Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

Dave Freudenthal, Governor

John Corra, Director

October 29, 2010

Mr. John Cash
Lost Creek ISR, LLC
5880 Enterprise Drive, Suite 200
Casper, WY 82609

RE: **Lost Creek ISR LLC, In-Situ Recovery (ISR) Permit Application, TFN 4 6/268, 5th Round Technical Review Comments**

Dear Mr. Cash,

Enclosed please find the fifth round of technical comments to responses which were received by the Wyoming Department of Environmental Quality – Land Quality Division (WDEQ/LQD) District II Field Office on September 30, 2010. In order to track the status of the comments in this review, the enclosed spreadsheet (table) is provided. According to that table, 19 comments (out of the 33 previously-outstanding comments) were resolved based on this review. This leaves 14 outstanding comments to date.

Please provide responses to the comments in the attached memorandum following the Index Sheet format and protocol you have followed in the past. Direction to proceed with Second Public Notice will not be given until the WDEQ/LQD receives a Letter of Application Approval / Concurrence from the Bureau of Land Management (landowner). That letter would serve as the required Surface Owner Consent per W.S. §35-11-406 (b)(xii).

If you have specific questions regarding the enclosed review, it is suggested that you contact the individual reviewer for clarification. However, please feel free to contact me at (307) 332-3047 with any questions as well.

Respectfully,

Melissa L. Bautz, P.G.
District II Natural Resources Analyst

w/ enclosures, 5th Round of Technical Comments Memorandum (39 pages, double sided), Summary/Status of 5th round comments (1 page spreadsheet)

Cc Mr. Harold Backer, Ur-Energy USA, 10758 W. Centennial Rd. Suite 200, Littleton, CO 80127 (w/encl)
Mark Newman – BLM Rawlins, P. O. Box 2407, Rawlins, WY 82301 (w/encl)
Tanya Oxenberg, U.S. Nuclear Regulatory Commission, Federal and State Materials and Environmental Management Programs Uranium Recovery Licensing Branch, Mail Stop T-8F5, Washington, D.C. 20555-0001 (w/encl)
Don McKenzie, Cheyenne WDEQ/LQD→ TFN 4 6/268 Lost Creek ISR File (w/encl)
Mark Moxley - Lander WDEQ/LQD→ TFN 4 6/268 Lost Creek ISR File (w/encl)
Chron (w/encl)

Memorandum

File: Lost Creek ISR, LLC Uranium Project, Permit Application, TFN 4 6/268

From: Melissa L. Bautz – WyDEQ/LQD District II Geologist (MLB)
Amy Boyle – WyDEQ/LQD District II Hydrogeologist (AB)
Mark Moxley – WyDEQ/LQD District II Supervisor (MM)
Brian R. Wood – WyDEQ/LQD District II Hydrologist (BRW)

Date: October 29, 2010

Subject: Fifth round of Technical Review comments on Lost Creek ISR Application, TFN 4 6/268

This memorandum contains the WDEQ Land Quality Division's (LQD's) technical comments on Lost Creek ISR's (LC's) responses to LQD's preliminary and final technical comments on the above mentioned application.

The application was originally hand-delivered to the WDEQ/LQD Lander office on December 20, 2007 and it achieved completeness on May 20, 2008. Preliminary technical comments were provided by Matthew Kunze (LQD Cheyenne) in a memorandum dated August 8, 2008 and by Amy Boyle (LQD Lander) in a memorandum dated August 26, 2008. Final technical comments were provided by LQD Lander staff in a memorandum dated January 30, 2009.

Responses to Amy Boyle's 44 comments (August 26, 2008) were received on May 5, 2009. A second round of comments was sent to LC on June 19, 2009. Eighteen of the original comments were resolved, and two new comments were generated as part of that review.

On October 19, 2009, LC submitted responses to the final technical comments (those cited in the January 30, 2009 memo). In a review memorandum dated November 20, 2009, LQD provided a review of those responses. On February 25, 2010, LC personnel hand delivered their most recent responses to LQD's comments to date. That is, the February 25, 2010 submittal included responses to 1) LQD's January 30, 2009 Technical Review of the entire Permit and 2) the third round of technical comments from Amy Boyle's August 26, 2008 Technical Review of Appendices D5 and D6.

LQD provided the third round of technical comments on the February 25, 2010 submittal under cover letter dated March 26, 2010. In a meeting among LC and LQD personnel on May 6, 2010, it was agreed that several comments that occurred in the Mine Unit 1 (MU1) review should be moved to the Main Permit review (fourth round review). Based on that conclusion, LC included several responses formerly handled under the MU1 review in their responses to comments received at the LQD Lander office on June 25, 2010. LQD provided a review of the June 25, 2010 submittal (the fourth round of technical comments) under cover letter dated July 23, 2010. On September 30, 2010, LQD received LC's responses to LQD's fourth round of technical comments. **Below is LQD's review of the September 30, 2010 submittal; that is, the fifth round of technical comments is presented below.** The format used in LC's September 30, 2010 correspondence has been used. It preserves the original comment number from applicable LQD reviews. However, items that are deemed "resolved" based on this (fifth) round of comments have had the historical/background comments dropped.

APPENDIX D-5 (GEOLOGY) - AUGUST 2008 - LQD REVIEW OF APPENDICES D5 AND D6 OF THE MAIN PERMIT DOCUMENT

D5-4) *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 conjunction 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)**

c) **LQD (10/10)** Revised cross sections (Plate D5-1a – D5-1f) were provided to address the March 2010 comments regarding the inclusion of the multiple faults along the cross sections. **This item is resolved. (AB)**

*******THIS CONCLUDES COMMENTS ON APPENDIX D-5*********

APPENDIX D-6 (HYDROLOGY) - AUGUST 2008 - LQD REVIEW OF APPENDICES D5 AND D6 OF THE MAIN PERMIT DOCUMENT

D6-14) *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. (AB)**

D6-16) LQD (10/10) The updated Piper Diagrams, with the inclusion of the MB wells were provided. **This item is resolved. (AB)**

OPERATIONS PLAN - JANUARY 2009 - LQD COMMENTS ON THE MAIN PERMIT DOCUMENT

OP-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.

LQD (11/09) - 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)**

LC ISR, LLC (2/10) - 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.

LQD (3/10) – 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 (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)**

OP-36) LQD 10/10 – Based on the information provided, including letters from the WGFD and USFWS, and the inclusion of the PIAA into Attachment OP-6, **this item is resolved. (MLB)**

OP-44) LQD 10/10 – Based on the inclusion (and content) of letters from the WGFD and USFWS into Attachment OP-6, **this item is resolved. (MLB)**

OP-48) LQD 10/10 – Based on the inclusion (and content) of letters from the WGFD and USFWS into Attachment OP-6, **this item is resolved. (MLB)**

OP-72) LQD 10/10 – Based on the revised text provided for Section OP 2.9.5, **this item is resolved. (MLB)**

OP-77) LQD (10/10) Attachment OP-8, Section V(C) was revised to address the potential build-up of radionuclides in the soil from well purging. **This item is resolved. (AB)**

OP-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."

LQD (7/10) - 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)

LC ISR, LLC (9/10) – 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)**

OP-90) LQD (10/10) – This item is resolved. LC has revised the text in Section OP 3.3 as requested in March 2010. **(BRW)**

OP-99) LQD (10/10) – This item is resolved. LC has revised the text in Attachment OP 2 to better address the process of fluid management. **(BRW)**

OP-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 ft^2/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 ft^2/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

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

OP-112) LQD (10/10) Table OP-10 was updated. **This item is resolved. (AB)**

OP-114) LQD (10/10) A response to the water usage estimates was provided. The predicted drawdown portion of the comment is being addressed by Comment OP-105. **This item is therefore resolved. (AB)**

OP-118) LQD 10/10 – This item is resolved based on the new language inserted into Section OP 2.5.1 and the added Figure OP-6c (Drill Pit Drawing). **(MM)**

OP-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)**

*****This concludes the comments on the OPERATIONS PLAN in the MAIN Permit Document *****

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.

LQD (4/10) - 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)

LC ISR, LLC (6/10) - 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) – <u>This item is unresolved.</u> 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)**

MU1-6) *<u>LQD (2/10)</u> - 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 (9/10) – LC ISR, LLC – Please see the response to Comment RP-5.

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

MU1-11) LQD (10/10) – This item is resolved based on the submittal of an updated Attachment OP-2. Please see Response to Comment OP-99 for a summary of the changes to the attachment. **(MM)**

MU1-20) b. LQD (10/10) – This item is resolved. LC has revised the text in Attachment OP 2 to better address the process of fluid management. **(BRW, MM)**

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) – <u>This item is unresolved</u>. 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)**

MU1-22) *<u>LQD (2/10)</u> - 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)*

<u>LC ISR, LLC (3/10)</u> - 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)**

MU1-24) LQD (10/10) – This item is resolved. LC has revised the text in Attachment OP 2 to better address the process of fluid management. **(BRW, MLB)**

MU1-27) LC ISR, LLC (9/10) – Pursuant to a conversation with WDEQ-LQD staff on August 25, 2010, the number of mine units has been reduced from six to three. The area planned for mineral recovery, however, has not changed. Changing the number of mine units has in turn required revisions to Plate OP-1, Figure OP-2a, Figure OP-4a, Figure RP-1, Figure RP-2 and numerous portions of text. A discussion of the reasoning behind this change has also been added to the adjudication file under the Permit Development tab. LC ISR, LLC is also including with this submittal numerous stickers for other plates and figures that direct the reader to Plate OP-1 to see the most up-to-date mine unit plan. This will allow changes to be made to the mine unit area in the future without having to revise every plate and figure in the document.

LQD (10/10) – This item is resolved. (MM)

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)

LC ISR, LLC (6/10) - 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).

LQD (7/10) – 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)

LC ISR, LLC (9/10) - 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)**

*****This concludes the comments on the MINE UNIT 1 APPLICATION, relevant to the Main Permit Document*****

APRIL 2010 - NEW LQD COMMENT, ON THE MINE UNIT 1 APPLICATION, RELEVANT TO THE MAIN PERMIT DOCUMENT

MU1-NC-1) LQD (10/10) – This item is resolved. Figure OP-A2-3 has been revised as requested. **(MM)**

*****This concludes comments on the APRIL 2010 - New LQD Comment, ON THE MINE UNIT 1 APPLICATION, RELEVANT TO THE MAIN PERMIT DOCUMENT*****

RECLAMATION PLAN

JANUARY 2009 - LQD COMMENTS ON THE MAIN PERMIT DOCUMENT

RP-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)

LC ISR, LLC (2/10) -

Surface Water -
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.

Ground Water
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 Sand): (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)

LC ISR, LLC (6/10) - 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. LQD (3/10) - 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.

LQD (7/10) – 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 (9/10) – LC ISR, LLC – 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 water supply wells during ISR operations within 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)**

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

LC ISR, LLC (10/09) - 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.

LQD (11/09) - 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)

LC ISR, LLC (2/10) - 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

LQD (3/10) 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) - <u>Response partially acceptable.</u> 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)**

RP-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)**

*****This concludes the comments on the RECLAMATION PLAN in the MAIN Permit Document *****

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.

LQD (4/10) – 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)

LC ISR, LLC (6/10) - 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.

LQD (7/10) – 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) - <u>This remains an open item</u> pending receipt of revisions to the MU1 package. **(MM)**

MU1-25b) LQD (10/10) – <u>This item is resolved</u> based on the changes made to Tables RP-4, RP-5 and Figure RP-4. **(MM)**

*****This concludes comments on the RECLAMATION Plan from the FEBRUARY 2010 LQD comments, On THE MINE UNIT 1 APPLICATION, relevant to the Main Permit Document*****

<u>Summary:</u>

Please respond to the above comments, where appropriate. Once the application is found to be technically complete <u>and</u> approval / concurrence of technical adequacy from the Bureau of Land Management is obtained, second public notice will be authorized (in writing from WDEQ Land Quality Division). Should you have any questions concerning this memorandum, please contact the individual reviewer(s) at the WDEQ-LQD District 2 Office in Lander (307-332-3047).

**********END OF MEMORANDUM**********

Summary of the status of comments addressed by the *5th round technical review of the Main Permit Document Lost Creek ISR Permit Application - TFN 4 6/268 October 29, 2010	
Comment ID	**Comment Status**
Appendix D5-4b	Unresolved
Appendix D5-4c	Resolved
Appendix D6-14i	Unresolved
Appendix D6-16	Resolved
OP-9	Unresolved
OP-36	Resolved
OP-44	Resolved
OP-48	Resolved
OP-72	Resolved
OP-77	Resolved
OP-84	Unresolved
OP-90	Resolved
OP-99	Resolved
OP-105	Unresolved
OP-112	Resolved
OP-114	Resolved
OP-118	Resolved
OP-119	Unresolved
MU1-4	Unresolved
MU1-6	Unresolved
MU1-11	Resolved
MU1-20b	Resolved
MU1-20e	Unresolved
MU1-22	Unresolved
MU1-24	Resolved
MU1-27	Resolved
MU1-33	Unresolved
MU1-NC-1	Resolved
RP-5b	Resolved
RP5-c	Unresolved
RP-25	Unresolved
RP-26	Unresolved
MU1-25a	Unresolved
MU1-25b	Resolved
*This review resolved 19 comments and leaves 14 comments unresolved.	