, and exercised its option with Valley Development Inc.
- 1986: Power Nuclear Corporation acquired the properties.
- 2000: Power Nuclear Corporation sold its Lost Creek properties to New Frontiers Uranium, LLC.
- 2005: New Frontiers Uranium, LLC transferred its Wyoming properties and data including its Lost Creek property to NFU.
- 2005: Ur-Energy USA Inc. purchased NFU from New Frontiers Uranium, LLC on terms.
- 2007: Ur-Energy USA Inc. completes the acquisition of NFU from New Frontiers Uranium, LLC, and maintains NFU as a wholly owned subsidiary.
- 2007: Ur-Energy USA Inc. forms Lost Creek ISR, LLC (LC ISR, LLC) to develop the Lost Creek property into an ISR facility and transfers the Lost Creek property from NFU to LC ISR, LLC.

At least 560 uranium exploration holes had been drilled in Permit Area prior to 2000. The plates and table in **Attachment D5-2** present the locations and total depths of all the known historic drill holes drilled in the Permit Area. The information that LC ISR LLC has pertaining to historic drill hole abandonment and re-plugging is provided in **Table D5-3**, including total depths of holes.

There have been continuing efforts over the years to ensure that drill holes are properly abandoned. In the early 1980s, the Conoco/Texasgulf Joint Venture worked to correct a WDEQ LQD violation resulting from incorrect surface capping and hole abandonment. Copies of the memos to WDEQ LQD explaining the work are included as **Attachment D5-3**. WDEQ-LQD subsequently approved the hole abandonment and released the bond.

In 2006, LC ISR, LLC re-located and re-abandoned twelve historic holes (**Table D5-3**). A drill rig was placed on each hole, and the hole was reamed/washed to 650 fbs A mixture of BH Thermal Grout, exceeding WDEQ-LQD Rules and Regulations Chapter 8 requirements, was pumped into the hole as the drill stem was retrieved. No effort was made to determine the depth of historic drill mud but the rig did have to ream/wash out mud from each hole. The upper 25 feet of each hole was plugged with cement. An attempt to relocate three additional holes was unsuccessful. LC ISR, LLC supplied this information to WDEQ-LQD in a letter dated January 15, 2007 (**Attachment D5-3**). In 2008, geologists discovered four historic holes with failed surface caps (Holes TT31, TT80, TT96, and TT141). Drill rigs were put on each of the four holes so they could be re-plugged. In each case, the drill stem was lowered between 180 and 220 fbs before hitting significant resistance. The holes were washed out and re-plugged to surface using grout. Each hole was also re-capped. **Table D5-3** contains information pertaining to the re-abandonment of these four holes.

Some pumping tests have shown very minor communication between the overlying and underlying aquifers and the HJ horizon (**Section 6.2.2.3**). There are several possible reasons for this communication, one of which is leakage through an improperly abandoned drill hole(s). However, the consistent nature of the response, regardless of distance from the pumping well, suggests that leakage through an improperly abandoned hole(s) is not the most likely cause of communication. Other more likely causes are: pumping from other wells in the area; regional communication between aquifers; background trends; or leakage through the juxtaposed aquifers across the Lost Creek Fault.

If additional, improperly abandoned drill holes are found in the future, LC ISR, LLC will plug the holes as described above. In particular, before operations begin in a mine unit, a field inspection will be performed to locate any historic holes with surface capping issues. If the inspection identifies any capping problems, the hole will be re-entered with a drill rig or tremie pipe and re-plugged with grout. A new cement surface cap will also be installed. Aquifer testing of the mine unit prior to operation will also help identify any improperly abandoned holes that could interfere with mine unit operation.

Upon receipt of a permit to mine and prior to injecting mining solutions in Mine Unit 1, LC ISR, LLC, with the assistance of WDEQ-LQD, will attempt to locate and properly abandon all historic drill holes documented to be improperly abandoned within the pattern area. In the event that the majority of the identified holes are located and abandoned such that there is an expectation that a definitive conclusion can be obtained from additional testing, a pump test will be performed to determine the effect of the hole abandonment effort. This pump test will be designed to mimic the initial wellfield pump test (length of test, pump rate, wells monitored, and pump rate).

D5.2.4.2 Other Minerals

Historic and current oil and gas exploration drilling are also in the region. There are no current oil and gas activities within the Basin that are completed in the same horizons as those discussed for ISR production in this application. The nearest significant gas fields are approximately ten miles to the southwest; therefore, no interference is anticipated between oil and gas production activities and ISR activities. There is no exploration of coal bed methane or other mineral resources within the Permit Area and the nearby region.

D5.3 Seismology

The discussion of the seismology of the Permit Area and surrounding areas includes: an analysis of historic seismicity; an analysis of the Uniform Building Code (UBC); a deterministic analysis of nearby faults; an analysis of the maximum credible "floating earthquake;" and a discussion of the existing short- and long-term probabilistic seismic hazard analysis. The materials presented here are mainly based on the seismologic characterization of Sweetwater, Carbon, Fremont, and Natrona Counties by James C.

groundwater flow can be clearly seen from the responses recorded in a pair of observation wells that were placed on either side of the Fault, within 100 feet of each other. Well HJT104, located on the north side of the Fault and completed in the HJ Horizon, had a maximum drawdown of 40.5 feet at the end of the LC19M test. Well HJMP107 (south of the Fault) in the HJ Horizon had a net decrease of 1.4 feet from the beginning of the test to the end of pumping at LC19M. At least a portion of that change is attributable to a declining trend in water levels that was observed in all monitor wells prior to the start of the test. The reason for the background trend observed has not been identified; however, it might be a result of offset pumping (e.g., LC ISR, LLC's first two water supply wells that are screened over multiple sands).

At the beginning of the LC19M test, the water level at HJT104 was at 6,770.68 feet above mean sea level (ft amsl) and the water level at HJMP107 was at 6,754.85 ft amsl, a head difference of almost 15 feet with the higher head north of the Lost Creek Fault. At the end of the pump test the water levels for HJT104 and HJMP107 were 6,730.14 ft amsl and 6753.47 ft amsl, respectively. At the termination of pumping at LC19M, the water level difference between HJT104 and HJMP107 was 23 feet with the higher head south of the Fault. Minor responses to pumping were observed across the Fault during the LC19M test. Based on the pump test results, the Fault, while not entirely sealing, significantly impedes groundwater flow, even under considerable hydraulic stress.

The response of the overlying and underlying aquifers during the LC19M pump test was small (e.g., on the order of 0.2 to 0.5 feet); but the water level responses did correspond to the start and stop of pumping from LC19M in the HJ Horizon. The underlying/overlying responses appear to be relatively consistent, regardless of distance from the pumping well, the hydrostratigraphic interval monitored, or the location relative to the Lost Creek Fault. These water level changes suggest potential impacts from off-site pumping or background trends that, because of distance from the monitor wells, are manifested at multiple locations at the same or similar times. As previously stated, a declining trend in water level elevations was observed prior to the start of the test. Most of the wells showed an initial inverted response (increase in water level) at the start of the test and then resumed a gradual downward trend during the test. This phenomenon was also observed and noted by Hydro-Engineering during the 2006 pump tests. It is possible that some of the drawdown response could be caused by: (1) pumping in the drilling water well (LC1) which is completed in both the DE and FG Horizons; (2) communication across multiple sands due to the scissors nature of the Lost Creek Fault distant from the pumping well location; (3) communication due to juxtapositioning of hydrostratigraphic units across the Fault; or (4) leakage through the confining shale, or any combination of these. While LC ISR, LLC has aggressively pursued re-plugging of historic wells, it is also possible that some of the communication could be related to abandoned wells. Please see **Section D5.2.4.1** for further details on locating and abandoning historic holes. Additional discussion regarding the results of the testing are included in **Attachment D6-2a**.

A second long term pump test was conducted to evaluate aquifer properties on the south side of the Lost Creek Fault using LC16M as the pumping well. A step-rate test was performed on pumping well LC16M October 7, 2007 to determine a suitable pumping rate for the long-term test. The long-term test for LC16M was started at 14:10 hours on October 22, 2007 and was terminated on October 28, 2007 at 01:00 hours when the generator used in the test failed. However, the HJ aquifer had been sufficiently stressed at that point and the pumping portion of the test was terminated. The total duration of the test was 5.5 days (7,850 minutes). The average pumping rate during the test was 37.4 gpm. Maximum drawdown in the pumping well was 69.3 feet. Monitoring was continued after pump shut-in to record recovery from the LC16M test.

The transmissivity calculated from six wells completed in the HJ aquifer on the south side of the Lost Creek Fault (including the pumping well LC16M) were similar, ranging from 56.7 to 110.0 ft^2/d and averaging 77.7 ft^2/d. The average hydraulic conductivity calculated for the six wells, assuming an aquifer thickness of 120 feet, was 0.65 ft/d. Storativity calculated from four of the monitoring wells ranged from 3.5×10^{-5} to 1.4×10^{-4} and averaged 7.3×10^{-5}. Well HJT105 had a calculated storativity of 9.1×10^{-5} which appears anomalously high and was not included in the average. Storativity was not, nor could be, calculated from the pumping well. **Table D6-10b** summarizes the analyses of the LC16M pump test. Drawdown near the end of the test in the HJ aquifer is shown on **Figure D6-16**.

The drawdown resulting from pumping LC16M shows a cone of depression developed around the pumping well that is elongated roughly parallel to the Lost Creek Fault (**Figure D6-16**). There is also drawdown within the HJ aquifer north of the Fault, although it is relatively minor. The same wells located about 100 feet apart and across the Fault from one another, Wells HJMP107 and HJT104, that were evaluated during the LC19M test were evaluated during the LQ16M test. Well HJMP107, located on the same side of the Fault as the pumping well, had nearly 25 feet of drawdown near the end of the test. Well HJT104, located approximately 100 feet north of Well HJMP107 and north of the Fault, had approximately 2.2 feet of drawdown at the end of pumping. The data from the LC16M pump test appear consistent with the LC19M pump test, showing that the Lost Creek Fault, while not impermeable, is a significant barrier to groundwater flow.

As in the LC19M pump test, the response of the overlying and underlying aquifers during the LC16M pump test was small (e.g., less than one foot in the LFG and less than two feet in the UKM); but the water level responses were coincident with the start and stop of pumping from LC16M (**Figure D6-16**). The response was slightly more pronounced in the UKM and occurred on both sides of the Lost Creek Fault. There were no observation points in the LFG aquifer across the Fault in the LC16M test. Similar to the LC19M pump test, results from the LC16M test indicate limited hydraulic communication between the HJ aquifer and the overlying LFG and underlying UKM aquifers. Additional discussion regarding the results of the testing are included in **Attachment D6-2b**.

As previously described, hydraulic communication between the HJ aquifer and overlying and underlying aquifers may be through historic boreholes that were improperly abandoned and have not yet been located, leakage through the confining shale units, or contact of sands juxtaposed across the Lost Creek Fault. Additional investigation will be completed prior to production of any mine units to isolate the cause of hydraulic communication between the production zone aquifer and the overlying and underlying aquifers.

It should be noted that although some minor hydraulic communication exists between the hydrostratigraphic units of interest, the hydraulic response only becomes apparent when large stresses (head differences) are applied to the aquifers. Under normal ISR production operations and those proposed for this project, flows are generally balanced so that a net bleed of approximately one percent is maintained within a mine unit/well pattern. Those typical operating conditions will not stress the aquifers to the extent of the recently completed pump tests. Therefore, it is anticipated that any hydraulic response in the overlying and underlying aquifers will be even less than the already negligible responses observed during the LC19M and LC16M pump test.

Detailed mine unit pump tests will be conducted during development of each future mine unit. As such, additional investigations will be performed to assess the background trends observed, characteristics of the Lost Creek Fault and potential communication between the sands monitored for the 2007 test. Based on testing results to date, it is anticipated that any minor communication between the HJ Horizon and the overlying and underlying sands can be managed through operational practices, detailed monitoring, and engineering operations. In this regard, the potential communication observed at Lost Creek is much lower (e.g., five to ten times less) than has been observed in other ISR operations where engineering practices were successfully implemented to isolate lixiviant from overlying and underlying aquifers. **Figure D6-17** summarizes the results of the Hydro-Search, Inc. (1982), Hydro-Engineering (2007), and Petrotek Engineering Corporation pump test results (**Attachments D6-2a** and **D6-2b**). **Table D6-11** summarizes the aquifer characteristics calculated from the pump test data and related field observations.

Table D6-6 Water Level Data (Page 16 of 18)

Well Name	Completion Zone	Measure Point Elevation	DTW	WL Elev	DTW	WL Elev	DTW	WL Elev	DTW	WL Elev	DTW	WL Elev
			3/31/10	3/31/10	6/29/2010	6/29/2010	7/6/2010	7/6/2010	7/7/2010	7/7/2010	11/1/2010	11/1/2010
HJMO-101	LFG	6949.70	-	-	-	-	-	-	-	-		
HJMO-102	FG	6934.56	-	-	-	-	-	-	-	-		
HJMO-103	FG	6936.29	-	-	-	-	-	-	-	-		
HJMO-104	LFG	6940.76	-	-	-	-	-	-	-	-		
HJMO-105	LFG	6938.00	-	-	-	-	-	-	-	-		
HJMO-106	LFG	6941.75	-	-	-	-	-	-	-	-		
HJMO-107	LFG	6937.86	-	-	-	-	-	-	-	-		
HJMO-108	LFG	6951.64	-	-	-	-	-	-	-	-		
HJMO-109	LFG	6938.95	-	-	-	-	-	-	-	-		
HJMO-110	LFG	6947.13	-	-	-	-	-	-	-	-		
HJMO-111	LFG	6950.46	-	-	-	-	-	-	-	-		
HJMO-112	LFG	6935.51	-	-	-	-	-	-	-	-		
HJMO-113	LFG	6936.97	-	-	-	-	-	-	-	-		
HJMO-114	LFG	6940.75	-	-	-	-	-	-	-	-		
HJMP-101	LHJ	6948.64	-	-	-	-	-	-	-	-		
HJMP-102	MHJ-2	6936.15	-	-	-	-	-	-	-	-		
HJMP-103	M1&M2	6936.49	-	-	-	-	-	-	-	-		
HJMP-104	MHJ-2	6941.04	-	-	-	-	-	-	-	-		
HJMP-105	LHJ	6937.38	-	-	-	-	-	-	-	-		
HJMP-106	LHJ	6941.29	-	-	-	-	-	-	-	-		
HJMP-107	MHJ-1,2	6938.45	-	-	-	-	-	-	-	-		
HJMP-108	MHJ-2	6952.20	-	-	-	-	-	-	-	-		
HJMP-109	LHJ	6939.10	-	-	-	-	-	-	-	-		
HJMP-110	LHJ	6947.01	-	-	-	-	-	-	-	-		
HJMP-111	M1&2	6949.49	-	-	-	-	-	-	-	-		
HJMP-112	UHJ	6935.48	-	-	-	-	-	-	-	-		
HJMP-113	MHJ-2	6937.26	-	-	-	-	-	-	-	-		
HJMP-114	M1&2	6941.01	-	-	-	-	-	-	-	-		
HJMU-101	UKM	6949.03	-	-	-	-	-	-	-	-		
HJMU-102	UKM	6935.35	-	-	-	-	-	-	-	-		
HJMU-103	UKM	6936.06	-	-	-	-	-	-	-	-		
HJMU-104	UKM	6940.51	-	-	-	-	-	-	-	-		
HJMU-105	UKM	6937.58	-	-	-	-	-	-	-	-		
HJMU-106	UKM	6941.75	-	-	-	-	-	-	-	-		
HJMU-107	UKM	6937.88	-	-	-	-	-	-	-	-		
HJMU-108	UKM	6951.51	-	-	-	-	-	-	-	-		
HJMU-109	UKM	6939.38	-	-	-	-	-	-	-	-		
HJMU-110	UKM	6947.56	-	-	-	-	-	-	-	-		
HJMU-111	UKM	6950.08	-	-	-	-	-	-	-	-		
HJMU-112	UKM	6935.35	-	-	-	-	-	-	-	-		
HJMU-113	UKM	6936.99	-	-	-	-	-	-	-	-		
HJMU-114	UKM	6940.43	-	-	-	-	-	-	-	-		

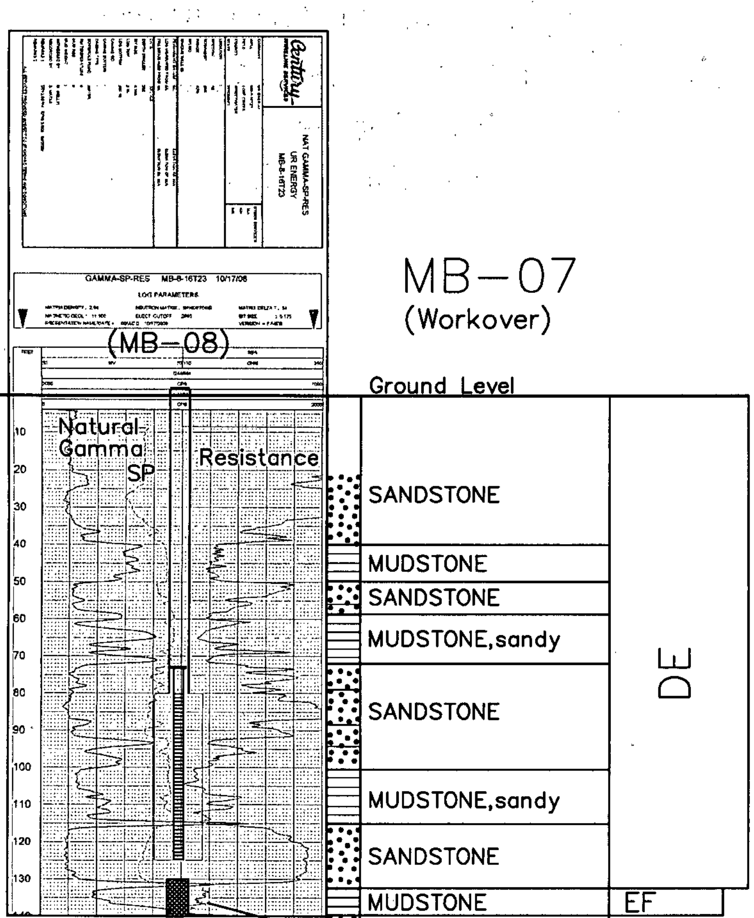
Table D6-6 Water Level Data (Page 17 of 18)

Well Name	Completion Zone	Measure Point Elevation	DTW	WL Elev	DTW	WL Elev	DTW	WL Elev	DTW	WL Elev	DTW	WL Elev
			3/31/10	3/31/10	6/29/2010	6/29/2010	7/6/2010	7/6/2010	7/7/2010	7/7/2010	11/1/2010	11/1/2010
HJT-101	LHJ	6937.56	-	-	-	-	-	-	-	-		
HJT-102	MHJ-2	6939.15	-	-	-	-	-	-	-	-		
HJT-103	MHJ-1	6938.22	-	-	-	-	-	-	-	-		
HJT-104	LHJ	6940.15	-	-	-	-	-	-	-	-		
HJT-105	UHJ	6938.87	-	-	-	-	-	-	-	-		
HJT-106	DE	6935.14	-	-	-	-	-	-	-	-		
LC15M	LFG	6936.55	-	-	-	-	-	-	-	-		
LC16M	HJ	6936.15	-	-	-	-	-	-	-	-		
LC17M	UKM	6936.90	-	-	-	-	-	-	-	-		
LC18M	LFG	6948.97	-	-	-	-	-	-	-	-		
LC19M	HJ	6950.01	-	-	-	-	-	-	-	-		
LC20M	UKM	6950.51	-	-	-	-	-	-	-	-		
LC24M	UKM	6944.33	-	-	-	-	-	-	-	-		
LC25M	LFG	6936.40	-	-	-	-	-	-	-	-		
LC29M	DE	6937.55	-	-	-	-	-	-	-	-		
UKMO-101	MHJ-2	6942.28	-	-	-	-	-	-	-	-		
UKMO-102	MHJ-2	6940.79	-	-	-	-	-	-	-	-		
UKMO-103	MHJ-2	6950.53	-	-	-	-	-	-	-	-		
UKMP-101	UKM	6941.74	-	-	-	-	-	-	-	-		
UKMP-102	UKM	6942.10	-	-	-	-	-	-	-	-		
UKMP-103	UKM	6950.84	-	-	-	-	-	-	-	-		
UKMU-101	MKM	6941.87	-	-	-	-	-	-	-	-		
UKMU-102	MKM	6942.62	-	-	-	-	-	-	-	-		
UKMU-103	MKM	6950.92	-	-	-	-	-	-	-	-		
M-25-92-17-1D	UKM	6,967.40	-	-	-	-	-	-	-	-		
M-25-92-17-1M	HJ	6,966.70	-	-	-	-	-	-	-	-		
M-25-92-17-1S	LFG	6,966.20	-	-	-	-	-	-	-	-		
M-25-92-18-1D	UKM	6,938.70	-	-	-	-	-	-	-	-		
M-25-92-18-1M	HJ	6,940.00	-	-	-	-	-	-	-	-		
M-25-92-18-1S	LFG	6,939.30	-	-	-	-	-	-	-	-		
M-25-92-19-1M	HJ	6,926.10	-	-	-	-	-	-	-	-		
M-25-92-19-2M	HJ	6,925.50	-	-	-	-	-	-	-	-		
M-25-92-19-3M	HJ	6,923.90	-	-	-	-	-	-	-	-		
M-25-92-20-1D	UKM	6,935.00	-	-	-	-	-	-	-	-		
M-25-92-20-1M	HJ	6,934.90	-	-	-	-	-	-	-	-		
M-25-92-20-1S	LFG	6,934.50	-	-	-	-	-	-	-	-		

Table D6-6 Water Level Data (Page 18 of 18)

Well Name	Completion Zone	Measure Point Elevation	DTW	WL Elev	DTW	WL Elev	DTW	WL Elev	DTW	WL Elev	DTW	WL Elev
			3/31/10	3/31/10	6/29/2010	6/29/2010	7/6/2010	7/6/2010	7/7/2010	7/7/2010	11/1/2010	11/1/2010
MB-1	DE	6,985.89	-	-	235.00	6750.89	-	-	-	-	233.28	6752.61
MB-2	LFG	6,986.92	-	-	-	-	246.30	6740.62	-	-		
MB-3B	HJ	6,987.38	-	-	-	-	266.20	6721.18	-	-		
MB-4	UKM	6,987.27	-	-	-	-	-	-	274.45	6712.82		
MB-5	LFG	6,805.04	146.20	6,658.84	-	-	146.00	6659.04	-	-		
MB-6	HJ	6,804.90	144.00	6,660.90	-	-	-	-	144.60	6660.30		
MB-8	LFG	6,985.50	-	-	172.20	6813.30	-	-	-	-	170.55	6814.95
MB-9	HJ	6,986.31	-	-	-	-	186.00	6800.31	-	-		

[1] DTW - Depth to water in feet below measure point
[2] WL. Elev. - Water Level Elevation in feet above mean sea level
† values not provided in Hydro-Search Inc 1982 report
(ND) Data unavailable
(-) Water level not measured



Vertical Scale: 1"=50' Backplugged w/cement

NOTE: MB-07 was drilled with air. Hole made no water. Hole not logged. Log for MB-08 used here as representative.

Workover 10-28-10:
- Screen pulled
- Hole washed to 140'(TD)
- Plugged w/cement: 130'-140'
- Screen re-set: 80'-125'
- Airlifted: made no water

Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # MB-07   SEO # 188858   Date Drilled: 10-22-08

Location: E 753,266 / N 538,981 (NAD 27)

Ground Elev: 6983.38   Measure Point Elev: 6984.88

TD: 140 ft.   Hole Dia.: 7-7/8"

CASED to: 80'   Casing: PVC SDR17   ID: 4.5"   OD: 5"

GROUT: Portland Cement - Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: DE Sand

Static Water Level: Depth dry @ 130' Elev: ______ (typical)

UNDERREAM: Blade Dia: 10-1/2"
Intervals: from 80' to 125' /length 45'
from ______ to ______ /length ______

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer		73'		6911'	
Screen	80'	125'	6904'	6859'	45'

SCREEN SPECIFICATIONS:
Slot: 0.020"   Composition 3" PVC

FILTER PACKING:
Volume: ______ (bags)(ft^3)   Sand Specs. ______
Method: N/A

WELL STIMULATION: Method Airlift
Yield: Good / Moderate / None (circled: None)

FIGURES

TABLES

PLATES

ATTACHMENTS

times higher (when operated) than the disposal rate included in the operating plan. This scenario could not be justified because of: the extreme rate and volume of waste water generated over short periods of time (estimated at 1,150 GPM); extreme and unsustainable drawdown and recharge during the periodic restoration activities; and economic considerations (capital requirements for a 6,000 GPM water purification facility).

It should however be feasible to maintain a rate of restoration progress equal to the rate of production progress. The result of a proper design would be that wellfields are restored in an equal amount of time as the production life of a typical wellfield. This is the design basis for LC ISR LLC's proposed mine plan (**Figure OP-4a**) and water balance (**Figures OP-5a** through **OP-5f**). LC ISR, LLC planned for a 60 pore volume (PV) production life at 6,000 GPM. The critical restoration stage (RO) is projected to require 10% of the production PVs (i.e., 6 PVs) and to thus operate at 10% of the production flow rate (average over life-of-project is approximately 600 GPM). The rate of completion of the groundwater sweep (GWS) phase of restoration would also match the rate of depletion of the production areas when properly designed and planned. Since GWS will involve less than one pore volume (see response to Response to Comment OP5, RP#1 for complete explanation), the required flow rate for GWS is designed to commonly be 30 GPM. Operating GWS at pre-determined/controlled flow rate will minimize the likelihood of excessive consumption of groundwater resources for this minimally effective restoration activity. The end result of proper design and planning is that there is adequate and appropriate restoration capacity available for each wellfield at the point in time that it is expected to be depleted and ready for restoration. When the restoration rate equals the production rate, operations would not be extended in one operational phase due to lack of capacity for the next sequential phase.

As restoration operations are nearing completion, GWS will be deemed complete and the only restoration activity remaining that impacts the water balance will be RO treatment. **Figure OP-5f** illustrates the post-production mode when only RO restoration is active. The water balance as a whole is not significantly changed by the shifting of the source of restoration recovered water from GWS to RO. The waste water requirements for this mode are unchanged from the operational mode illustrated previously.

Incorporating the water balance design parameters discussed above into the schedule presented in **Figure OP-4a**, an average net consumptive removal flow (gpm) from the mine units over the life-of project was determined to be 89 gpm. The impact of this consumptive removal on the cumulative drawdown of the aquifer is discussed in **Section OP 3.6.3.3**.

OP 3.6.3.2 Mine Unit Interference

Decisions about the order in which mine units will be brought on line and the rates at which they will be developed and restored will depend, in part, on the potential for interference among the mine units. As noted in **Section OP 3.2**, any particular concerns about interference will be addressed in the Hydrologic Test Proposal and Report.

OP 3.6.3.3 Cumulative Drawdown - Mine Unit Operations

As discussed in **Appendix D6**, a regional pump test has been conducted to assess the hydraulic characteristics of the HJ Horizon and overlying and underlying confining units. Pump tests also will be performed for each mine unit in order to demonstrate hydraulic containment above and below the production zone, demonstrate communication between the pattern area and perimeter monitor wells, and to further evaluate the hydrologic properties of the HJ Horizon.

Based on a bleed of 0.5 to 1.5 percent, the potential impact from consumptive use of groundwater is expected to be minimal. In this regard, the vast majority (e.g., on the order of 98 percent) of groundwater used in the ISR process will be treated and re-injected (**Table OP-6**).

During ISR operations, extraction of groundwater will result in drawdown within the production zone aquifer and potentially in the overlying and underlying aquifers. Additional drawdown will occur in aquifers that are pumped to meet the water supply requirements for dust suppression, drilling, plant process and wash water, and potable water. Drawdown estimates for the mine units are described below and for the water supply are described in **Section 3.6.3.4**.

Drawdown will be greatest in the immediate vicinity of the mine units. A numerical model was used to assess drawdown impacts from Lost Creek ISR operations. The model was developed using site-specific data based on geologic and hydrologic information collected from site characterization activities. The model development, calibration and simulations are described in the report "Numerical Modeling of Hydrologic Conditions at the Lost Creek In-Situ Recovery Uranium Project, Wyoming" (Petrotek 2010). Simulations were run representing the full production-restoration sequence for Mine Unit 1. The simulation included a production phase at a maximum rate of 5,838 gpm (with a net bleed of 38 gpm) for a period of 26 months (791 days), groundwater sweep at 30 gpm for 12 months (365 days), and treatment with RO at 541 gpm for 18 months (548 days). The total simulation period was 56 months (4.75 years). During RO, the simulated consumptive use (reject brine) was 67.6 gpm. Simulated drawdown during the maximum production rate is shown on **Plate OP-4a**. Drawdown during the RO phase is shown on **Plate OP-4b**. The 5-foot drawdown contour extends a maximum of 3.3 miles (17,250 feet) beyond the Permit Area boundary. The maximum drawdown outside the Permit Area boundary is slightly greater than 25 feet. This occurs where the Mine Unit is closest to the Permit Area boundary. Although this simulation only represents production and restoration from a single mine unit, the production rates and RO rates are maximized. During a portion of the Lost Creek ISR operations, full production could occur during restoration, in which case, the total drawdown could be the combination of the two simulated scenarios. In other words, combining the two drawdown maps would represent the worst case scenario for cumulative impacts.

The estimated drawdown from production and restoration will not result in loss of use of wells outside of the Permit Area. Even so, as discussed in **Section OP 2.11.2.2**, monitoring of off-site wells is planned.

The nearest surface water body to the Permit Area is the Sweetwater Mill Pit (**Plate OP-4a** and **Plate OP-4b**). It is unknown if the Sweetwater Mill Pit intercepts strata that are the stratigraphic equivalent of the HJ Horizon. The effects of the Sweetwater Mill Pit on the hydrology of the HJ Horizon, or vice versa, are unknown. Regardless, the model simulations indicate that the drawdown impacts of projected Lost Creek ISR operations will be minor (less than 5 feet) at distances as far as the Sweetwater Mill Pit. In the event that the Sweetwater Mill Pit experiences unacceptable drawdown (greater than two feet), LC ISR, LLC will cooperate with the owner of the Sweetwater Mill Pit to determine the cause of the drawdown. If the Lost Creek ISR operations are the cause of the drawdown, LC ISR, LLC will work with the Sweetwater Mill Pit lake owner to develop and implement a mutually agreeable solution.

OP 3.6.3.4 Cumulative Drawdown - Water Supply Wells

Drawdown will occur in aquifers that are pumped to meet the water supply requirements for dust suppression, drilling, plant process and wash water, and potable water. Water supply wells will include two wells completed in the FG Horizon, one well completed in the HJ Horizon, three wells completed in the KM Horizon, and one well completed in the N Horizon. Potable water and dust suppression requirements are minimal at 250 and 300 gallons per day, respectively (0.17 and 0.21 gpm). Plant process and wash water will require approximately 10 gpm, and drill water will require approximately 24 gpm. The proportion of water to be pumped from each of the water supply wells has not been determined. It is assumed that more water will be pumped from the deeper aquifers than from the FG horizon because of generally lower transmissivity of that aquifer. For purposes of this estimate, the 35 gpm is divided between the seven water supply wells as follows:

Aquifer	Number of Wells	Total Pumping Rate (gpm)
FG	2	5
HJ	1	10
KM	3	10
N	1	10

Aquifer properties of the FG and KM (as the UKM) aquifers are listed in **Table D6-11**. The representative values for the transmissivity of the FG Horizon are between 8 and 28 ft^2/d (60 and 200 gpd/ft^2). A value of 18 ft^2/d is used for the calculations. The representative values for the KM Horizon transmissivity are between 60 and 92 ft^2/d (450 and 570 gpd/ft^2). A value of 76 ft^2/d is used for the calculations. Because no data are available for the N sand, it is assumed that unit has similar properties to the overlying KM Horizon. No storativity data are available so it is also assumed that all of the aquifers have a similar value to the HJ Horizon of 7.0E-05. An eight-year life-of-mine is assumed. The estimated drawdown at distances from the centroid of the Permit Area for each of the aquifers at the end of eight years is estimated using the Theis non-equilibrium solution.

The calculated drawdown is as follows:

	Drawdown (ft)		
Aquifer	2 miles	3 miles	5 miles
FG	11.7	8.4	4.7
KM	8.4	6.8	4.8
N	8.4	6.8	4.8

The drawdown in the HJ Horizon was not calculated herein, because the modeling previously described indicates that pumping of 10 gpm will result in less than 5 feet of drawdown outside the Permit Area.

Use of the Theis solution implies numerous assumptions that are not fully applicable. In particular, because the Theis solution does not account for recharge to the aquifers, the predicted drawdown is overestimated. Therefore, the drawdown resulting from water supply wells will most likely be less than five feet in the FG, KM and N Horizons at distances greater than three miles from the center of the Permit Area (or generally two miles outside the Permit Area). Furthermore, if excessive drawdown were to occur to the shallow FG Horizon during water supply pumping, the allocation of pumping rates would be shifted so as to withdraw a greater proportion of water supply from the other water supply wells completed in the deeper aquifers.

OP 3.6.4 Excursion Monitoring and Control

Excursion monitoring and control is designed to identify any unanticipated impacts to hydrology of the Permit Area and its vicinity during ISR activities and provide measures that may be used singly or in combination to address the unanticipated impacts. The excursion monitoring augments the above information on production and injection control, such as injection rates and pattern balance, which is instrumental to efficient ISR.

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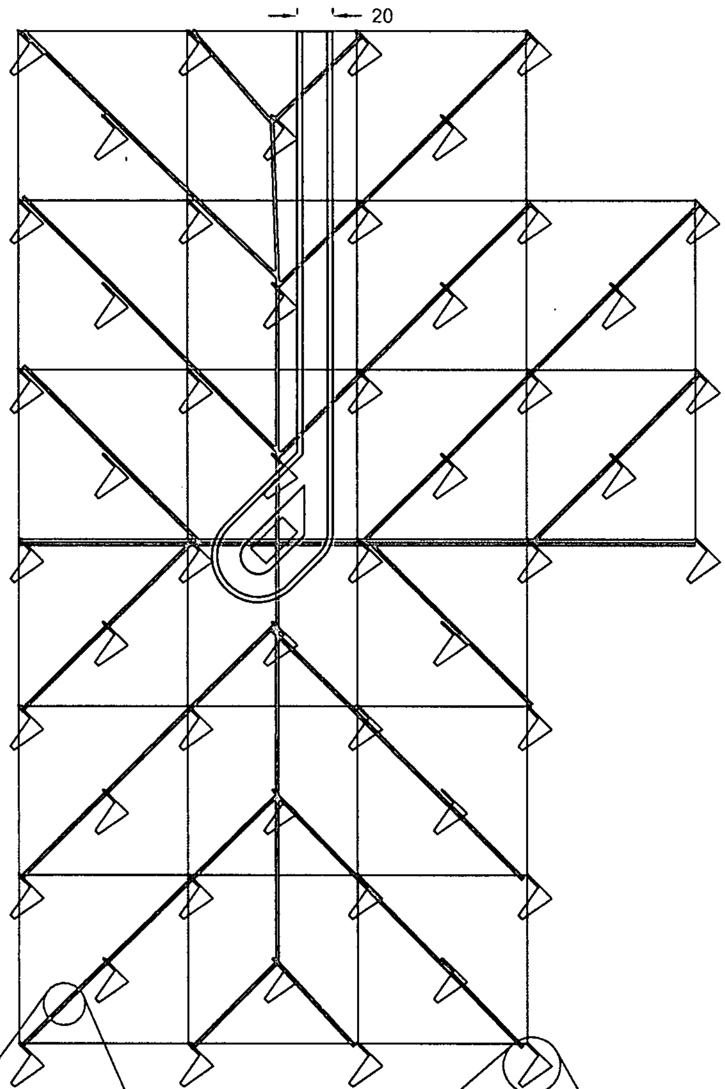
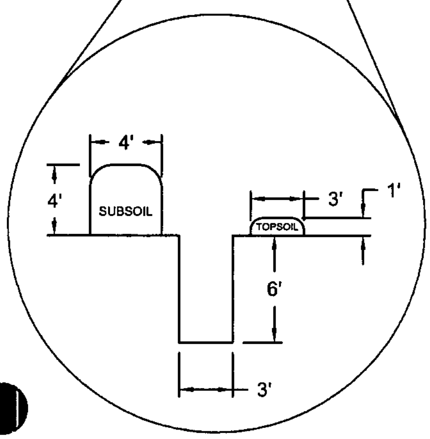
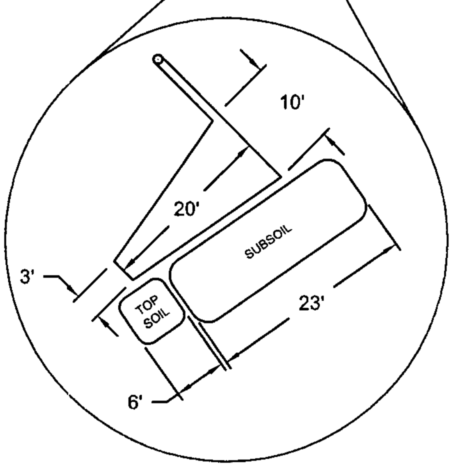




TYPICAL TRENCH LAYOUT



TYPICAL DRILL PIT LAYOUT

THE TOTAL PATTERN AREA = 20 PATTERNS X 9025 SQ. FT. = 180,500 SQ. FT.

LONG TERM TOPSOIL STORAGE: 8,000 SQ. FT. (LIFE OF HEADER HOUSE)

SECONDARY ROAD = 7,700 SQ. FT.
HEADER HOUSE = 300 SQ. FT.

SHORT TERM TOPSOIL REMOVAL: 17,800 SQ. FT. (< 3 MONTHS)

DRILL PITS = 51 PITS X 140 SQ. FT. = 7,140 SQ. FT.
TRENCHES = 3,550 FT. X 3 FT. WIDE = 10,650 SQ. FT.

TOPSOIL DISTURBANCE (% PATTERN AREA):

LONG TERM DISTURBANCE = 4.4%
SHORT TERM DISTURBANCE = 10%

PATTERN

SECONDARY ROAD (14' WIDE w/ 3' borrow)

TRENCH (3' WIDE)

HEADER HOUSE

TYPICAL DRILL PIT

Lost Creek ISR, LLC
Littleton, Colorado USA

AATA INTERNATIONAL, INC.
Fort Collins, Colorado, USA

FIGURE OP-6b
Vegetation and Soil Impacts Due to Excavation

Lost Creek Permit Area

Issued For: WDEQ-LQD 1.0 Drawn By: SMH

Issued / Revised: 1.4.2010 / 10.28.2010

Dwg No. WDEQLQD1.0 FIG OP-6b 1.4.10 SMH

0' 25' 50' 100'
FEET

Attachment OP-2
Summary of Engineering Controls

FIGURES

Attachment OP-2
Summary of Engineering Controls

Note: This material is also part of the NRC NUREG-1910, "Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities", 2009 (GEIS). Engineering controls are discussed in general in Section 7.4 of the GEIS, and cross-references to specific GEIS sections are also included. Cross-references to specific sections of the WDEQ-LQD Operations Plan are also included.

1.0 Mine Unit

Each mine unit consists of a monitor well ring, production patterns, and the associated infrastructure to allow for transfer of lixiviant to and from the Plant. The mine unit boundaries are based on the geometry of the specific uranium mineralization and will have sufficient size and lateral continuity to enable economic uranium extraction. The well pattern installation for a given mine unit is based on the subsurface geometry of the ore deposit. Various pattern shapes are used including five-spot, line drives and various alternate configurations. Because roll-front uranium deposits normally have irregular shapes, some of the well patterns in a given well field are also irregular, and the well patterns may be altered to fit the size, shape, and boundaries of individual ore bodies. Depending on ore body geometry and surface topography, a typical pattern will be from 6,000 to 10,000 sq. ft. Ore body size and geometry will also influence the number of wells in a mine unit.

1.1 Pipelines

Pipelines are used to transport lixiviant to and from the Plant, the mine units, the header houses and eventually the injection and production wells. Pipelines are also used to transport waste water to the disposal wells. The lines are generally buried, minimizing the possibility of freezing in adverse weather and of being damaged by surface traffic (Section OP 2.9.1). In general, piping to and from the Plant and the mine units and within the mine units are constructed of high density polyethylene (HDPE) with butt-welded joints or the equivalent. In addition to the electronic engineering controls described below, Plant and Mine Unit operators augment the systems by performing routine visual checks and comparisons of the operating parameters. Access routes are installed (where possible) to track pipelines and powerlines to allow operators to perform visual inspections during travel.

1.1.1 Flow

Flow is measured at entrance and exit points of the Plant and the header houses. Flow data from the header house is transmitted to the Plant and compared to the Plant outflow through the Plant Programmable Logic Controller (PLC) to determine if a leak is present. If the change in flow is beyond the set point (allowing for accuracy in the measurement devices), then an alarm occurs.

1.1.2 Pressure

Pressure is measured at entrance and exit points of the Plant and the header houses. Pressure data from the header house headers is transmitted to the Plant and compared to the Plant outflow through the Plant PLC to determine if a leak is present. If the change in pressure is beyond the set point (allowing for friction and elevation), then an alarm occurs.

1.1.3 Leak Detection

As previously indicated in Sections 1.1.1 and 1.1.2 above, leak detection occurs in the form of pressure and flow measurement and comparison. If changes occur in the measured variables, then an alarm occurs. Additionally, more conventional methods of leak detection occur continually during production operations. Standard operating procedures (SOPs) require routine inspection of pipeline ROWs and valve station inspections. Operators are trained to look for leak indicators in their visual inspections of pattern areas, header houses and pipeline (ROWs).

1.2 Monitor Wells

There are three types of wells required: injection wells for injecting lixiviant; production wells for uranium production; and monitoring wells for assessing ongoing operations. In addition, observation wells may be used to supplement information from monitor wells where additional data is preferred. (Deep disposal wells are discussed in Section 2.5.3 of this attachment).

1.2.1 Installation

Design, location and installation are based on data gathered during exploration and delineation drilling. That previous drilling allows for the geologists to correlate the sands and confining units associated with the mine unit. The geologist also generally defines the ore completion horizons and their relationship to the monitor well ring. From this combined information, the geologist specifies the locations of the exterior, overlying, underlying and production zone monitor wells including their proposed completion intervals. This same information may be used to recommend the installation of observation wells to supplement monitoring. This may be particularly helpful in areas where the standard monitor wells are an abnormal distance from the zone of interest or where the standard may not be at the appropriate level for the existing hydrologic conditions.

The monitor and/or observation well locations are surveyed, drill locations are constructed and pilot holes are drilled and a geophysical log of the hole is made. The geologist checks the actual geophysical log versus the estimate and revises the casing and completion interval accordingly. The well casing is then installed, cemented in place and the cement allowed to cure. The well is then completed by under-reaming the desired monitor interval and possibly installing a well screen, if necessary. The final step for the drilling rig is to develop the completion interval by "airlifting" the well. After the rig moves off the location, a mechanical integrity test (MIT) is performed on the well. Following the MIT, a swabbing unit is typically used to develop the well again to insure an adequate completion. The final step is the installation of a pump, water level measurement, and sampling for water quality.

1.2.2 Water Quality (OP 3.6.4.1)

The water quality data provides the baseline assessment for the monitor well ring as well as the excursion detection procedure. Baseline water quality in the monitor ring is determined from four sampling events prior to production operations. Subsequent operational sampling is compared to the upper control limits (UCLs) for chloride, conductivity and total alkalinity. The same procedure will typically be used to evaluate baseline conditions in any observation wells installed, although multiple rounds of sampling and analysis may not occur to determine baseline. As the monitor and/or observation well samples are collected, they are evaluated in the on-site laboratory for the excursion parameters. The analytical results are put in the monitor well database and compared against previous results and the UCLs for significant changes or trends. This analysis indicates whether the mine unit is operating as planned or whether an excursion or a trend toward an excursion is occurring. Section OP 3.6.4.3 details the measures in excursion detection and verification.

Any adverse trend in water quality is reported to the site Operations Manager who will work with his staff to reverse the affects. Methods for trend reversal include modifying pattern balance in the region and increasing localized bleed (OP 3.6.4.4). Also included in this process is the review of well completion records, area geology and well history to insure no issues exist with any of the well placements or completions.

1.2.3 Water Levels

Sudden changes in water levels may indicate that the mine unit flow is out of balance. Increases in water levels in the overlying or underlying aquifers may be an indication of fluid migration from the production zone. Flow rates would be adjusted to correct this situation (**OP 3.6.4.2 through 4**). Adjustments to well flow rates or complete shutdown of individual wells may be required to correct this situation. Increases in water levels in the overlying or underlying aquifers may also be an indication of casing failure in a production, injection or monitor well. Isolation and shutdown of individual wells can be used to determine the well causing the water level increases. **Figure OP A2-5** provides the typical monitor well data review process in flowchart form.

Baseline water levels in the monitor ring are determined during four sampling events prior to production operations. Subsequent operational sampling water levels are put in the monitor well database and compared against previous results and the baseline data for significant changes or trends. This trend analysis may indicate an unbalanced group of patterns and may be the precursor to an increase in water quality parameters. Analysis may be in the form of numerical, graphical or both. **Figure OP-A2-1** depicts one form of this review method. In this example, a significant change is highlighted after the May 15 sample. However, this method does not provide the entire water balance picture.

In the case of ring monitor wells, an additional review method that will be used in conjunction with the individual water levels is a "rose" or "radar" plot. The "Rose Diagram" provides a quick, visual method to identify these changes over time and aids the reviewer in recognizing anomalous regional trends. Changes will trigger a review of operational activities within the area of interest and a possible modification of operating flow rates and pattern balance. The water level data for all the monitor wells of the same horizon are plotted radially and anomalies are graphically noted. In the rudimentary example shown in **Figure OP A2-2**, it is easily seen that a "mounding" of water is occurring at M-101. The plot during actual operations would include all the wells in the entire monitor ring, typically.

In the case of overlying and underlying monitor wells, the water level data will be plotted on a standard line graph along with the baseline water level. Any increase in the water level above baseline or an increase in water level of greater than ten feet will result in an immediate investigation to determine the cause. The review of water level data plots will typically be performed on a computer monitor.

Any identified problematic trend in water levels will typically be reported to the site Operations Manager who will work with his staff to reverse the affects. The magnitude of change which will trigger an action is somewhat subjective. A change in water level will be relative to operational activities such as the start up or shut down of a header house or a pump test in an adjacent mine unit. Basic to the review is the baseline water level data and, more importantly, the trending of the water levels (The baseline water level will be included in all plots used to assess water balance). Irrespective of operational activities, the reviewer will look for significant changes in water level (approximately ten feet or more). The reviewer will also look for water level changes the show that baseline water levels have been exceeded. In the event that baseline water levels are exceeded or if there is a water level change of greater than 10 feet, an investigation will be performed. Corrective actions will be taken as dictated by the results of the investigation.

Methods for trend reversal include modifying pattern balance in the region and increasing localized bleed. In particular, a trial and error system involving modifying injection and bleed patterns will be used to determine the exact location of the problem, i.e., the injection wells near the mounding would be turned off one at a time and the effects on the water level noted until the appropriate well or combination of wells was found. These wells and their associated patterns would then be re-balanced to properly affect the balance in the monitor wells. Also included in this process is the review of well completion records, area geology and well history to insure no issues exist with any of the well placements or completions.

Additional controls may include detailed monitoring of water levels adjacent to new production areas during the first two weeks of start-up, installation of observation wells as deemed hydrologically pertinent and/or installation and full-time monitoring of permanent piezometers in wells of concern.

1.3 Header Houses (GEIS 6.3.2; OP 3.6)

Header houses are the interface and measurement point between the Plant, pipelines and the well patterns. Each header house will consist of an injection and production header where the lixiviant will go to/come from the wells. The houses will also be the point where power control, instrumentation and oxygen distribution will occur. The attached **Figure OP-A2-3** depicts the header house instrumentation systems in general form.

1.3.1 Pattern Balance

This balance is the key component to maintaining hydrologic control within header houses and the mine units. Several tools will be used in pattern balance: individual well flow rates, monitor well water levels and overall bleed. The individual well flow rates are gathered when the fluid from/to each well travels through its "meter run" and the flow rate is measured. Monitor well water levels are obtained (prior to constituent sampling) approximately every two weeks and bleed is the amount of fluid removed from the system to insure a cone of depression in the pattern area. The engineering control aspects of pattern balance are: flow design, flow control, flow measurement, monitor well sampling and bleed as outlined in the following subsections.

1.3.1.1 Flow Design

Once the well patterns are installed, the designing engineer and operations staff will designate "balanced" flow values for each injection well based on the associated production flow rate. **Figure OP-A2-4** details the process for flow determination. Flow rates may be modified from the original, theoretical balance in the event that monitor well water level data shows an imbalance in the field. The Operations staff will work to adjust the injection/production balance to reduce outward flow toward the monitor wells. This is typically performed in small increments to verify the change will affect the appropriate response in the ring. The change may come in the form of a localized reduction in injection, a localized increase in production, or some combination of each.

1.3.1.2 Flow Control

Wellfield operators will inspect each house daily to physically monitor and adjust the flow in the wells. They will review the pattern balance based on production well performance and adjust the injection wells accordingly. If special balance conditions exist such as excursion control or monitor well water level "mounding", the operator may be required to operate a group of patterns in an underbalanced mode. In other words, the injection well flow rates will be set below the balance level to increase the localized bleed. The operator will use a control valve and the flow meter reading on the injection meter run to set each individual injection well rate. In this case, the operations staff may obtain additional monitor well (including overlying and underlying) water level data to substantiate the changes made in pattern balance and confirm that the changes are providing the appropriate response.

1.3.1.3 Flow Measurement

This measurement will occur via a flow meter installed on each injection and production meter run. Wellfield operators will inspect each house daily to physically monitor the flow in the wells. In addition, the flow data will be transmitted to the Plant computer for review, analysis, and alarm. Additional bulk measurement (See Section 1.1.1) will occur on the injection and production header to facilitate comparison against Plant flow for pipeline leak detection.

1.3.1.4 Data Comparison and Review

Data analysis will occur after the flow data has been transmitted to the Plant computer system for the following:

Individual Wells

Comparative analysis will be used to monitor for significant changes in individual well flow rates. A significant change could be an indicator of an upset condition either inside the header house or in the piping between the header house and the well head. Changes of this nature will cause an alarm and the wellfield operator will be notified for visual inspection of the well and/or to reset the well to the appropriate flow rate for proper balance.

Pattern Balance

The transmitted data will be used by operations staff to review pattern balance. This will be used in conjunction with monitor well water level data to insure the balance does not have a negative effect on fluid migration. As noted above, this may result in routine daily adjustments or modifications in pattern balance as well.

1.3.1.5 Monitor Well Sampling

Normal monitor well sampling will occur at least twice per month, and no less than ten days apart. Sampling consists of obtaining a static water level followed by a monitor well sample to be analyzed for the excursion constituents. The water level will be compared to previous water levels as well as other water levels in the mine unit. A change in water level will be relative to operational activities such as the start up or shut down of a header house or a pump test in an adjacent mine unit. Irrespective of operational activities, the reviewer will look for significant changes in water level (approximately ten feet or more).

1.3.1.6 Bleed

Bleed, or the net amount of fluid withdrawn from the production system, is estimated to be between 0.5 and 1.5 percent. This volume may vary based on responses to operational activities as seen through water levels in the monitoring ring, but is generally anticipated to be at 1 percent of the total injection/production flow through the plant. The bleed is taken to create a cone of depression within the production zone and pull groundwater towards the patterns. This is true for not only the production horizon, but also for the overlying and underlying formations if leakage exists to those zones. As previously stated, bleed may be locally elevated by either increasing production or decreasing injection within a pattern or group of patterns to reduce hydrologic mounding.

1.3.2 Pressure Control

Controls exist within the header house to insure that operational pressure requirements are not exceeded for: lixiviant injection and production and for oxygen injection, as outlined in the following subsections.

1.3.2.1 Lixiviant Injection

Pressure on the injection header will be measured and transmitted to the Plant control room for comparison with the

Plant pipeline exit pressure. If the difference, less losses for elevation and friction, are significant then an alarm will be generated. This may be an indication of a pipeline leak or non-functioning equipment.

Low Pressure

A low pressure switch will be installed on the injection header. It is designed to alarm (locally and at the Plant) for a leak on the injection system as well as interlock with the oxygen system to insure oxygen injection occurs only in conjunction with lixiviant injection. This switch will also interlock with the injection control valve and shut flow off (in operational mode) to the injection header to minimize the volume in case of a spill. OP 3.4 and OP 3.6.1 discuss the pressure levels partially established by MIT and pressure monitoring at the header.

High Pressure

A high pressure switch will also be installed on the injection header. It is designed to shut down injection via the control valve to insure all regulatory pressure requirements are met. Those requirements are detailed in OP 3.4 and OP 3.6.1. High pressure alarms will be generated locally and at the Plant.

1.3.2.2 Lixiviant Production

Pressure on the production header will be measured and transmitted to the Plant control room for comparison with the Plant pipeline entrance pressure. If the difference, less losses for elevation and friction, are significant then an alarm will be generated. This may be an indication of a pipeline leak or non-functioning equipment.

Low Pressure

A low pressure switch will be installed on the production header. It is designed to alarm (locally and at the Plant) for a leak on the production system or to indicate an electrical problem causing the production pumps to not operate properly.

High Pressure

A high pressure switch will also be installed on the production header. It is designed to shut down production via the motor control center to insure piping pressure ratings are not exceeded. High pressure alarms will be generated locally and at the Plant.

1.3.2.3 Oxygen Injection

The oxygen system in each header house will have solenoid operated valves that will close in the event of a power loss or injection flow shutdown. This will prevent the continued delivery of oxygen to the pipeline when the field is not operating. High and low data points will be set for oxygen injection piping within the header houses. If pressures are outside the set points, operators will be notified via alarm and will address the upset condition.

1.3.3 Leak Detection (OP 3.5)

Mine unit leak detection is focused in three main areas: pipelines feeding the mine unit and Plant, header houses and pattern areas. The engineering controls associated with each area are:

1.3.3.1 Pipelines

Leak detection will occur in the form of flow and pressure measurement and comparison. If changes occur in the measured variables, then an alarm will occur. Additionally, more conventional methods of leak detection occur continually during production operations. Standard operating procedures (SOP's) will require routine inspection of pipeline right-of-ways (ROWs) and valve station inspections. Operators will be trained to look for leak indicators in their visual inspections of pipeline ROWs.

Flow

Flow will be measured at pipeline entrance and exit points at the Plant and the header houses. Flow data from the header house will be transferred to the Plant and compared through the Plant PLC to determine if a leak is present. If the change in flow is beyond the set point (allowing for accuracy in the measurement devices), then an alarm will occur.

Pressure

Pressure will be measured at pipeline entrance and exit points at the Plant and the header houses. Pressure data from the header house headers will be transferred wirelessly to the Plant and compared through the Plant PLC to determine if a leak is present. If the change in pressure is beyond the set point (allowing for friction and elevation), then an alarm will occur.

1.3.3.2 Header Houses

Leak detection will occur in the form of pressure and flow measurement and comparison as well level indication in the sump. If changes occur in the measured variables, then an alarm will occur. Additionally, more conventional methods of leak detection occur continually during production operations. Standard operating procedures (SOP's) will require inspection of each header house each shift. Operators will be trained to look for leak indicators in their visual inspections.

Flow

Flow is measured at each well meter run and on the injection and production headers. As discussed above, comparative analysis is used to determine if significant changes exist and alarms will occur. Wellfield operators are notified upon alarm and a visual inspection is required to determine the nature of the upset condition.

Pressure

Pressure is measured on the injection and production headers and is transmitted to the Plant. Pressure switches are used to detect upset conditions in the headers. If the injection header appears to have a failure, the injection control valve will close and stop lixiviant flow to the header house. If the production header pressure is above or below the pressure switch set points, then the motor control center will be shutdown which will, in turn, shut all production well flow to the header house. Wellfield operators will be notified upon alarm and a visual inspection will be required to determine the nature of the upset condition.

Sump

The sumps should be dry; therefore, water levels and the operating status of the sump pumps in the header house basements will be monitored and transmitted to the Plant for review and alarm. A low level indication in the sump will initiate an alarm as well as begin pumping sump fluid into the production header. A high sump level will continue to alarm but will also shut down flow into and out of the header house.

1.3.3.3 Pattern Areas

Leak detection will occur via flow and pressure measurements and via wellhead equipment at each well. SOP's will require inspection of each header house each shift. Operators will be trained to look for leak indicators in their visual inspections.

Flow

Flow will be measured at each well meter run. As discussed above, comparative analysis will be utilized to determine if significant changes exist and alarms will occur. Wellfield operators will be notified upon alarm and a visual inspection will be required to determine the nature of the upset condition.

Pressure

Pressure indication is available on each meter run and will also be used as an indicator of a potential leak. Pressure is not a good leak indicator on injection wells, as they may operate at different pressures depending upon recent workover status and reservoir loading. The same is true of production wells as a drop in pressure could be an indicator of a failed pump, a failure in the downhole tubing used to support the pump or a failure in the piping from the well. Any changes in pressure data will be noted by operators and visual inspections of lines and systems will be completed to insure system integrity.

Wellheads

Each wellhead (injection and production) includes leak detection into its construction. Each wellhead cover includes a catch - basin and an alarm contactor. The contactor's circuit will complete if fluid is present in the catch-basin and a local and Plant alarm will occur. A wellfield operator will be notified upon alarm and a visual inspection will be required to determine the nature of the upset condition.

2.0 Plant

2.1 Ion Exchange (GEIS 2.4.2.1)

2.1.1 Flow / Water Balance

As pregnant lixiviant (also called production concentrate [PC]) from the production wells enters the ion-exchange circuit, it is sent to the ion-exchange columns. The lixiviant exiting the ion-exchange columns normally contains less than 5 mgL of uranium. The PC flow rate is monitored entering the Plant and at each of the ion exchange columns. This is the total flow from the header houses, i.e. the production wells. The flow rates will be compared through the PLC and an alarm generated if the difference is outside the set point (based on meter accuracy). The purpose of this comparison is to look for pipeline leaks between the header houses and the Plant by comparing total well field production well output to total Plant input.

The barren lixiviant (also called injection concentrate [IC]), is recharged with oxidant and bicarbonate, and is returned to the well field for reinjection. The production bleed is removed downstream of the ion-exchange columns, before re-injecting the barren lixiviant into the well field. The total bleed is estimated to be between 0.5% and 1.5% of the total well field production flow. IC flow rate is monitored leaving the Plant and, similar to the PC, is compared to the IC flow rates at the header houses through the Plant PLC. An alarm will be generated if the difference is outside the set point (based on meter accuracy). The purpose of this comparison is to look for pipeline leaks between the Plant and the header houses.

2.1.2 Pressure

Pressure readings will be utilized in a comparative manner to determine if an upset condition exists (leaking pipeline, fitting or valve) in the well field piping similar to the flow comparison. Entry and exit pressures for IC and PC lines at the header houses will be monitored and compared to the Plant IC and PC pressures through the PLC with allowances for friction and elevation changes. An alarm will be generated if the difference is outside the head loss allowances.

2.2 Elution (GEIS 2.4.2.2)

After the resin is loaded with uranium, it enters the elution circuit where the uranium is washed (eluted) from the resin, and the resin is made available for further cycles of uranium absorption. The resin will be transferred to a separate elution tank where the uranium is removed from the resin by flushing with a concentrated brine solution (eluant). After the uranium has been stripped from the resin, the resin may be rinsed with a sodium carbonate or bicarbonate solution. This rinse removes the high chloride eluant physically entrained in the resin and partially converts the resin to bicarbonate form. The resulting uranium-rich solution is termed pregnant or rich eluant. After enough pregnant eluant is obtained, it is moved to the precipitation, drying, and packaging circuit. All facets of the elution system are monitored to optimize chemical usage and minimize water usage. Monitored parameters include, but are not limited to: flow rates, fluid volume/level, pH and pressure. These types of engineering controls are designed to reduce waste disposal water and thus overall water consumption.

2.3 Precipitation (GEIS 2.4.2.3)

In the precipitation circuit, the pregnant eluant will be acidified to destroy the uranyl carbonate complex. Hydrogen peroxide (H2O2) is then added to precipitate the uranium as uranyl peroxide. Caustic soda (NaOH) is also added at this stage to neutralize the acid remaining in the eluate. The (now barren) eluant is recycled. Water left over from these processes will be reused in the eluant circuit or added to the waste stream to be included in deep disposal. All facets of the precipitation system are monitored to optimize chemical usage and minimize water usage. Monitored parameters include, but are not limited to: flow rates; fluid volume/level; pH; and slurry density. These types of engineering controls are designed to reduce waste disposal water and thus overall water consumption.

2.4 Slurry Storage (GEIS 2.4.2.3)

After the precipitation process, the resulting slurry is washed, filtered, and dewatered. At this point, the slurry is 30 to 50% solids. This thickened slurry will be stored in tanks in preparation for transport offsite to a uranium processing facility to produce yellowcake. Process water will be reused as possible in the elution and precipitation circuits. Filter press wash times will be minimized through monitoring of fluid flow rates and pressures as well as routine conductivity measurement on the filter press wash water discharge. Conductivity is a direct indication of chloride and thus the slurry cleanliness.

2.5 Waste Water Disposal (GEIS 2.4.3)

Uranium mobilization and processing produce excess water that must be properly managed. The production wells extract slightly more water than is re-injected into the host aquifer, which creates a net inward flow of groundwater in the well field. This production bleed is about 0.5 to 1.5% of the circulation rate. The production bleed is diverted after the uranium is removed in the ion-exchange resin system, but before the lixiviant is recharged. This water still contains lixiviant and minerals leached from the aquifer. The excess water will go through secondary ion exchange for further uranium capture prior to being stored for deep well disposal or to be treated further through reverse osmosis. Permeate from reverse osmosis may be used for Plant makeup water or restoration purposes. Other liquid waste streams produced during ISL operation can include spent eluant from the ion-exchange system and liquids from process drains. These are handled in the same manner as the production bleed.

Specifically, the Lost Creek Project waste water disposal system will consist of two storage tanks inside the Plant, two lined storage ponds adjacent to the Plant and a network of up to five deep disposal wells located around the Permit Area as well as the transfer and injection pumps. Engineering controls for each aspect will function as follows:

2.5.1 Plant Storage Tanks

Each of the tanks will be equipped with high and low fluid level indication that will interlock with feed and transfer pumps to either limit water coming into the tanks and/or transfer water going out of the tanks to the storage ponds and/or the deep disposal wells. A low level will shut down the pumps that transfer fluid to the storage ponds or feed the deep disposal injection pumps. A high level will shut down the waste water feed pumps. High and low fluid levels will alarm to the Plant Operator and pump status will also display on the Operator's screen.

2.5.2 Lined Storage Ponds

The lined storage ponds, Section OP 5.2.3.1, will be installed as additional waste fluid storage in the event deep disposal capacity is disrupted. The primary reasons for use will be falloff testing of disposal wells or well failure(s). The Storage Ponds will be lined and equipped with a leak detection system. During operations, the leak detection standpipes will be checked for evidence of leakage. Visual inspection of the pond embankments, fences and liners and the measurement of pond freeboard will also be performed during normal operations. The criteria for determining if a leak has been detected include both water level and water quality criteria. If there is an abrupt increase in the water level in one of the leak detection standpipes or if six or more inches of water are present in one of the standpipes, the water in that standpipe will be analyzed for specific conductance. If the specific conductance is more than half the specific conductance of the water in the pond, the water will be further sampled for chloride, alkalinity, sodium, and sulfate. In addition, the liner will be immediately inspected for damage and the appropriate agencies will be notified. Upon verification of a liner leak in one of the ponds, the water level in that pond will be lowered by transferring the contents to the other pond and/or to the UIC Class I wells.

With respect to pond overflow, SOPs will be such that neither pond is allowed to fill to a point where overflow is considered a realistic possibility. Flow rates to and from the storage ponds will be monitored and pump status will also display on the Operator's screen. Since the primary disposal method will be the UIC Class I wells, the flow rates to the pond are expected to be minimal; and there will be sufficient time to reroute the flow to another pond, or to modify Plant operations to reduce flow for the critical period. If precipitation is excessive, the freeboard allowance of the ponds will be designed to contain significant quantities of precipitation before an overflow occurs. The freeboard allowance will also reduce the possibility of water blowing over the pond walls during high winds.

2.5.3 Deep Disposal Well System

Up to five total deep disposal wells are planned for the Lost Creek Project. The wells are monitored in accordance with the requirements of the UIC Class I permit; and an evaluation of the well performance is included in the Annual Report submitted to NRC and WDEQ. Each well installation consists of a deep disposal well, an injection pipeline, pump house with injection pump and a feeder pipeline from the Plant.

2.5.3.1 Deep Disposal Wells

Each well consists of steel casing with perforations into the receiver formation, with injection tubing and a packer to deliver the waste fluid to the receiver and to form a casing annulus. The annulus will be filled with corrosion inhibited fluid. The wellhead (injection) and annulus pressure will be transmitted to the Plant wirelessly where it will be monitored and trended and where alarms will occur if either exceeds limits. The injection pressure limit is detailed in the Class 1 UIC permit and is based on the fracture pressure and gradient. The annular pressure is monitored as a secondary means of maintaining mechanical integrity. If the pressure in the annulus equals the injection pressure then a failure in either the tubing or packer or both has occurred and repairs will be required.

2.5.3.2 Injection Pipeline

This pipeline consists of high pressure steel piping rated for the transfer of the waste fluid between the pump house and the well. This pipe will be buried approximately six feet below surface and will typically be less than 100 feet in length. Pressure readings at the pump house discharge and at the wellhead will be compared using the Plant PLC to determine if there is a leak. A pressure drop greater than the allowance for friction and elevation head will generate an alarm and the injection pump will be shut down.

2.5.3.3 Pump House

The pump house consists of a skid type building, motor control center, high pressure injection pump, instrumentation, leak detection, and suction and discharge piping. The following parameters are monitored: suction pressure (pump inlet pressure); suction flow rate; discharge pressure;, sump level; and pump status. All data will be transmitted wirelessly to the Plant for monitoring, trending and alarming. Suction pressure and flow rate will be compared to pressure and flow data at the Plant to determine if there is a pipeline leak. If either parameter exceeds set points which allow for friction and head loss, then an alarm will be generated and the pump(s) will be shut down. Sump level will also be monitored to two stages: low and high. A low level in the sump will alarm the Plant operator of the condition. A high level will initiate shut down of the pump(s).

2.5.3.4 Feeder Pipeline

This pipeline consists of a buried pipeline, typically HDPE, from the Plant to each well. This line may feed more than one disposal well. Pressure and flow at the start and end of the pipelines will be compared through the Plant PLC to determine if a leak is present. If the change in pressure is beyond the set point (allowing for friction and elevation), then an alarm will occur and the pump(s) will be shut down.

2.6 Restoration (GEIS 2.5)

The objective of restoration is to return the affected groundwater to the uses for which it was suitable before commencement of Project operations. The Plant restoration systems (ion exchange, reverse osmosis filtration, storage tanks, and degassers) are used to achieve this goal, and the engineering controls for each are outlined in the following subsections.

2.6.1 Ion Exchange

This system consists of two ion exchange columns designed to remove the majority of any remaining uranium from the stream. The incoming fluid flow rate is monitored entering the Plant and at each of the ion exchange columns. This is the total flow from the restoration header houses. The flow rates will be compared through the PLC and an alarm generated if the difference is outside the set point (based on meter accuracy). Pressure is also monitored as a secondary means of leak detection. The purpose of this comparison is to look for pipeline leaks between the header houses and the Plant by comparing total well field production well output to total Plant input. The barren fluid is then pumped to the reverse osmosis system for filtration.

2.6.2 Reverse Osmosis (RO)

The RO system consists of pre-filtration, pumps, instrumentation and semi-permeable membranes. The RO process yields two fluids: clean water (permeate) that can be re-injected into the aquifer and water with concentrated ions (brine) that cannot be re-injected directly. The following instrumentation (pressure transmitters, pressure gauges, conductivity meters, and flow meters) will be part of the reverse osmosis system.

2.6.2.1 Pressure Transmitters

The transmitters on the system feed and discharge will be monitored, trended and alarmed through the PLC. Operation outside of set points will alarm the Plant operator and may cause an automatic shutdown of feed and discharge pumps depending on the severity of the reading.

2.6.2.2 Pressure Gauges

The gauges on the pumps, feed, interstage and discharge and on the required pre-filtration will support operation of the system.

2.6.2.3 Conductivity

Conductivity of permeate and feed will be monitored and alarmed through the PLC. Operation outside of set points will alarm the Plant operator and necessitate review of the RO performance. This may trigger additional cleaning of membranes.

2.6.2.4 Flow

Flows of permeate and concentrate will be monitored, trended and alarmed through the PLC. Operation outside of set points will alarm the Plant Operator and may cause an automatic shutdown of one or more of the pumps.

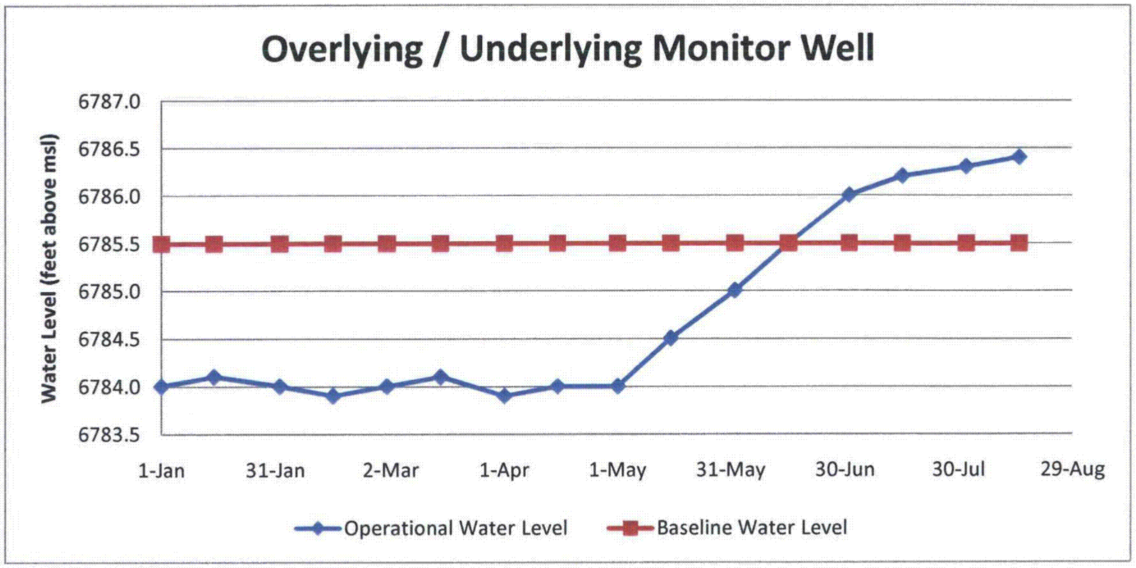
2.6.3 Storage Tanks

Permeate and brine streams will each be stored in tanks prior to shipment. The brine will be added to the waste water tanks previously discussed in Section 2.5 (Waste Water Disposal). The permeate tank will be equipped with high and low fluid level indication that will interlock with feed and transfer pumps to either limit water coming into the tanks and/or transfer water going out of the tanks to the wellfield. A low level will shut down the pumps that send fluid to the wellfield for reinjection as part of the restoration process. High and low fluid levels will alarm to the Plant Operator and pump status will also display on the Operator's screen.

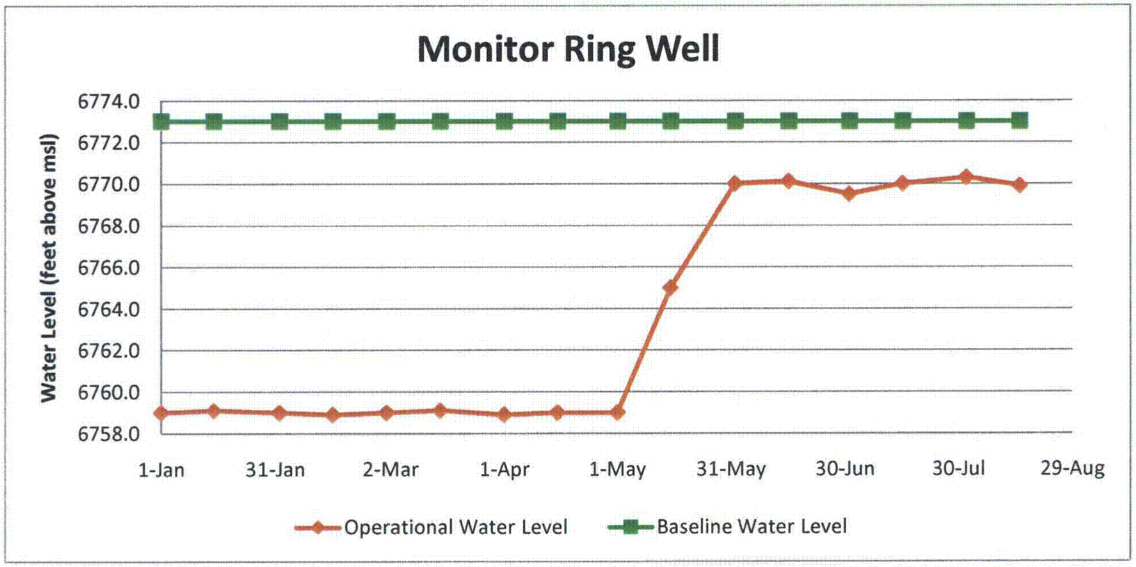
2.6.4 Degasser

The purpose of the degassers is to liberate carbon dioxide and moderate pH prior to permeate reinjection. The units will monitor, trend and alarm pH and pressure through the Plant PLC.

FIGURE OP-A2-1 Example of Change in Water Level in Monitoring Wells

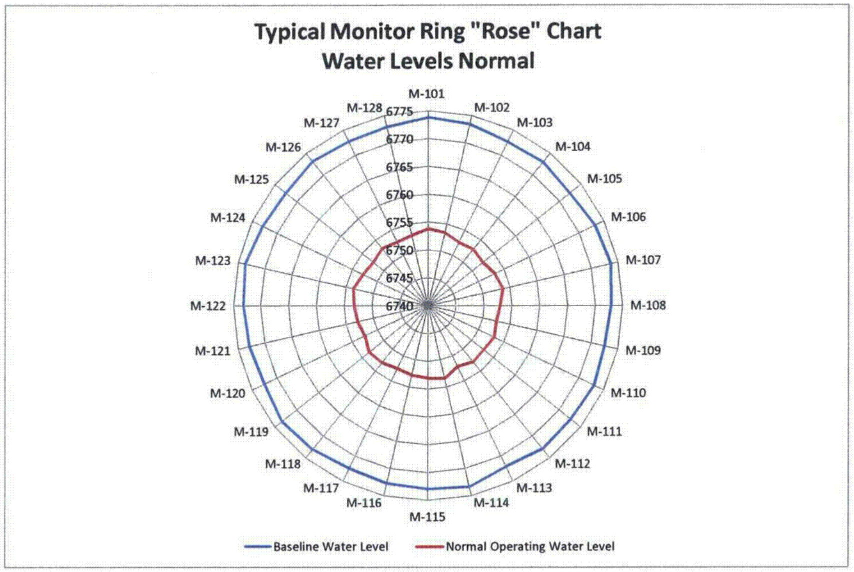


Date	Water Lvl	Change
1-Jan	6784.0	
15-Jan	6784.1	0.1
1-Feb	6784.0	-0.1
15-Feb	6783.9	-0.1
1-Mar	6784.0	0.1
15-Mar	6784.1	0.1
1-Apr	6783.9	-0.2
15-Apr	6784.0	0.1
1-May	6784.0	0.0
15-May	6784.5	0.5
1-Jun	6785.0	0.5
15-Jun	6785.5	0.5
1-Jul	6786.0	0.5
15-Jul	6786.2	0.2
1-Aug	6786.3	0.1
15-Aug	6786.4	0.1



Date	Water Lvl	Change
1-Jan	6759.0	
15-Jan	6759.1	0.1
1-Feb	6759.0	-0.1
15-Feb	6758.9	-0.1
1-Mar	6759.0	0.1
15-Mar	6759.1	0.1
1-Apr	6758.9	-0.2
15-Apr	6759.0	0.1
1-May	6759.0	0.0
15-May	6765.0	6.0
1-Jun	6770.0	5.0
15-Jun	6770.1	0.1
1-Jul	6769.5	-0.6
15-Jul	6770.0	0.5
1-Aug	6770.3	0.3
15-Aug	6769.9	-0.4

Figure OP-A2-2 Example of Rose Diagrams - Normal and Mounding Conditions



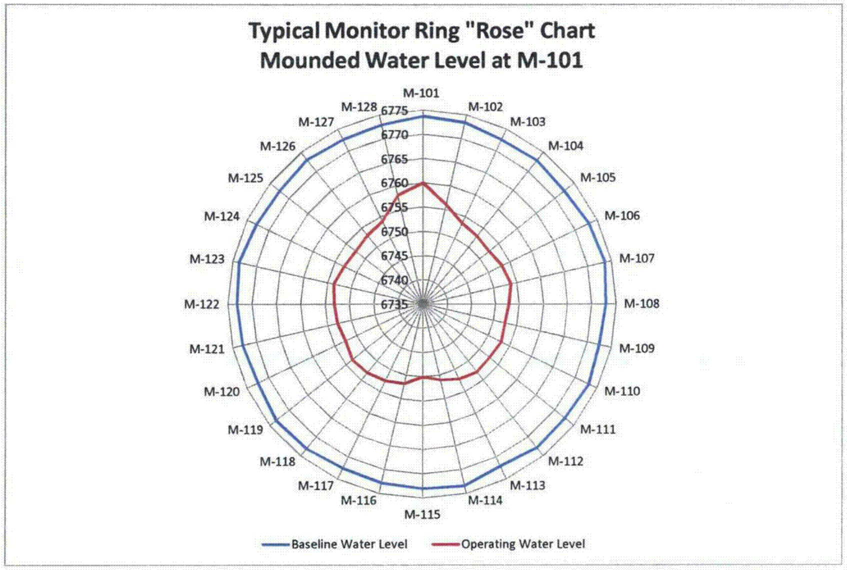
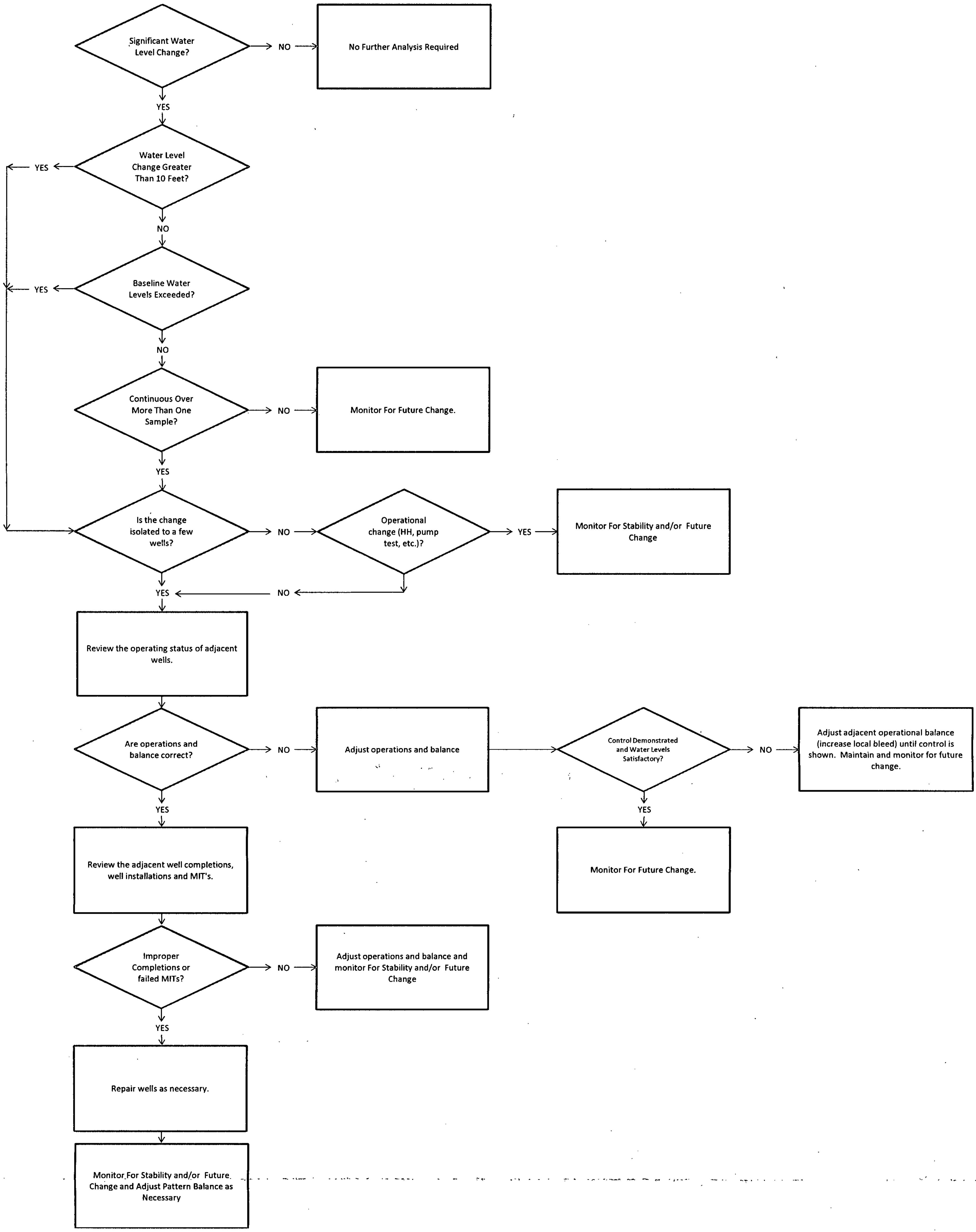


FIGURE OP A2-5, rev 2 - 111510
LOST CREEK ISR, LLC. - WATER LEVEL CHANGE REMEDIATION



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FIGURES

- the total vegetation cover and species diversity and composition are quantitatively assessed in accordance with procedures approved by WDEQ-LQD.

Because many of the reclaimed areas are relatively small in comparison with the Permit Area and because of the similarity of the vegetation communities at the site, LC ISR,

LLC will delineate a comparison area in an undisturbed portion of the site at least six months prior to evaluation of revegetation success. In addition, LC ISR, LLC will describe the quantitative methods to be used for comparing the total vegetation cover in the reclaimed and undisturbed areas and for evaluating species diversity and composition. These methods, as well as the size and location of the comparison area, will be submitted to WDEQ-LQD for review and approval at least six months prior to the fifth full growing season.

RP 4.6 Recovery of Groundwater Levels

Once ISR operations cease, water levels will begin to recover to pre-ISR levels. An estimate of the time required for water levels to recover following completion of ISR operations at Mine Unit 1 (MU1) was performed using a numerical groundwater flow model. The model was developed using site-specific data based on geologic and hydrologic information collected from site characterization activities. The model development, calibration and simulations are described in the report "Numerical Modeling of Hydrologic Conditions at the Lost Creek In-Situ Recovery Uranium Project, Wyoming" (Petrotek 2010).

Simulations were run representing the full production-restoration sequence for MU1. The simulation included a production phase at a maximum rate of 5,838 gpm (with a net bleed of 38 gpm) for a period of 26 months (791 days), groundwater sweep at 30 gpm for 12 months (365 days), and treatment with RO at 541 gpm for 18 months (548 days). During RO, the simulated consumptive use (reject brine) was 67.6 gpm. The total operational period for MU1 was simulated as 56 months (4.75 years). The average rate of extraction for the 4.75-year model simulation is 45.8 gpm. A recovery period of 5 years (1,825 days) was also simulated. During the simulated recovery period, water levels returned to within one foot of pre-mining levels in less than one year.

Simulated recovery of water levels in the HJ Horizon aquifer after termination of ISR operations is illustrated by placing observation points on the northwest, southwest, northeast and south-central edges of the Lost Creek Permit Area. **Figure RP-5a** shows the location of the simulation monitoring points. **Figure RP-5b** illustrates the simulated drawdown that occurs during ISR operations at MU1 and the recovery following termination of operations.

Although the model simulation only represents production and restoration from a single mine unit, the production rates and RO rates are maximized. During various stages of the Lost Creek ISR operations, multiple mine units are projected to be simultaneously in production and/or restoration. This may result in greater drawdown than simulated in the single mine unit model. However, the magnitude of drawdown and the duration of recovery are anticipated to be similar. Even if the drawdown is increased by twofold during ISR operations, recovery of HJ Horizon aquifer water levels to pre-mining conditions should occur within a few years after the end of the Lost Creek ISR Project.

RP 5.0 FINANCIAL ASSURANCE

LC ISR, LLC will establish and maintain appropriate surety arrangements with NRC and WDEQ to cover the costs of groundwater restoration, radiological decontamination, facility decommissioning, and surface reclamation. The surety will be reviewed annually and adjusted to reflect changes in cost and in the Project.

The surety estimate for the Project for the first year after the permit receipt, including surface reclamation of all the facilities, including the Plant, and groundwater restoration and reclamation of Mine Unit 1's first six header houses, is $6,151,685. Restoration costs for additional mine units and header houses will be added to the surety as the mine units are brought online. The anticipated schedule and approximate amounts for the bond increases associated with the additional mine units are shown on **Figure RP-3**.

A detailed description of this surety estimate is provided in **Table RP-4**, and the schedule on which the estimate is based is detailed in **Figure RP-4**. The table includes a summary page and a series of worksheets with itemized costs for the reclamation and restoration activities. Each worksheet covers a particular task or associated tasks, such as Building Demolition. Worksheets are provided for:

- groundwater restoration,
- building demolition (including disposal),
- pond reclamation (including disposal of pond materials),
- well abandonment,
- mine unit equipment, and
- topsoil and revegetation.

Table RP-5 provides information on quantities and weights of equipment for the demolition calculations.

The Bond Estimate (**Table RP-4**) is divided into the following categories:

Category 1) Groundwater Restoration (Worksheet 1),
Category 2) Decommissioning and Surface Reclamation (Worksheets 2 – 8), and
Category 3) Miscellaneous Costs Associated with Third Party Contractors and Contingency (summary [first] page of **Table RP-4**).

Category 1) Groundwater Restoration

Worksheet 1 in **Table RP-4** supports the bonding requirement for Mine Unit 1 in 2007 dollars. The assumptions are broken down into Technical, Operating and Cost categories and are shown in the left hand columns. The right hand columns provide an explanation as to the line item and the source (data, calculated, rate, and similar information). The capital investment for equipment is included in initial plant construction. All required restoration equipment will be installed prior to initiating production (**Figure OP-4a**). The restoration analytical costs are summarized in **Table RP-5**. Additional mine units are estimated for future bonding to be of similar size and character to Mine Unit 1.

Category 2) Decommissioning and Surface Reclamation

Worksheet 2 supports the bonding requirement for Plant Equipment Removal and Disposal in 2007 dollars. The quantity of materials to be removed is summarized in **Table RP-5**. The assumptions are based on current labor and trucking costs. The right hand columns provide an explanation as to the line item and the source (data, calculated, rate, and similar information).

Worksheet 3 supports the bonding requirement for Facility Buildings Demolition and Disposal in 2007 dollars. The quantity of materials to be removed is based on the plant design as shown in **Plate OP-2** as well as the header house and drill shed designs. The assumptions are based on current labor, equipment and trucking costs. The right hand columns provide an explanation as to the line item and the source (data, calculated, rate, and similar information).

Worksheet 4 supports the bonding requirement for Storage Pond Reclamation in 2007 dollars. The quantity of materials to be removed is based on the preliminary pond design including liner and leak detection materials. The assumptions are based on experience, current labor, equipment and trucking costs. The right hand columns provide an explanation as to the line item and the source (data, calculated, rate, and similar information).

Worksheet 5 supports the bonding requirement for Well Abandonment and for Mine Unit Equipment Removal and Disposal for Mine Unit 1 in 2007 dollars. The quantity of materials for abandonment is based on use of Class G Cement to plug the wells from total depth to surface. The assumptions are based on experience, current labor and equipment costs. The right hand columns provide an explanation as to the line item and the source (data, calculated, rate, and similar information). Additional mine units are estimated for future bonding to be of similar size and character to Mine Unit 1.

Worksheet 6 supports the bonding requirement for Mine Unit Equipment Removal and Disposal for Mine Unit 1 in 2007 dollars. The quantity of materials is based on the current anticipated design for production systems for Mine Unit 1. The assumptions are based on experience, current labor, equipment and trucking costs. The right hand columns provide an explanation as to the line item and the source (data, calculated, rate, and similar information). Additional mine units are estimated for future bonding to be of similar size and character to Mine Unit 1.

Worksheet 7 supports the bonding requirement for Topsoil Replacement and Revegetation for Mine Unit 1 and the Storage Ponds in 2007 dollars. The affected area is a conservative estimate (5 of 40 total acres) that will require topsoil handling and grading. **Figure OP-7b** details the area of disturbance on a header house basis. The assumptions are based on experience, and current labor, equipment and material costs. The right hand columns provide an explanation as to the line item and the source (data, calculated, rate, and similar information). Additional mine units are estimated for future bonding to be of similar size and character to Mine Unit 1.

Worksheet 8 supports the bonding requirement for Miscellaneous Reclamation in 2007 dollars. The areas of bonding are for removal of fencing, powerline, culverts, other utilities, and disposal well pipelines. The assumptions are based on experience, current labor, equipment and trucking costs. The quantities are based on initial engineering designs for Mine Unit 1 and associated systems. The right hand columns provide an explanation as to the line item and the source (data, calculated, rate, and similar information). Additional mine units are estimated for future bonding to be of similar size and character to Mine Unit 1.

Category 3) Miscellaneous Associated with Third Party Contractors and Contingency

The Summary of Reclamation/Reclamation Bond Estimate supports the bonding requirements for Miscellaneous Third Party Contractors and Contingency in 2007 dollars. The costs are a percentage of the total restoration and reclamation costs detailed in Worksheets 1 through 8 and are 25 percent for miscellaneous and four percent for additional contingency. These percentages are taken directly from WDEQ-LQD

Guideline 12 Section (II)(B)(12 and 13) for large non-coal operations. The total add-on costs are 29 percent.

Figure RP-4 Bond Schedule Detail for the Plant and Mine Unit One

		YEAR 1											
Area	Module	M 1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
	Construction												
	Production												
PLANT	Restoration												
	Reclamation												
	1-1												
	1-2												
MU-1	1-3												
	1-4												
	1-5												
	1-6												
	Production gpm							640	1280	1920	2560	3200	3840
	GW Sweep gpm												
	Reverse Osmosis gpm												
	Recirculation gpm												
	Water Disposal gpm							16	23	29	36	42	48
	Headcount	22	24	24	24	50	52	52	47	46	45	45	36
1	Mine Manager	1	1	1	1	1	1	1	1	1	1	1	1
1	Supervisor IT-Admin	1	1	1	1	1	1	1	1	1	1	1	1
1	Accountant					1	1	1	1	1	1	1	1
1	Technician Instrument		1	1	1	1	1	1	1	1	1	1	1
1	Technician IT		1	1	1	1	1	1	1	1	1	1	1
1	Secretary						1	1	1	1	1	1	1
1	Warehouseman					1	1	1	1	1			
1	Supervisor EHS	1	1	1	1	1	1	1	1	1	1	1	1
1	Technician EHS	1	1	1	1	1	1	1	1	1	1	1	1
1	Sampler EHS						1	1	1	1	1	1	1
1	Site Chief Geologist	1	1	1	1	1	1	1	1	1	1	1	1
1	Supervisor Drilling	1	1	1	1	1	1	1					
1	Staff Geologist	1	1	1	1	1	1	1	1	1	1	1	
1	Draftsman	1	1	1	1	1	1	1	1	1	1	1	
1	Backhoe Operator	1	1	1	1	1	1	1	1	1	1	1	1
3	Casing Tech	3	3	3	3	3	3	3					
2	Geotech Logger	2	2	2	2	2	2	2	1	1	1	1	1
1	Project Engineer	1	1	1	1	1	1	1	1	1	1	1	1
1	Foreman WFC	1	1	1	1	1	1	1	1	1	1	1	
1	Electrician WFC	1	1	1	1	1	1	1	1	1	1	1	
1	Lead Tech WFC	1	1	1	1	1	1	1	1	1	1	1	
4	Technician WFC	4	4	4	4	4	4	4	4	4	4	4	
1	Foreman Maint					1	1	1	1	1	1	1	1
4	Technician Maint					4	4	4	4	4	4	4	4
1	Electrician Maint					1	1	1	1	1	1	1	1
1	Manager Operations					1	1	1	1	1	1	1	1
1	Foreman Operations					1	1	1	1	1	1	1	1
4	Wellfield Operator					4	4	4	4	4	4	4	4
3	Technician WF Maint					3	3	3	3	2	2	2	2
1	Foreman Plant					1	1	1	1	1	1	1	1
4	Plant Operator					4	4	4	4	4	4	4	4
1	Dryer Operator					1	1	1	1	1	1	1	1
1	Lab Chemist					1	1	1	1	1	1	1	1
2	Technician Lab					2	2	2	2	2	2	2	2
4	Restoration Operator												
4	Reclamation Crew												
MINE UNIT 1													
Drilling													
	Pilot Rig Ct			2	2	2	2	2	2				
	Pilot - 32 wls/mo/rig			1-1	1-2	1-3	1-4	1-5	1-6				
	Ream/Case Rig Ct				4	4	4	4	4	4			
	Case - 16 wls/mo/rig				1-1	1-2	1-3	1-4	1-5	1-6			
	U/R-G/P Rig Ct					4	4	4	4	4	4		
	U/R - 16 wls/mo/rig					1-1	1-2	1-3	1-4	1-5	1-6		
	MIT - 48 wls/mo/rig												
Construction													
	Pipeline												
	Powerline												
	Roads												
	Header Houses						1-1	1-2	1-3	1-4	1-5	1-6	

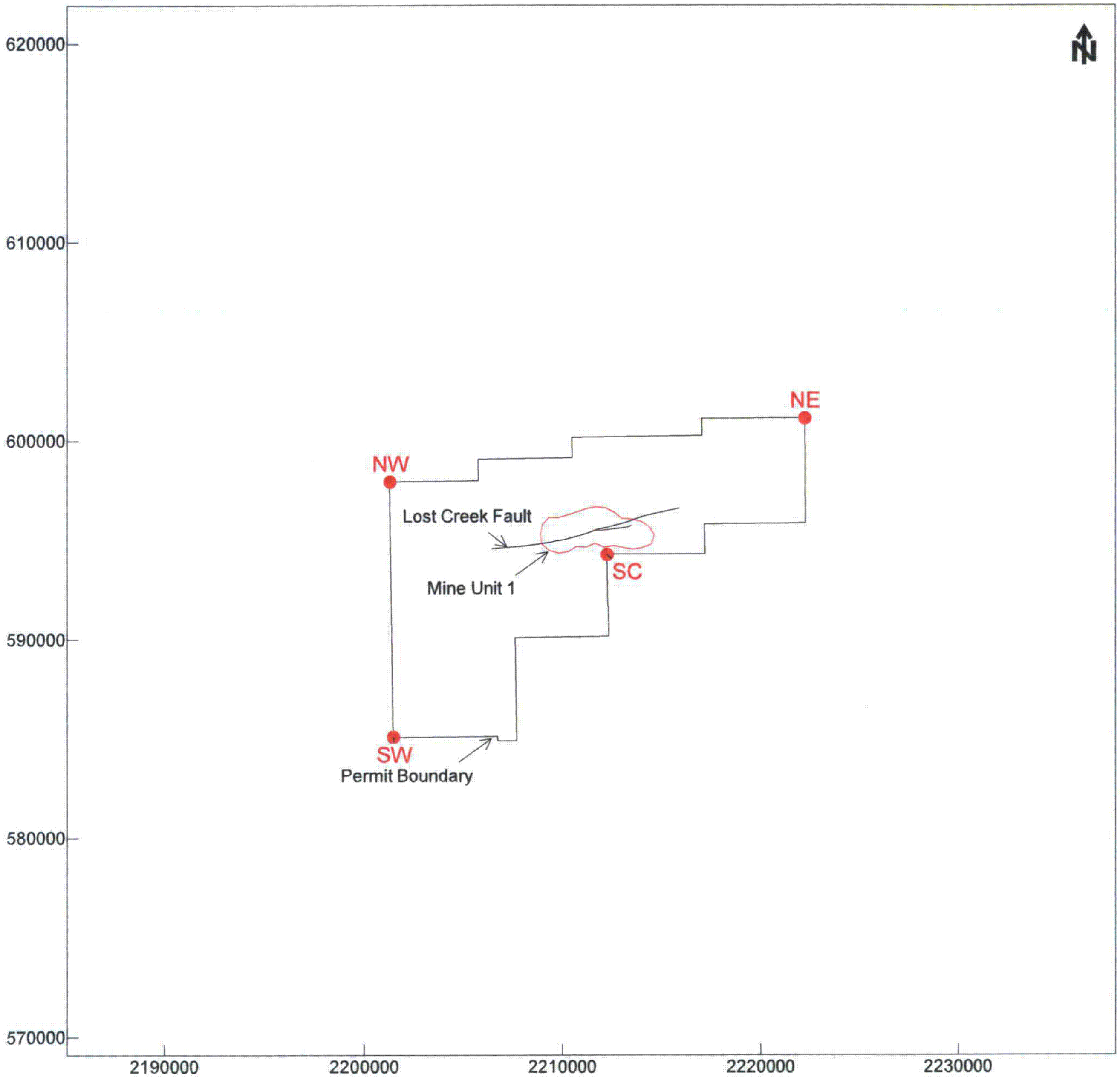
		YEAR 2											
Area	Module	M 1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
	Construction												
	Production												
PLANT	Restoration												
	Reclamation												
	1-1												GWS
	1-2												GWS
MU-1	1-3												GWS
	1-4												
	1-5												
	1-6												
	Production gpm	3840	3840	3840	3840	3840	3840	3200	2560	1920	1280	640	
	GW Sweep gpm												120
	Reverse Osmosis gpm												
	Recirculation gpm												
	Water Disposal gpm	48	48	48	48	48	48	42	36	29	23	16	130
	Headcount	36	36	36	36	36	35	35	35	35	35	35	17
1	Mine Manager	1	1	1	1	1	1	1	1	1	1	1	1
1	Supervisor IT-Admin	1	1	1	1	1	1	1	1	1	1	1	
1	Accountant	1	1	1	1	1	1	1	1	1	1	1	
1	Technician Instrument	1	1	1	1	1	1	1	1	1	1	1	
1	Technician IT	1	1	1	1	1	1	1	1	1	1	1	
1	Secretary	1	1	1	1	1	1	1	1	1	1	1	1
1	Warehouseman												
1	Supervisor EHS	1	1	1	1	1	1	1	1	1	1	1	1
1	Technician EHS	1	1	1	1	1	1	1	1	1	1	1	1
1	Sampler EHS	1	1	1	1	1	1	1	1	1	1	1	1
1	Site Chief Geologist	1	1	1	1	1	1	1	1	1	1	1	
1	Supervisor Drilling												
1	Staff Geologist												
1	Draftsman												
1	Backhoe Operator	1	1	1	1	1	1	1	1	1	1	1	1
3	Casing Tech												
2	Geotech Logger	1	1	1	1	1	1	1	1	1	1	1	
1	Project Engineer	1	1	1	1	1	1	1	1	1	1	1	
1	Foreman WFC												
1	Electrician WFC												
1	Lead Tech WFC												
4	Technician WFC												
1	Foreman Maint	1	1	1	1	1	1	1	1	1	1	1	
4	Technician Maint	4	4	4	4	4	4	4	4	4	4	4	
1	Electrician Maint	1	1	1	1	1	1	1	1	1	1	1	1
1	Manager Operations	1	1	1	1	1	1	1	1	1	1	1	
1	Foreman Operations	1	1	1	1	1	1	1	1	1	1	1	
4	Wellfield Operator	4	4	4	4	4	4	4	4	4	4	4	
3	Technician WF Maint	2	2	2	2	2	2	2	2	2	2	2	
1	Foreman Plant	1	1	1	1	1	1	1	1	1	1	1	1
4	Plant Operator	4	4	4	4	4	4	4	4	4	4	4	4
1	Dryer Operator	1	1	1	1	1	1	1	1	1	1	1	
1	Lab Chemist	1	1	1	1	1	1	1	1	1	1	1	1
2	Technician Lab	2	2	2	2	2	1	1	1	1	1	1	
4	Restoration Operator												4
4	Reclamation Crew												

		YEAR 3											
Area	Module	M 1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
	Construction												
	Production												
PLANT	Restoration												
	Reclamation												
	1-1		RO						[illegible]	STABILIZATION			
	1-2			RO									
MU-1	1-3				RO								
	1-4	GWS				RO							
	1-5	GWS					RO						
	1-6	GWS						RO					
	Production gpm												
	GW Sweep gpm	120											
	Reverse Osmosis gpm		760	760	760	760	760	760					
	Recirculation gpm								3840				
	Water Disposal gpm	130	110	110	110	110	110	110					
	Headcount	17	17	17	17	17	17	17	17	9	9	9	9
1	Mine Manager	1	1	1	1	1	1	1	1	1	1	1	1
1	Supervisor IT-Admin												
1	Accountant												
1	Technician Instrument												
1	Technician IT												
1	Secretary	1	1	1	1	1	1	1	1	1	1	1	1
1	Warehouseman												
1	Supervisor EHS	1	1	1	1	1	1	1	1	1	1	1	1
1	Technician EHS	1	1	1	1	1	1	1	1	1	1	1	1
1	Sampler EHS	1	1	1	1	1	1	1	1	1	1	1	1
1	Site Chief Geologist												
1	Supervisor Drilling												
1	Staff Geologist												
1	Draftsman												
1	Backhoe Operator	1	1	1	1	1	1	1	1	1	1	1	1
3	Casing Tech												
2	Geotech Logger												
1	Project Engineer												
1	Foreman WFC												
1	Electrician WFC												
1	Lead Tech WFC												
4	Technician WFC												
1	Foreman Maint												
4	Technician Maint												
1	Electrician Maint	1	1	1	1	1	1	1	1	1	1	1	1
1	Manager Operations												
1	Foreman Operations												
4	Wellfield Operator												
3	Technician WF Maint												
1	Foreman Plant	1	1	1	1	1	1	1	1	1	1	1	1
4	Plant Operator	4	4	4	4	4	4	4	4				
1	Dryer Operator												
1	Lab Chemist	1	1	1	1	1	1	1	1	1	1	1	1
2	Technician Lab												
4	Restoration Operator	4	4	4	4	4	4	4	4				
4	Reclamation Crew												

		YEAR 4											
Area	Module	M 1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
	Construction												
	Production												
PLANT	Restoration												
	Reclamation												
	1-1						REGULATORY APPROVAL						RECLAMATION
	1-2												
MU-1	1-3												
	1-4												
	1-5												
	1-6												
	Production gpm												
	GW Sweep gpm												
	Reverse Osmosis gpm												
	Recirculation gpm												
	Water Disposal gpm												
	Headcount	9	9	9	9	9	7	7	7	7	7	7	11
1	Mine Manager	1	1	1	1	1	1	1	1	1	1	1	1
1	Supervisor IT-Admin												
1	Accountant												
1	Technician Instrument												
1	Technician IT												
1	Secretary	1	1	1	1	1	1	1	1	1	1	1	1
1	Warehouseman												
1	Supervisor EHS	1	1	1	1	1	1	1	1	1	1	1	1
1	Technician EHS	1	1	1	1	1	1	1	1	1	1	1	1
1	Sampler EHS	1	1	1	1	1							
1	Site Chief Geologist												
1	Supervisor Drilling												
1	Staff Geologist												
1	Draftsman												
1	Backhoe Operator	1	1	1	1	1	1	1	1	1	1	1	1
3	Casing Tech												
2	Geotech Logger												
1	Project Engineer												
1	Foreman WFC												
1	Electrician WFC												
1	Lead Tech WFC												
4	Technician WFC												
1	Foreman Maint												
4	Technician Maint												
1	Electrician Maint	1	1	1	1	1	1	1	1	1	1	1	1
1	Manager Operations												
1	Foreman Operations												
4	Wellfield Operator												
3	Technician WF Maint												
1	Foreman Plant	1	1	1	1	1	1	1	1	1	1	1	1
4	Plant Operator												
1	Dryer Operator												
1	Lab Chemist	1	1	1	1	1							
2	Technician Lab												
4	Restoration Operator												
4	Reclamation Crew												4

		YEAR 5											
Area	Module	M 1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
	Construction												
	Production												
PLANT	Restoration												
	Reclamation												
	1-1												
	1-2												
MU-1	1-3												
	1-4												
	1-5												
	1-6												
	Production gpm												
	GW Sweep gpm												
	Reverse Osmosis gpm												
	Recirculation gpm												
	Water Disposal gpm												
	Headcount	11	11	11	11	11	11	11	11	11	11	11	
1	Mine Manager	1	1	1	1	1	1	1	1	1	1	1	
1	Supervisor IT-Admin												
1	Accountant												
1	Technician Instrument												
1	Technician IT												
1	Secretary	1	1	1	1	1	1	1	1	1	1	1	
1	Warehouseman												
1	Supervisor EHS	1	1	1	1	1	1	1	1	1	1	1	
1	Technician EHS	1	1	1	1	1	1	1	1	1	1	1	
1	Sampler EHS												
1	Site Chief Geologist												
1	Supervisor Drilling												
1	Staff Geologist												
1	Draftsman												
1	Backhoe Operator	1	1	1	1	1	1	1	1	1	1	1	
3	Casing Tech												
2	Geotech Logger												
1	Project Engineer												
1	Foreman WFC												
1	Electrician WFC												
1	Lead Tech WFC												
4	Technician WFC												
1	Foreman Maint												
4	Technician Maint												
1	Electrician Maint	1	1	1	1	1	1	1	1	1	1	1	
1	Manager Operations												
1	Foreman Operations												
4	Wellfield Operator												
3	Technician WF Maint												
1	Foreman Plant	1	1	1	1	1	1	1	1	1	1	1	
4	Plant Operator												
1	Dryer Operator												
1	Lab Chemist												
2	Technician Lab												
4	Restoration Operator												
4	Reclamation Crew	4	4	4	4	4	4	4	4	4	4	4	

Revised November 1, 2010



NAD 83 WSPC

● Observation Point for Simulated Drawdown

Lost Creek ISR, LLC
Littleton, Colorado, USA

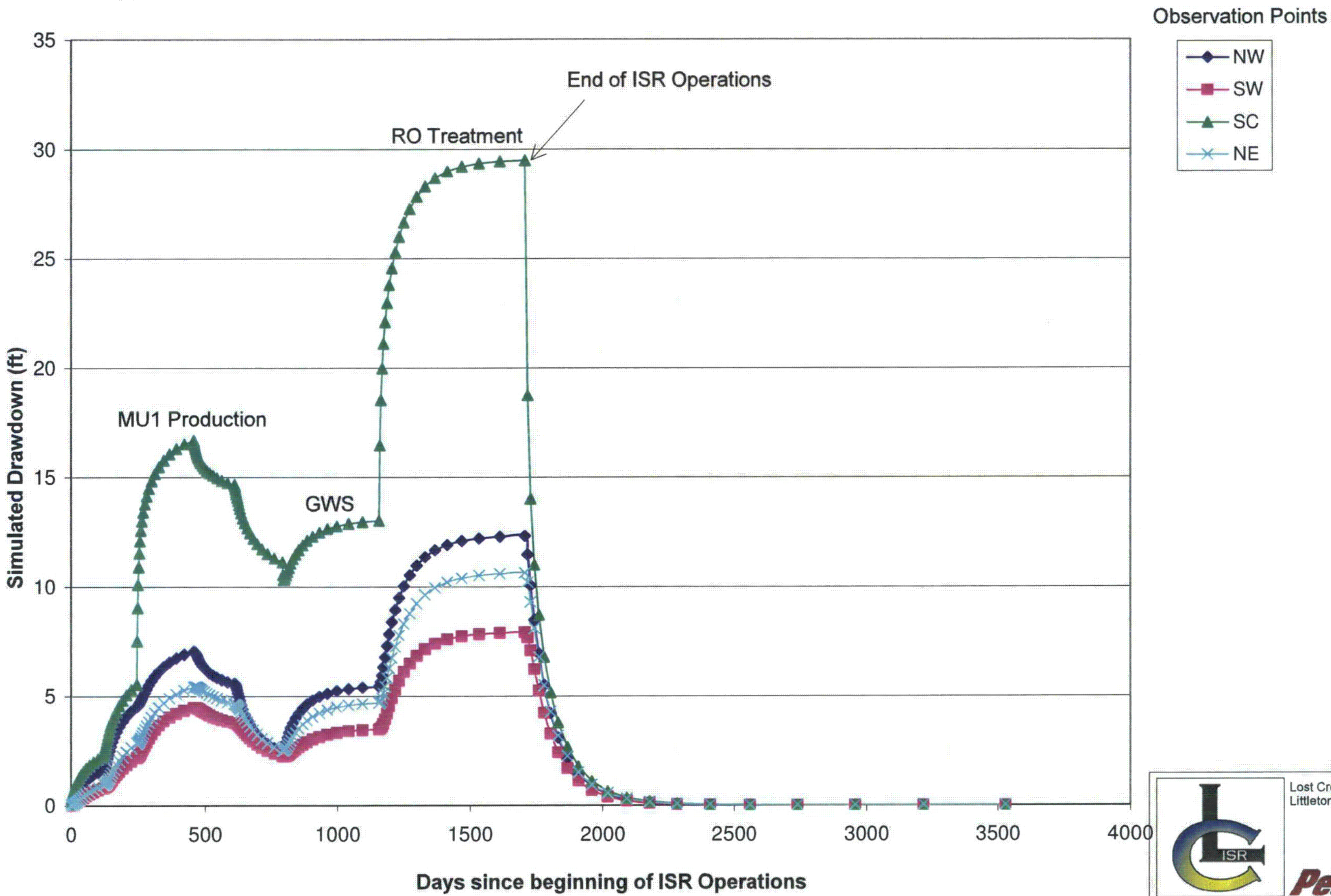
Petrotek www.petrotek.com Littleton, CO, USA

FIGURE RP5a
Drawdown Observation Points
Mine Unit 1 Simulation
Production-Restoration-Recovery

Numerical Modeling of Hydrologic Conditions
Lost Creek Insitu Recovery Uranium Project

Issued For: WDEQ LQD	Drawn By: EPL
Issued /Revised: 11.15.10	
Drawing No.: Figure RP5a	

0 1 2 3 Miles



See Figure RP5a for location of observation points

Lost Creek ISR, LLC
Littleton, Colorado, USA

Petrotek
www.petrotek.com
Littleton, CO, USA

FIGURE RP5b
Drawdown at Permit Boundary During Mine Unit 1 Simulation Production-Restoration-Recovery

Numerical Modeling of Hydrologic Conditions Lost Creek Insitu Recovery Uranium Project

Issued For: WDEQ LQD	Drawn By: EPL
Issued/Revised: 11.15.10	
Drawing No.: Figure RP5b	

LOST CREEK ISR, LLC SUMMARY OF RECLAMATION/RESTORATION BOND ESTIMATE

I GROUNDWATER RESTORATION - Worksheet 1	$3,274,790
II DECOMMISSIONING AND SURFACE RECLAMATION	$1,493,958

A. Plant Equipment Removal and Disposal - Worksheet 2	$73,724
B. Plant Building Demolition and Disposal - Worksheet 3	$601,999
C. Storage Pond Sludge and Liner Handling - Worksheet 4	$271,003
D. Well Abandonment - Worksheet 5	$185,408
E. Wellfield Equipment Removal and Disposal - Worksheet 6	$182,997
F. Topsoil Replacement and Revegetation - Worksheet 7	$108,166
G. Miscellaneous Reclamation Activities - Worksheet 8	$70,662

SUBTOTAL RESTORATION AND RECLAMATION	**$4,768,748**
III TOTAL CONTINGENCY	$1,382,937

Miscellaneous Items (*Footnote 1*)	**25%**	**=**	**$1,192,187**
Project Design			
Contractor Profit & Mobilization			
Pre-Construction Investigation			
Project Management			
On-Site Monitoring			
Site Security & Liability Assurance			
Longterm Administration			
Contingency (*Footnote 2*)	**4%**	**=**	**$190,750**

TOTAL RESTORATION AND RECLAMATION	**$6,151,685**

Footnote 1: In accordance with WDEQ-LQD Guideline 12, Section II, B, 12.
Footnote 2: In accordance with WDEQ-LQD Guideline 12, Section II, B, 13.

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
Technical Assumptions:			
Wellfield Area (Square Feet)	1,057,797	Proposed area	Data
Wellfield Area (Acres)	24.28		Calculated
Affected Ore Zone Area (Square Feet)	1,057,797	Proposed area affected	Data
Average Completed Thickness (Feet)	12.0	Proposed thickness	Data
Affected Volume:			
Factor For Vertical Flare	20%	Vertical flare estimate	Estimated
Factor For Horizontal Flare	20%	Horizontal flare estimate	Estimated
Total Volume (Cubic Feet)	18,278,732	= Area * Thickness * Vertical flare * Horizontal flare	Calculated
Porosity	26.0%	Typical value for host sand	Data
Gallons Per Cubic Foot	7.48	Conversion factor	Constant
Gallons Per Pore Volume	35,548,478	= Volume * Porosity * gal/ft³	Calculated
Number of Wells in Unit(s)			
Production Wells	120	Proposed well count	Data
Injection Wells	208	Proposed well count	Data
Average Well Spacing (Feet)	95	Proposed well spacing	Data
Average Well Depth (Feet)	425	Proposed well depth	Data

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
I GROUNDWATER SWEEP			
A. PLANT & OFFICE			
Operating Assumptions:			
Flow Rate (Gallons per Minute)	120	Planned flow	Data
Pore Volumes Required	0.3	Required value	Data
Total Gallons For Treatment	10,664,543	= Gallons per Pore Volume * Number of Pore Volumes	Calculated
Total Kilogallons for Treatment	10,665		Calculated
Cost Assumptions:			
Power			
Average Connected Horsepower	20	Proposed pump horsepower	Data
Kilowatt-hours per Horsepower	0.746		Conversion Factor
Cost per Kilowatt-hour	$0.060	Estimate based on supplier	Unit Rate
Gallons per Minute	120	Planned rate	Data
Gallons per Hour	7200		Calculated
Cost per Hour	$0.90		Calculated
Cost per Gallon	$0.00012		Calculated
Cost per Kilogallon	$0.124		Calculated
Chemicals			
Antiscalent (Cost per Kilogallon)	$0.120	Based on required dosage/estimated cost	Unit Rate
Repair & Maintenance (Cost per Kilogallon)	$0.035	Estimate	Unit Rate
Analysis (Cost per Kilogallon)	$0.745	From Table RP-5	Unit Rate

Table RP-4 Reclamation/Restoration Bond Estimate (Page 4 of 37)

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
I GROUNDWATER SWEEP (continued)			
A. PLANT & OFFICE (continued)			
Total Cost per Kilogallon	$1.025		Calculated
Total Treatment Cost	$10,928		Calculated
Utilities			
Power (Cost per Month)	$225	Estimate	Unit Rate
Propane (Cost per Month)	$225	Estimate	Unit Rate
Time for Treatment			
Minutes for Treatment	88,871	=Total Gallons for Treatment Divided by Flow Rate (gpm)	Calculated
Hours for Treatment	1,481		Calculated
Days for Treatment	62		Calculated
Average Days per Month	30.4		Calculated
Months for Treatment	2.0		Calculated
Utilities Cost	$913		Calculated
TOTAL PLANT & OFFICE COST	$11,841		

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
I GROUNDWATER SWEEP (continued)			
B. WELLFIELD			
Cost Assumptions:			
Power			
Average Flow per Pump (Gallons per Minute	32	Estimate from pumping	Data
Average Horsepower per Pump	7.50	Estimate from pumping	Data
Average Number of Pumps Required	3.8	Estimate from pumping	Data
Average Connected Horsepower	33.1	Pumps plus 5 horsepower for HH	Data
Kilowatt-hours per Horsepower	0.746		Conversion Factor
Cost per Kilowatt-hour	$0.060	Estimate based on supplier	Unit Rate
Gallons per Minute	120	Planned flow	Data
Gallons per Hour	7200		Calculated
Cost per Hour	$1.48		Calculated
Cost per Gallon	$0.0002		Calculated
Cost per Kilogallon	0.206		Calculated
Repair & Maintenance (Cost per Kilogallon)	$0.115	Estimate	Unit Rate
Total Cost per Kilogallon	$0.321		Calculated
TOTAL WELLFIELD COST	$3,423		Calculated
TOTAL GROUNDWATER SWEEP COST	$15,264		Calculated

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
II REVERSE OSMOSIS			
A. PLANT & OFFICE			
Operating Assumptions:			
Flow Rate (Gallons per Minute)	760	Estimate from pumping	Data
Pore Volumes Required	6.0	Required value	Data
Total Gallons for Treatment	213,290,870	= Gallons per Pore Volume * Number of Pore Volumes	Calculated
Total Kilogallons for Treatment	213,291		Calculated
Feed to Reverse Osmosis Unit (Gallons per Minute)	760	Planned flow	Data
Permeate Flow (Gallons per Minute)	570	= Planned Flow * Average Reverse Osmosis Recovery	Calculated
Brine Flow (Gallons per Minute)	190	= Planned Flow - Permeate Flow	Calculated
Average Reverse Osmosis Recovery	75.0%	Reverse Osmosis Design	Data
Cost Assumptions:			
Power			
Average Connected Horsepower	300.00	Average value for each area	Data
Kilowatt-hours per Horsepower	0.746		Conversion Factor
Cost per Kilowatt-hour	$0.060	Estimate based on supplier	Unit Rate
Gallons per Minute	760	Planned flow	Data
Gallons per Hour	45600		Calculated
Cost per Hour	$13.43		Calculated
Cost per Gallon	$0.00029		Calculated
Cost per Kilogallon	$0.294		Calculated
Chemicals			
Sulfuric Acid (Cost per Kilogallon)	$0.090	Estimate	Unit Rate
Caustic Soda (Cost per Kilogallon)	$0.023	Estimate	Unit Rate
Reductant (Cost per Kilogallon)	$0.113	Estimate	Unit Rate
Antiscalent (Cost per Kilogallon)	$0.124	Based on required dosage/estimated cost	Unit Rate
Repair & Maintenance (Cost per Kilogallon)	$0.068	Estimate	Unit Rate
Sampling & Analysis (Cost per Kilogallon)	$0.198	From Table RP-5	Unit Rate

Table RP-4 Reclamation/Restoration Bond Estimate (Page 7 of 37)

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
II REVERSE OSMOSIS (continued)			
A. PLANT & OFFICE (continued)			
Total Cost per Kilogallon	$0.910		Calculated
Total Pumping Cost	$194,183		Calculated
Utilities			
Power (Cost per Month)	$560	Estimate	Unit Rate
Propane (Cost per Month)	$225	Estimate	Unit Rate
Time for Treatment			
Minutes for Treatment	280,646		Calculated
Hours for Treatment	4,677		Calculated
Days for Treatment	195		Calculated
Average Days per Month	30.4		Calculated
Months for Treatment	6.4		Calculated
Utilities Cost	$5,024		Calculated
TOTAL PLANT & OFFICE COST	$199,207		Calculated

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
II REVERSE OSMOSIS (continued)			
B. WELLFIELD			
Cost Assumptions:			
Power			
Average Flow per Pump (Gallons per Minute	32.00	Average value for each area	Data
Average Horsepower per Pump	7.50	Average value for each area	Data
Average Number of Pumps Required	23.8	Average value for each area	Data
Average Connected Horsepower	188.1	Pump horsepower plus 10 horsepower	Calculated
Kilowatt-hours per Horsepower	0.746		Conversion Factor
Cost per Kilowatt-hour	$0.060	Estimate based on supplier	Unit Rate
Gallons per Minute	760	Planned flow	Data
Gallons per Hour	45,600		Calculated
Cost per Hour	$8.42		Calculated
Cost per Gallon	$0.0002		Calculated
Cost per Kilogallon	$0.185		Calculated
Repair & Maintenance (Cost per Kilogallon)	$0.115	Estimate	Unit Rate
Total Cost per Kilogallon	$0.300		Calculated
TOTAL WELLFIELD COST	$63,915		Calculated
TOTAL REVERSE OSMOSIS COST	$263,121		Calculated

Table RP-4 Reclamation/Restoration Bond Estimate (Page 9 of 37)

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
III RECIRCULATION			
A. WELLFIELD			
Cost Assumptions:			
Power			
Average Flow per Pump (Gallons per Minute	32	Estimate from pumping	Data
Average Horsepower per Pump	7.50	Estimate from pumping	Data
Average Number of Pumps Required	120.0	Estimate from pumping	Data
Average Connected Horsepower	905.0	Pumps plus 5 horsepower for HH	Data
Kilowatt-hours per Horsepower	0.746		Conversion Factor
Cost per Kilowatt-hour	0.060	Estimate based on supplier	Unit Rate
Gallons per Minute	3840	Planned flow	Data
Gallons per Hour	230400		Calculated
Cost per Hour	$40.51		Calculated
Cost per Gallon	$0.0002		Calculated
Cost per Kilogallon	0.176		Calculated
Repair & Maintenance (Cost per Kilogallon)	$0.115	Estimate	Unit Rate
Analysis (Cost per Kilogallon)	$0.131	From Table RP-5	Unit Rate
Total Cost per Kilogallon	$0.421		Calculated
TOTAL WELLFIELD RECIRCULATION COST	$14,980		Calculated

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
IV WASTE DISPOSAL WELL			
Operating Assumptions:			
Annual Evaporation Capacity (Gallons)	0		Data
Average Monthly Evaporation Capacity (Gallons)	0		Calculated
Total Disposal Requirement			
RO Brine and GWS (Total Gallons)	63,987,261	=Treatment Gallons * (1- Reverse Osmosis Recovery) + GWS	Calculated
RO Brine and GWS (Total Kilogallons)	63,987		Calculated
Brine Concentration Factor	50%	Reverse Osmosis Design	Data
Total Concentrated Brine (Gallons)	31,993,630	= Reverse Osmosis Brine Gallons * Brine Concentration Factor	Calculated
Months of RO and GWS Operation	8.4		Calculated
Average Monthly Requirement (Gallons)	3,795,651	=Total Concentrated Brine / Months of Reverse Osmosis Operation	Calculated
Monthly Balance for DDW (Gallons)	3,795,651	=Average Monthly Requirement - Average Monthly Evaporation	Calculated
Total WDW Disposal (Gallons)	31,993,630		Calculated
Total WDW Disposal (Kilogallons)	31,994		Calculated
Cost Assumptions:			
Power			
Average Connected Horsepower	100.0	Estimate	Data
WDW Average Connected Horsepower	300.0	Estimate	Data
Kilowatt-hours per Horsepower	0.746		Conversion Factor
Cost per Kilowatt-hour	$0.060	Estimate based on supplier	Unit Rate
Gallons per Minute	115.0	Planned flow	Data
Gallons per Hour	6900		Calculated
Cost per Hour	$17.90		Calculated
Cost per Gallon	$0.0026		Calculated
Cost per Kilogallon	$2.595		Calculated

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
IV WASTE DISPOSAL WELL (continued)			
Chemicals			
Reverse Osmosis Antiscalent (Cost per Kilogallon)	$0.225	Based on required dosage and cost	Unit Rate
WDW Antiscalent (Cost per Kilogallon)	$0.254	Based on required dosage and cost	Unit Rate
Sulfuric Acid (Cost per Kilogallon)	$0.315	Estimate	Unit Rate
Corrosion Inhibitor	$0.244	Estimate	Unit Rate
Repair & Maintenance (Cost per Kilogallon)	$0.130	Estimate	Unit Rate
Total Cost per Kilogallon	$3.762		Calculated
TOTAL WASTE DISPOSAL WELL COST	$120,369		Calculated
V STABILIZATION MONITORING			
Operating Assumptions:			
Time of Stabilization (Months)	9	Time frame required	Data
Frequency of Analysis (Months)	3	Required sampling	Data
Total Sets of Analysis	5	Required sampling	Data
Cost Assumptions:			
Power (Cost per Month)	$1,125	Estimate	Unit Rate
Total Power Cost	$10,125		Calculated
Sampling & Analysis (Cost per Set)	$8,178	From Table RP-5	Unit Rate
Total Sampling & Analysis Cost	$40,891	From Table RP-5	Calculated
Utilities (Cost per Month)	$2,250	Estimate	Unit Rate
Total Utilities Cost	$20,250		Calculated
TOTAL STABILIZATION COST	$71,266		Calculated

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items					Mine Unit No. 1	Explanation	Source
VI LABOR							
Cost Assumptions							
	Crew Numbers	Cost per Hour	Hours	Crew	Cost		
	1	$50.00	6240	Project Manager	$312,000	Anticipated operations crew	Data
	1	$40.00	6240	Supervisor/RSO	$249,600	Anticipated operations crew	Data
	1	$30.00	6240	EHS Tech	$187,200	Anticipated operations crew	Data
	1	$30.00	3120	Sampler	$93,600	Anticipated operations crew	Data
	8	$30.00	1560	Plant and Field Operators	$374,400	Anticipated operations crew	Data
	1	$30.00	6240	Maintenance	$187,200	Anticipated operations crew	Data
	1	$30.00	6240	Office Support	$187,200	Anticipated operations crew	Data
	1	$30.00	6240	Equipment Operator	$187,200	Anticipated operations crew	Data
	4	$30.00	2080	Reclamation Laborer	$249,600	Anticipated operations crew	Data
	1	$35.00	6240	Foreman	$218,400	Anticipated operations crew	Data
	1	$40.00	3120	Lab Chemist	$124,800	Anticipated operations crew	Data
	4	$13.50	2080	Vehicles	$112,320		Data
TOTAL RESTORATION LABOR COST					$2,483,520		

VII RESTORATION CAPITAL REQUIREMENTS				
I	Plug and Abandon DDW (3)	$306,270	$104,090 for well 1 and $101,090 for wells 2/3	Data
TOTAL		$306,270		

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
SUMMARY:			
I GROUNDWATER SWEEP	$15,264		
II REVERSE OSMOSIS	$263,121		
III RECIRCULATION	$14,980		
IV WASTE DISPOSAL WELL	$120,369		
V STABILIZATION	$71,266		
VI LABOR	$2,483,520		
VII CAPITAL	$306,270		
TOTAL GROUNDWATER RESTORATION COST	**$3,274,790**		

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: A. Plant Equipment Removal and Disposal - WORKSHEET 2

Assumptions/Items	Shop / Lab / Office	Precipitation Section	Chemical Section	Ion Exchange Section	Restoration Section	Total	Explanation	Source
Volume (Cubic Yards)	68	46	17	111	96	338	Estimate of equipment to be removed	Data
Volume per Truck Load (Cubic Yards)	20	20	20	20	20		Typical load for shipping	Data
Number of Truck Loads	3.4	2.3	0.8	5.6	4.8	16.9		Calculated
I DECONTAMINATION								
Decontamination Cost per Truck Load	*$620*	*$620*	*$620*	*$620*	*$620*		*Estimated average decontaminate*	Unit Rate
Percent Requiring Decontamination	50.0%	100.0%	0.0%	100.0%	100.0%		Percent expected	Data
TOTAL DECONTAMINATION COST	$1,060	$1,428	$0	$3,443	$2,963	$8,894		Calculated
II DISMANTLING & LOADING								
Cost per Truck Load	$805	$805	$805	$805	$805		Estimated average dismantle cost	Unit Rate
TOTAL DISMANTLING & LOADING COST	$2,753	$1,854	$676	$4,470	$3,847	$13,600		Calculated
III OVERSIZE								
Percent Requiring Permits	0.0%	10.0%	10.0%	10.0%	10.0%			Data
Cost per Truck Load	$367	$367	$367	$367	$367			Unit Rate
TOTAL OVERSIZE COST	$0	$85	$31	$204	$175	$495		Calculated
IV TRANSPORTATION & DISPOSAL								
A. Landfill								
Percent to be Shipped	90.0%	50.0%	100.0%	50.0%	50.0%		Percent acceptable at landfill	Data
Distance (Miles)	48	48	48	48	48		Distance to landfill	Data
Cost per Mile	$2.90	$2.90	$2.90	$2.90	$2.90		Current transport rate	Unit Rate
Transportation Cost	$429	$160	$117	$386	$333			Calculated
Disposal Fee per Cubic Yard	$13.50	$13.50	$13.50	$13.50	$13.50		Landfill fee	Unit Rate
Disposal Cost	$831	$311	$227	$750	$645			Calculated
Total Cost	$1,260	$471	$344	$1,136	$978			Calculated
B. Licensed Site								
Percent to be Shipped	*10.0%*	*50.0%*	*0.0%*	*50.0%*	*50.0%*		Percent requiring disposal at licensed site	Calculated
Distance (Miles)	105	105	105	105	105		Distance to Shirley Basin	Data
Cost per Mile	$2.90	$2.90	$2.90	$2.90	$2.90		Current transport rate	Unit Rate
Transportation Cost	$104	$351	$0	$845	$728			Calculated
Disposal Cost per Cubic Foot	$12.38	$12.38	$12.38	$12.38	$12.38		Licensed site fee	Unit Rate
Volume per Truck Load (Cubic Yards)	20.0	20.0	20.0	20.0	20.0		Typical load for shipping	Data
Volume per Truck Load (Cubic Feet)	540	540	540	540	540			Calculated
Disposal Cost	$2,287	$7,697	$0	$18,562	$15,975			Calculated
Total Cost Licensed Site	$2,391	$8,047	$0	$19,407	$16,702			Calculated
TOTAL TRANSPORTATION & DISPOSAL COST	$3,650	$8,518	$344	$20,544	$17,680	$50,736		Calculated
TOTAL PLANT EQUIPMENT REMOVAL AND DISPOSAL COST	**$7,464**	**$11,884**	**$1,050**	**$28,661**	**$24,666**	**$73,724**		Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: B. Plant Building Demolition and Disposal - WORKSHEET 3

Assumptions/Items	Plant	Header Houses	Drill Shed	Total	Explanation	Source
I STRUCTURE DEMOLITION & DISPOSAL						
Structural Character	2-Story Steel Frame	1-Story Pre-Fab. (6)	1-Story Pole Barn			
Demolition Volume (Cubic Feet)	1,248,000	19,620	22,400		Estimated volume of structures	Data
Demolition Cost per Cubic Foot	$0.2500	$0.2500	$0.2500			Unit Rate
Demolition Cost	$312,000	$4,905	$5,600	$322,505		Calculation
Factor For Gutting	20.0%	10.0%	10.0%			Data
Gutting Cost	$62,400	$491	$560	$63,451		Calculation
Weight (Pounds)	196,750	99,000	15,000		Estimated weight of building components	Data

	Quantity	Height (Feet)	Length (Feet)	Area (Square Feet)	Density (Pounds per Square Foot)	Building Weight (Pounds)
Ends	2	1	4800	9600	2.5	24000
Roof	2	82.5	260	42900	2.5	107250
Sidewall	2	20	260	10400	2.5	26000
Internal Wall	1	20	460	9200	2.5	23000
Internal Wall	1	30	220	6600	2.5	16500
Total 2-Story Steel Frame Weight						**196750**

Assumptions/Items	Plant	Header Houses	Drill Shed	Total	Explanation	Source
Weight per Truck Load	40,000	40,000	40,000		Typical load for shipping	Data
Number of Truck Loads	4.9	2.5	0.4			Calculation
Distance to Landfill	48	48	48		Distance to landfill	Data
Cost per Mile	$2.90	$2.90	$2.90		*Current transport rate*	Unit Rate
Transportation Cost	$685	$345	$52	$1,081		
Disposal Cost per Ton	$40.20	$40.20	$40.20		Landfill fee	Unit Rate
Disposal Cost	$3,955	$1,990	$302	$6,246		Calculation
TOTAL STRUCTURE DEMOLITION & DISPOSAL COST	$379,039	$7,730	$6,514	$393,283		Calculation

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: B. Plant Building Demolition and Disposal - WORKSHEET 3

Assumptions/Items	Plant	Header Houses	Drill Shed	Total	Explanation	Source
II CONCRETE DECONTAMINATION, DEMOLITION & DISPOSAL						
Area (Square Feet)	30,050	283	565		Building concrete area	Data
Average Thickness (Feet)	1	1.0	0.3			Data
Volume (Cubic Feet)	30,050	283	141			Calculation
Percent Requiring Decontamination	75.0%	50.0%	0.0%			Data
Percent Decontaminated	75.0%	75.0%	0.0%			Data
Decontamination (Cost per Square Foot)	$0.191	$0.191	$0.191			Unit Rate
Decontamination Cost	$4,305	$41	$0	$4,345		Calculation
Demolition (Cost per Square Foot)	$2.124	$2.124	$0.100			Unit Rate
Demolition Cost	$63,826	$601	$57	$64,484		Calculation
Transportation & Disposal						
A. Landfill Disposal						
Percent to be Disposed at Landfill	90%	90%	100%			Data
Concrete Weight (Pounds per Cubic Foot)	150	150	150			Data
Concrete Weight (Pounds)	4,056,750	38,205	21,188			
Weight per Truck Load (Pounds)	40,000	40,000	40,000			
Number of Truck Loads	101.4	1.0	0.5			
Distance to Landfill (Miles)	48	48	48			
Cost per Mile	$2.90	$2.90	$2.90		Current transport rate	
Transportation Cost	$14,117	$133	$74	$14,324		Data
Disposal Cost per Ton	$40.20	$40.20	$40.20			Unit Rate
Disposal Cost	$81,541	$10,239	$5,678	$97,458		Calculation
B. Licensed Site						
Percent to be Shipped	10%	10%	0%			Calculation
Distance (Miles)	105	105	105			Data
Cost per Mile	$2.90	$2.90	$2.90		Current transport rate	Unit Rate
Transportation Cost	$1,694	$16	$0	$1,710		Calculation
Disposal Cost per Cubic Foot	$4.16	$4.16	$4.16			Unit Rate
Volume per Truck Load (Cubic Yards)	20	20	20			Data
Volume per Truck Load (Cubic Feet)	540	540	540			Calculation
Disposal Cost	$12,501	$118	$0	$12,619		Calculation
TOTAL CONCRETE DECONTAMINATION, DEMOLITION & DISPOSAL COST	$177,984	$11,147	$5,808	$194,940		Calculation

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: B. Plant Building Demolition and Disposal - WORKSHEET 3

Assumptions/Items	Plant	Header Houses	Drill Shed	Total	Explanation	Source
III SOIL REMOVAL & DISPOSAL						
Front End Loader Cost per Hour	$50	$50	$50	$50		
Time with Front End Loader (Hours)	16	6	1	23		
Cost of Front End Loader	$800	$300	$50	$1,150	Assume removal of 3" of Contaminated	Data
Volume to be Shipped (Cubic Feet)	2504	71	0		Soil Under Headers, 1" under Plant,	Data
Distance (Miles)	105	105	105		Disposal at a Licensed Facility	Data
Cost per Mile	$2.90	$2.90	$2.90			Unit Rate
Transportation Cost	$1,412	$40	$0	$1,452		Calculation
Disposal Fee per Cubic Foot	$4.16	$4.16	$4.16			Unit Rate
Quantity per Truck Load (Cubic Feet)	540	540	540			Data
Disposal Cost	$10,417	$294	$0	$10,712		Calculation
TOTAL SOIL REMOVAL & DISPOSAL COST	$12,629	$634	$50	$13,314		Calculation
IV RADIATION SURVEY						
Area Required (Acres)	0.69	0.01	0.01			Data
Survey Cost per Acre	$653.00	$653.00	$653.00			Unit Rate
TOTAL RADIATION SURVEY COST	$450	$4	$8	$462		Calculation
TOTAL PLANT BUILDING DEMOLITION AND DISPOSAL COST	**$570,103**	**$19,515**	**$12,380**	**$601,999**		Calculation

Table RP-4 Reclamation/Restoration Bond Estimate (Page 18 of 37)

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: C. Storage Pond Sludge and Liner Handling - WORKSHEET 4

Assumptions/Items	Pond 1 Storage	Pond 2 Storage	Total	Explanation	Source
I POND SLUDGE					
Average Sludge Depth (Feet)	0.125	0.125			Data
Average Sludge Area (Square Feet)	40,300	40,300			Data
Sludge Volume (Cubic Feet)	5,038	5,038			Calculated
Sludge Volume (Cubic Yards)	187	187			Calculated
Sludge Volume per Truck Load (Cubic Yards)	20.0	20.0			Data
Number of Sludge Truck Loads	9.4	9.4			Calculated
Sludge Handling Cost Per Load	$268.00	$268.00			Unit Rate
Total Sludge Handling Cost	$2,519	$2,519	$5,038		Calculated
Transportation & Disposal					
Percent to be Shipped	100.0%	100.0%			Data
Distance (Miles)	105	105			Data
Cost per Mile	$2.90	$2.90			Unit Rate
Transportation Cost	$2,862	$2,862			Calculated
Disposal Cost per Cubic Foot	$12.38	$12.38			Unit Rate
Volume per Truck Load (Cubic Yards)	20.0	20.0			Data
Volume per Truck Load (Cubic Feet)	540	540			Calculated
Disposal Cost	$62,841	$62,841			Calculated
Total Transportation & Disposal Cost	$65,703	$65,703	$131,406		Calculated
TOTAL POND SLUDGE COST	$68,222	$68,222	$136,444		Calculated

Table RP-4 **Reclamation/Restoration Bond Estimate** (Page 19 of 37)

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: C. Storage Pond Sludge and Liner Handling - WORKSHEET 4

Assumptions/Items	Pond 1 Storage	Pond 2 Storage	Total	Explanation	Source
II POND LINER					
Total Pond Area (Acres)	0.93	0.93			Data
Total Pond Area (Square Feet)	40,300	40,300			Calculated
Factor For Sloping Sides	20.0%	20.0%			Data
Total Liner Area (Square Feet)	48360	48360			Calculated
Liner Thickness (Mils)	30	30			Data
Liner Thickness (Inches)	0.0300	0.0300			Calculated
Liner Thickness (Feet)	0.0025	0.0025			Calculated
"Swell" Factor	25.0%	25.0%			Data
Liner Volume (Cubic Feet)	151	151			Calculated
Truck Loads of Liner	0.3	0.3			Calculated
Liner Handling Cost					
Labor Crew Cost per Hour	$135	$135			Unit Rate
Hours per Load	2.0	2.0			Unit Rate
Liner Handling Cost per Load	$270.00	$270.00			Calculated
Total Liner Handling Cost	$81	$81	$162		Calculated
Transportation & Disposal					
Percent to be Shipped	100.0%	100.0%			Data
Distance (Miles)	105	105			Data
Cost per Mile	$2.90	$2.90			Unit Rate
Transportation Cost	$91	$91			Calculated
Disposal Cost per Cubic Foot	$12.38	$12.38			Unit Rate
Volume per Truck Load (Cubic Feet)	540	540			Data
Disposal Cost	$2,006	$2,006			Calculated
Total Transportation & Disposal	$2,097	$2,097	$4,194		Calculated
TOTAL POND LINER COST	$2,178	$2,178	$4,356		Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: C. Storage Pond Sludge and Liner Handling - WORKSHEET 4

Assumptions/Items	Pond 1 Storage	Pond 2 Storage	Total	Explanation	Source
III POND BACKFILL					
Backfill Required (Cubic Yards)	10,448	10,448			Data
Backfill Cost per Cubic Yard	$1.13	$1.13			Unit Rate
TOTAL POND BACKFILL COST	$11,806	$11,806	$23,612		Calculated
IV RADIATION SURVEY					
Areal required (Acres)	1.02	1.02			Data
Survey Cost per Acre	$653.00	$653.00			Unit Rate
TOTAL RADIATION SURVEY COST	$665	$665	$1,330		Calculated
V LEAK DETECTION SYSTEM REMOVAL					
Gravel and Piping Volume (Cubic Feet)	10075	10075		Assume 3 inches	Data
Volume per Truck Load (Cubic Feet)	540	540			Data
Loads to be Shipped	18.7	18.7			Calculated
Distance (Miles)	105	105			Data
Cost per Mile	$2.90	$2.90			Unit Rate
Transportation Cost	$5,681	$5,681			Calculated
Handling Cost	$5,038	$5,038			Unit Rate (Imbedded)
Disposal Fee per Cubic Foot	$4.16	$4.16			Unit Rate
Disposal Cost	$41,912	$41,912			Calculated
TOTAL LEAK DETECTION SYSTEM REMOVAL COST	$52,631	$52,631	$105,261		Calculated
TOTAL POND RECLAMATION COST	**$135,502**	**$135,502**	**$271,003**		Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: D. Well Abandonment - WORKSHEET 5

Assumptions/Items	Mine Unit No. 1	Explanation	Source
Number of Wells	328		Data
Average Depth (Feet)	425		Data
Average Diameter (Inches)	4.328		Data
I MATERIALS			
Class G Neat Cement Required (Cubic Feet per Well)	43.4		Data
Cement Sacks Required per Well	33.9	15 ppg Class G cement requires 6 gallons water per sack cement and 1-1/2% bentonite by weight	Data
Cement Sack Cost	$14.43		Unit Rate
Cement Cost per Well	$489.49		Calculated
Bentonite Sacks Required per Well	1.0		Data
Bentonite Bag Cost	$2.90		Unit Rate
Bentonite Cost per Well	$2.77		Calculated
TOTAL MATERIALS COST PER WELL	$492.27		Calculated
II LABOR (INCLUDED IN WORKSHEET 1)			
Hours Required per Well	0.0		Data
Labor Cost per Hour	$0.00		Unit Rate
TOTAL LABOR COST PER WELL	$0.00		Calculated
III EQUIPMENT RENTAL			
Hours Required per Well	1.0		Data
Backhoe with Operator Cost per Hour	$48.00		Unit Rate
Cementer Cost per Hour	$25.00		Unit Rate
Total Equipment Cost per Well	$73.00		Calculated
TOTAL ABANDONMENT COST PER WELL	$565.27		Calculated
TOTAL WELL ABANDONMENT COST	**$185,408**		Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: E. Wellfield Equipment Removal and Disposal - WORKSHEET 6

Assumptions/Items	MU-1	Source
I WELLFIELD PIPING		
A. Removal		
Surface Length per Well (Feet)	250	
Downhole Length per Well (Feet)	350	
Total Number of Wells	328	
Total Length (Feet)	196,800	Calculated
Cost of Removal per Foot	$0.109	Unit Rate
Cost of Removal	$21,353	Calculated
Chipping Rate (feet per hour)	1500	Estimate
Chipper Cost per Hour	$30	Unit Rate
Chipping Cost	$3,936	Calculated
Average OD (Inches)	1.6	
Chipped Volume Reduction (Cubic Feet per Foot)	0.008	Unit Rate
Chipped Volume (Cubic Feet)	1,574	Calculated
Volume per Truck Load (Cubic Feet)	540	
Total Number of Truck Loads	2.9	Calculated
B. Survey & Decontamination		
Percent Requiring Decontamination	0%	
Number of Decontamination Loads	0.0	Calculated
Decontamination Cost per Load	$620.00	Unit Rate
Decontamination Cost	$0	Calculated
C. Transport & Disposal		
Landfill Transportation		
Percent to be Shipped	0.0%	
Loads to be Shipped	0.0	Calculated
Distance (Miles)	48	
Transportation Cost per Mile	$2.90	Unit Rate
Transportation Cost	$0	Calculated
Landfill Disposal		
Disposal Fee per Cubic Yard	$13.50	Unit Rate
Load Volume (Cubic Yards)	20	
Disposal Cost	$0	Calculated
Total Landfill Cost	$0	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: E. Wellfield Equipment Removal and Disposal - WORKSHEET 6

Assumptions/Items	MU-1	Source
I WELLFIELD PIPING (continued)		
C. Transport & Disposal (continued)		
Licensed Site		
Transportation		
Percent to be Shipped	100.0%	Calculated
Loads to be Shipped	2.9	Calculated
Distance (Miles)	105	
Transportation Cost per Mile	$2.90	Unit Rate
Transportation Cost	$883	Calculated
Disposal		
Disposal Fee per Cubic Foot	$12.38	Unit Rate
Disposal Fee per Cubic Yard	$334.26	Calculated
Load Volume (Cubic Yards)	20	
Disposal Cost	$19,387	Calculated
Total Licensed Site Cost	$20,270	Calculated
Total Transport & Disposal Cost	$20,270	Calculated
TOTAL WELLFIELD PIPING REMOVAL & DISPOSAL COST	$45,559	Calculated
II PRODUCTION WELL PUMPS		
A. Pump and Tubing Removal		
Number of Production Wells	120	
Removal Cost per Well	$12.07	Unit Rate
Removal Cost	$1,448	Calculated
Number of Pumps per Truck Load	180	
Number of Truck Loads (Pumps)	0.7	Calculated
B. Survey & Decontamination (Pumps)		
Percent Requiring Decontamination	0.0%	
Number of Decontamination Truck Loads	0.0	Calculated
Decontamination Cost per Load	$0.00	Unit Rate
Decontamination Cost	$0	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: E. Wellfield Equipment Removal and Disposal - WORKSHEET 6

Assumptions/Items	MU-1	Source
II PRODUCTION WELL PUMPS (continued)		
C. Tubing Volume Reduction & Loading		
Length per Well (Feet)	375	
Total Length (Feet)	45,000	Calculated
Removal Cost per Foot	$0.014	Unit Rate
Removal Cost	$608	Calculated
Average OD (Inches)	2.0	
Chipped Volume Reduction (Cubic Feet per Foot)	0.012	
Chipped Volume (Cubic Feet)	540	Calculated
Volume per Truck Load (Cubic Feet)	540	
Number of Truck Loads	1.0	Calculated
D. Transport & Disposal		
Landfill		
Transportation		
Percent to be Shipped (Pumps)	100.0%	
Loads to be Shipped	0.7	Calculated
Distance (Miles)	48	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$97	Calculated
Disposal		
Disposal Fee per Cubic Yard	$13.50	Unit Rate
Load Volume (Cubic Yards)	20	
Disposal Cost	$189	Calculated
Total Landfill Cost	$286	Calculated
Licensed Site		
Transportation		
Percent to be Shipped (Pumps)	0.0%	
Percent to be Shipped (Tubing)	100.0%	
Loads to be Shipped	1.0	Calculated
Distance (Miles)	105	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$305	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: E. Wellfield Equipment Removal and Disposal - WORKSHEET 6

Assumptions/Items	MU-1	Source
II PRODUCTION WELL PUMPS (continued)		
D. Transport & Disposal (continued)		
Licensed Site (continued)		
Disposal		
Disposal Cost per Cubic Foot	$12.38	Unit Rate
Disposal Fee per Cubic Yard	$334.26	Calculated
Load Volume (Cubic Yards)	20	
Disposal Cost	$6,685	Calculated
Total Licensed Site Cost	$6,990	Calculated
Total Transport & Disposal Cost	$7,276	Calculated
TOTAL PRODUCTION WELL PUMP REMOVAL & DISPOSAL COST	$9,331	Calculated
III SURFACE TRUNKLINE PIPING		
A. Removal		
Total Length (Feet)	0	
Removal Cost per Foot	$0.081	Unit Rate
Removal Cost	$0	Calculated
Average OD (Inches)	8.750	
Chipped Volume Reduction (Cubic Feet per Foot)	0.088	Unit Rate
Chipped Volume (Cubic Feet)	0	Calculated
Volume per Truck Load (Cubic Feet)	540	
Total Number of Truck Loads	0.0	Calculated
B. Survey & Decontamination		
Percent Requiring Decontamination	0.0%	
Number of Decontamination Truck Loads	0.0	Calculated
Decontamination Cost per Load	$0.00	Unit Rate
Decontamination Cost	$0	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: E. Wellfield Equipment Removal and Disposal - WORKSHEET 6

Assumptions/Items	MU-1	Source
III SURFACE TRUNKLINE PIPING (continued)		
C. Transport & Disposal		
Landfill		
Transportation		
Percent to be Shipped	0.0%	
Loads to be Shipped	0.0	Calculated
Distance (Miles)	48	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$0	Calculated
Disposal		
Disposal Fee per Cubic Yard	$13.50	Unit Rate
Load Volume (Cubic Yards)	20	
Disposal Cost	$0	Calculated
Total Landfill Cost	$0	Calculated
Licensed Site		
Transportation		
Percent to be Shipped	100.0%	Calculated
Loads to be Shipped	0.0	Calculated
Distance (Miles)	105	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$0	Calculated
Disposal		
Disposal Cost per Cubic Foot	$12.38	Unit Rate
Disposal Fee per Cubic Yard	$334.26	Calculated
Load Volume (Cubic Yards)	20	
Disposal Cost	$0	Calculated
Total Licensed Site Cost	$0	Calculated
Total Transport & Disposal Cost	$0	Calculated
TOTAL SURFACE TRUNKLINE PIPING REMOVAL & DISPOSAL COST	$0	Calculated

Table RP-4 Reclamation/Restoration Bond Estimate (Page 27 of 37)

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: E. Wellfield Equipment Removal and Disposal - WORKSHEET 6

Assumptions/Items	MU-1	Source
IV BURIED TRUNKLINE		
A. Removal		
Total Length (Feet)	24,304	
Removal Cost per Buried Foot	$1.58	Unit Rate
Removal Cost	$19,139	Calculated
Chipping Rate (feet per hour)	150	Estimate
Chipper Cost per Hour	$30	Unit Rate
Chipping Cost	$4,861	Calculated
Average OD (Inches)	9.635	
Chipped Volume Reduction (Cubic Feet per Foot)	0.309	Unit Rate
Chipped Volume (Cubic Feet)	7,510	Calculated
Volume per Truck Load (Cubic Feet)	540	
Number of Truck Loads	13.9	Calculated
B. Survey & Decontamination		
Percent Requiring Decontamination	0.0%	
Number of Decontamination Truck Loads	0.0	Calculated
Decontamination Cost per Load	$0.00	Unit Rate
Decontamination Cost	$0	Calculated
C. Transport & Disposal		
Landfill		
Transportation		
Percent to be Shipped	0.0%	
Loads to be Shipped	0.0	Calculated
Distance (Miles)	48	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$0	Calculated
Disposal		
Disposal Fee per Cubic Yard	$13.50	Unit Rate
Load Volume (Cubic Yards)	20	
Disposal Cost	$0	Calculated
Total Landfill Cost	$0	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: E. Wellfield Equipment Removal and Disposal - WORKSHEET 6

Assumptions/Items	MU-1	Source
IV BURIED TRUNKLINE (continued)		
C. Transport & Disposal (continued)		
Licensed Site		
Transportation		
Percent to be Shipped	100.0%	Calculated
Loads to be Shipped	13.9	Calculated
Distance (Miles)	105	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$4,233	Calculated
Disposal		
Disposal Cost per Cubic Foot	$12.38	Unit Rate
Disposal Fee per Cubic Yard	$334.26	Calculated
Load Volume (Cubic Yards)	20	
Disposal Cost	$92,924	Calculated
Total Licensed Site Cost	$97,157	Calculated
Total Transport & Disposal Cost	$97,157	Calculated
TOTAL BURIED TRUNKLINE REMOVAL & DISPOSAL COST	$121,157	Calculated
V MANHOLES		
A. Removal		
Total Quantity	9	
Removal Cost per Manhole	$73.16	Unit Rate
Removal Cost	$658	Calculated
Quantity per Truck Load	10	
Number of Truck Loads	0.9	Calculated
B. Survey & Decontamination		
Percent Requiring Decontamination	0.0%	
Number of Decontamination Truck Loads	0.0	Calculated
Decontamination Cost per Load	$0.00	Unit Rate
Decontamination Cost	$0	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: E. Wellfield Equipment Removal and Disposal - WORKSHEET 6

Assumptions/Items	MU-1	Source
V MANHOLES (continued)		
C. Transport & Disposal		
Landfill		
Transportation		
Percent to be Shipped	0.0%	
Loads to be Shipped	0.0	Calculated
Distance (Miles)	48	Unit Rate
Cost per Mile	$2.90	Calculated
Transportation Cost	$0	
Disposal		
Disposal Fee per Cubic Yard	$13.50	Unit Rate
Load Volume (Cubic Yards)	20	
Disposal Cost	$0	Calculated
Total Landfill Cost	$0	Calculated
Licensed Site		
Transportation		
Percent to be Shipped	100.0%	Calculated
Loads to be Shipped	0.9	Calculated
Distance (Miles)	105	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$274	Calculated
Disposal		
Disposal Cost per Cubic Foot	$12.38	Unit Rate
Disposal Fee per Cubic Yard	$334.26	Calculated
Load Volume (Cubic Yards)	20	
Disposal Cost	$6,017	Calculated
Total Licensed Site Cost	$6,291	Calculated
Total Transport & Disposal Cost	$6,291	Calculated
TOTAL MANHOLE REMOVAL & DISPOSAL COST	$6,949	Calculated

TOTAL WELLFIELD EQUIPMENT REMOVAL AND DISPOSAL COST	**$182,997**	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: F. Topsoil Replacement and Revegetation - WORKSHEET 7

Assumptions/Items	Mine Unit No. 1	Source
I PLANT		
A. Topsoil Handling & Grading		
Affected Area (Acres)	5.0	
Average Affected Thickness (Inches)	16.0	
Topsoil Volume (Cubic Yards)	10,756	Calculated
Hauling/Placement Cost per Cubic Yard	$1.13	Unit Cost
Topsoil Handling Cost	$12,154	Calculated
Grading Cost per Acre	$56.28	Unit Cost
Grading Cost	$281	Calculated
Total Topsoil Handling & Grading Cost	$12,435	Calculated
B. Radiation Survey & Soil Analysis		
Survey & Analysis Cost per Acre	$653.00	Unit Cost
Total Survey & Analysis Cost	$3,265	Calculated
C. Revegetation		
Fertilizer Cost per Acre	$52.33	Unit Cost
Seeding Preparation & Seeding Cost per Acre	$189.85	Unit Cost
Mulching & Crimping Cost per Acre	$311.25	Unit Cost
Total Revegetation Cost per Acre	$553.43	Calculated
Total Revegetation Cost	$2,767	Calculated
TOTAL PLANT COST	$18,467	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: F. Topsoil Replacement and Revegetation - WORKSHEET 7

Assumptions/Items	Mine Unit No. 1	Source
II PONDS		
A. Topsoil Handling & Grading		
Affected Area (Acres)	5.0	
Average Affected Thickness (Inches)	20	
Topsoil Volume (Cubic Yards)	13,444	Calculated
Hauling/Placement Cost per Cubic Yard	$1.13	Unit Cost
Topsoil Handling Cost	$15,192	Calculated
Grading Cost per Acre	$56.28	Unit Cost
Grading Cost	$281	Calculated
Total Topsoil Handling & Grading Cost	$15,474	Calculated
B. Radiation Survey & Soil Analysis		
Survey & Analysis Cost per Acre	$653.00	Unit Cost
Total Survey & Analysis Cost	$3,265	Calculated
C. Revegetation		
Fertilizer Cost per Acre	$52.33	Unit Cost
Seeding Preparation & Seeding Cost per Acre	$189.85	Unit Cost
Mulching & Crimping Cost per Acre	$311.25	Unit Cost
Total Revegetation Cost per Acre	$553.43	Calculated
Total Revegetation Cost	$2,767	Calculated
TOTAL POND COST	$21,506	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: F. Topsoil Replacement and Revegetation - WORKSHEET 7

Assumptions/Items	Mine Unit No. 1	Source
III WELLFIELDS		
A. Topsoil Handling & Grading		
Affected Area (Acres)	12.1	50% of Ptn Area
Average Affected Thickness (Inches)	0.0	
Topsoil Volume (Cubic Yards)	0	Calculated
Hauling/Placement Cost per Cubic Yard	$1.13	Unit Cost
Topsoil Handling Cost	$0	Calculated
Grading Cost per Acre	$56.28	Unit Cost
Grading Cost	$681	Calculated
Total Topsoil Handling & Grading Cost	$681	Calculated
B. Radiation Survey & Soil Analysis		
Survey & Analysis Cost per Acre	$653.00	Unit Cost
Total Survey & Analysis Cost	$7,901	Calculated
C: Spill Cleanup		
Affected Area (Acres)	-	Calculated
Affected Area (Square Feet)	-	
Average Affected Thickness (Feet)	0.25	
Affected Volume (Cubic Feet)	-	Calculated
Volume per Truck Load (Cubic Feet)	540	
Number of Truck Loads	0.0	Calculated
Distance (Miles)	105	
Cost per Mile	$2.90	Unit Cost
Transportation Cost	$0	Calculated
Handling Cost per Truck Load	$238	Unit Cost
Handling Cost	$0	Calculated
Disposal Fee per Cubic Foot	$4.16	Unit Cost
Disposal Cost	$0	Calculated
Total Spill Cleanup Cost	$0	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: F. Topsoil Replacement and Revegetation - WORKSHEET 7

Assumptions/Items	Mine Unit No. 1	Source
III WELLFIELDS (continued)		
D. Revegetation		
Fertilizer Cost per Acre	$52.33	Unit Cost
Seeding Preparation & Seeding Cost per Acre	$189.85	Unit Cost
Mulching & Crimping Cost per Acre	$311.25	Unit Cost
Total Revegetation Cost per Acre	$553.43	Calculated
Total Revegetation Cost	$6,697	Calculated
TOTAL WELLFIELDS COST	$15,279	Calculated
IV ROADS		
A. Topsoil Handling & Grading		
Affected Area (Acres)	11.1	

Main Road Lengths (ft)	Secondary Road Lengths (ft)	
1,556		
594		
228		
356	966	
362	391	
211	276	
2,309	291	
1,260	311	
244	257	
1,029	330	
5,049	323	
13,198	3,145	Total Road Lengths (Feet)
20	12	Road Width (Feet)
12	8	Road Borrow (Feet)
32	20	Road Width and Borrow (Feet)
9.7	1.4	Road Area (Acres)
11.1		**Total Road Area (Acres)**

Table RP-4 **Reclamation/Restoration Bond Estimate** (Page 34 of 37)

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: F. Topsoil Replacement and Revegetation - WORKSHEET 7

Assumptions/Items	Mine Unit No. 1	Source
IV ROADS (continued)		
A. Topsoil Handling & Grading (continued)		
Average Affected Thickness (Inches)	15	
Topsoil Volume (Cubic Yards)	22,385	Calculated
Hauling/Placement Cost per Cubic Yard	$1.13	Unit Cost
Topsoil Handling Cost	$25,295	Calculated
Grading Cost per Acre	$56.28	Unit Cost
Grading Cost	$625	Calculated
Scarify Compacted Area per Acre	$53.83	Unit Cost
Scarify Cost	$598	Calculated
Total Topsoil Handling & Grading Cost	$26,517	Calculated
B. Radiation Survey & Soil Analysis		
Survey & Analysis Cost per Acre	$653.00	Unit Cost
Total Survey & Analysis Cost	$7,248	Calculated
C. Revegetation		
Fertilizer Cost per Acre	$52.33	Unit Cost
Seeding Preparation & Seeding Cost per Acre	$189.85	Unit Cost
Mulching & Crimping Cost per Acre	$311.25	Unit Cost
Total Revegetation Cost per Acre	$553.43	Calculated
Total Revegetation Cost	$6,143	Calculated
TOTAL ROADS COST	$39,909	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: F. Topsoil Replacement and Revegetation - WORKSHEET 7

Assumptions/Items	Mine Unit No. 1	Source
V OTHER		
A. Topsoil Handling & Grading		
Affected Area (Acres)	1.0	
Average Affected Thickness (Inches)	15.0	
Topsoil Volume (Cubic Yards)	2016.67	Calculated
Hauling/Placement Cost per Cubic Yard	$1.13	Unit Cost
Topsoil Handling Cost	$2,279	Calculated
Grading Cost per Acre	$56.28	Unit Cost
Grading Cost	$56	Calculated
Total Topsoil Handling & Grading Cost	$2,335	Calculated
B. Radiation Survey & Soil Analysis		
Survey & Analysis Cost per Acre	$653.00	Unit Cost
Total Survey & Analysis Cost	$653	Calculated
C. Revegetation		
Fertilizer Cost per Acre	$52.33	Unit Cost
Seeding Preparation & Seeding Cost per Acre	$189.85	Unit Cost
Mulching & Crimping Cost per Acre	$311.25	Unit Cost
Total Revegetation Cost per Acre	$553.43	Calculated
Total Revegetation Cost	$553	Calculated
TOTAL OTHER COST	$3,542	Calculated

Table RP-4 Reclamation/Restoration Bond Estimate (Page 36 of 37)

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: F. Topsoil Replacement and Revegetation - WORKSHEET 7

Assumptions/Items	Mine Unit No. 1	Source
VI REMEDIAL ACTION		
A. Topsoil Handling & Grading		
Affected Area (Acres)	17.1	
Average Affected Thickness (Inches)	0.0	
Topsoil Volume (Cubic Yards)	0	Calculated
Hauling/Placement Cost per Cubic Yard	$1.13	Unit Cost
Topsoil Handling Cost	$0	Calculated
Grading Cost per Acre	$0.00	Unit Cost
Grading Cost	$0	Calculated
Total Topsoil Handling & Grading Cost	$0	Calculated
B. Radiation Survey & Soil Analysis		
Survey & Analysis Cost per Acre	$0.00	Unit Cost
Total Survey & Analysis Cost	$0	Calculated
C. Revegetation		
Fertilizer Cost per Acre	$52.33	Unit Cost
Seeding Preparation & Seeding Cost per Acre	$189.85	Unit Cost
Mulching & Crimping Cost per Acre	$311.25	Unit Cost
Total Revegetation Cost per Acre	$553.43	Calculated
Total Revegetation Cost	$9,464	Calculated
TOTAL REMEDIAL ACTION COST	$9,464	Calculated

TOTAL TOPSOIL REPLACEMENT AND REVEGETATION COST	**$108,166**	

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: G. Miscellaneoues Reclamation Activities - WORKSHEET 8

Assumptions/Items	Quantity	Source
I FENCE REMOVAL & DISPOSAL		
Length (Feet)	9,500	
Removal & Disposal Cost per Foot	$0.34	Unit Cost
TOTAL FENCE REMOVAL AND DISPOSAL COST	$3,230	Calculated
II CULVERT REMOVAL & DISPOSAL		
Length (Feet)	200	
Removal & Disposal Cost per Foot	$1.74	Unit Cost
TOTAL CULVERT REMOVAL & DISPOSAL COST	$348	Calculated
III UTILITIES		
Number of Months	6	
Cost per Month	$2,380	Unit Cost
TOTAL UTILITIES COST	$14,280	Calculated
IV DDW PIPELINE REMOVAL AND DISPOSAL		
Length (Feet)	21,730	
Removal & Disposal Cost per Foot	$2.43	Unit Cost
TOTAL DDW PIPELINE REMOVAL & DISPOSAL COST	$52,804	Calculated
TOTAL MISCELLANEOUS RECLAMATION ACTIVITIES COST	**$70,662**	Calculated

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PLATE OP-4A
SIMULATED DRAWDOWN, HJ HORIZON AT MAXIMUM PRODUCTION RATE – MINE UNIT 1

LOST CREEK PERMIT AREA

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PLATE OP-4B
SIMULATED DRAWDOWN, HJ HORIZON END OF REVERSE OSMOSIS – MINE UNIT 1

LOST CREEK PERMIT AREA

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