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LOST CREEK ISR, LLC

February 2, 2011

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

Re: Response to 7th Round LQD Comments

Dear Mrs. Bautz,

Please find behind this cover responses to the unresolved comments (MU1-22f, MU1-23i, Follow-up on Figures MU1 4-2a-c, OP-105, RP-5, MU1-6, and Completion Logs). The responses required revisions to both the Permit to Mine Application and the Mine Unit 1 Application. Index sheets are included to assist with the replacement and insertion of pages into both these documents.

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

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

John W. Cash
Director of Regulatory Affairs

Enclosures: As Stated

Cc: Ms. Ramona Christensen, LQD Records Manager, Cheyenne WDEQ Office via Mr. Don McKenzie
Mrs. Nancy Fitzsimmons, Ur-Energy, Littleton, CO
Ms. Tanya Oxenberg, PhD, Project Manager, U.S. Nuclear Regulatory Commission

RESPONSES TO JANUARY 2011 WDEQ/LQD COMMENTS ON THE MAIN PERMIT DOCUMENT

for the
LOST CREEK PROJECT
Wyoming

February 2011

The responses are organized as follows:

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

This document combines outstanding comments from the following:

January 2009:	LQD Comments on the Main Permit Document;
November 2009:	New LQD comments on the Main Permit Document;
February 2010:	LQD comments, on the Mine Unit 1 Application, relevant to the Main Permit Document;
March 2010:	New LQD comments on the Main Permit Document;
April 2010:	New LQD comments, on the Mine Unit 1 Application, relevant to the Main Permit Document;
July 2010:	New LQD comments on the Main Permit Document and on the Mine Unit 1 Application, relevant to the Main Permit Document;
October 2010:	New LQD comments on the Main Permit Document and on the Mine Unit 1 Application, relevant to the Main Permit Document;
December 2010:	New LQD comments on the Main Permit Document and on the Mine Unit 1 Application, relevant to the Main Permit Document; and
January 2011:	New LQD comment on the Mine Unit 1 Application.

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

OPERATIONS PLAN

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

RECLAMATION PLAN

January 2009:	LQD Comments on the Main Permit Document

OPERATIONS PLAN

JANUARY 2009 - LQD COMMENTS ON THE MAIN PERMIT DOCUMENT

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:
$(u)_p$- $r_p^2S/4Tt$
$(u)_t$ - $r_t^2S/4Tt$
where:
r_p is the distance from the pumping well to the observation point;
r_i is the distance from the image well to the observation point; and
S - aquifer storativity.

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

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

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

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

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

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

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

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

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

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

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

LQD (12/10) - Adding a permit commitment to monitor existing wells on or near the proposed permit perimeter of Lost Creek will resolve this impact/mitigation item (specifically Sweetwater pit lake). These wells would be checked for water levels at some frequency (i.e. quarterly) to determine if the model is correct and if impacts are possibly occurring.

An item regarding Plate OP-4 listed under RP-5: the October 2010 LQD comment made reference to providing a complete legend to Plate OP-4. Plate OP-4 has been replaced by Plates OP-4a and OP-4b. The Note section appears to be an attempt to address the reviewer's prior comment, but the notes provided are unclear as to what they are pertaining to. Can you address this?

LC ISR, LLC (1/11) - A revised map legend explaining the map symbols has been included as a sticker.

LQD (1/11) – During the January 20, 2011 meeting, Brian Wood presented LC personnel with revised text for Cumulative Hydrologic Impacts section of the Operations Plan. LC personnel thought they could accept that language but would need to review it before formally submitting it. **The LQD awaits the submittal of a revised version of the Cumulative Hydrologic Impacts section in the Operations Plan.**

LC ISR, LLC (2/11) - LQD proposed changes to Section OP 3.6.3.3 to address LQD's concerns with potential drawdown from ISR operations and restoration. Included within the proposed language was monitoring of well M-1, which is near the Kennecott Sweetwater Mill Pit Lake. A review of well M-1 revealed that the completion interval of the well (approximately 6,706 to 6,261 feet above mean sea level) does not reflect the elevation range of the Pit Lake (approximately 6,639 to 6,425 feet above mean sea level). Since well M-1 is not completed in the same aquifer as the Pit Lake, it would not be a good indicator of drawdown in the Pit Lake caused by in situ operations. It is also worth pointing out that the water table elevation of M-1 is approximately 25 feet higher than the top of the Pit Lake. This difference in elevation is a good indicator that the monitor well is "seeing" a different aquifer than the Pit Lake. LC ISR, LLC has discussed this issue with Oscar Paulson of Kennecott Uranium to see if there are other monitor wells with appropriate completions that could be monitored in place of well M-1. There are a few wells very near the Pit Lake with appropriate completions; however, they are so near the Pit Lake that they would not improve upon the information gained by monitoring the Pit Lake water level.

The language proposed by LQD has been revised by removing the reference to monitor well M-1 but the proposed review of water levels in the Pit Lake has been left unchanged. Additionally, a few other minor changes to the language were made.

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

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

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

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

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

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

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

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

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

LQD (12/10) - *Adding a permit commitment to monitor existing wells on or near the proposed permit perimeter of Lost Creek will resolve this impact/mitigation item (specifically Sweetwater pit lake). These wells would be checked for water levels at some frequency (i.e. quarterly) to determine if the model is correct and if impacts are possibly occurring.*

An item regarding Plate OP-4 listed under RP-5: the October 2010 LQD comment made reference to providing a complete legend to Plate OP-4. Plate OP-4 has been replaced by Plates OP-4a and OP-4b. The Note section appears to be an attempt to address the reviewer's prior comment, but the notes provided are unclear as to what they are pertaining to. Can you address this?

LC ISR, LLC (1/11) – Please see the response to Comment OP #105.

LQD (1/11) – During the January 20, 2011 meeting, Brian Wood presented LC personnel with revised text for Cumulative Hydrologic Impacts section of the Operations Plan. LC personnel thought they could accept that language but would need to review it before formally submitting it. **The LQD awaits the submittal of a revised version of the Cumulative Hydrologic Impacts section in the Operations Plan.**

LC ISR, LLC (2/11) - Please see the response to Comment OP #105.

RECLAMATION PLAN

JANUARY 2009 - LQD COMMENTS ON THE MAIN PERMIT DOCUMENT

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

LC ISR, LLC (10/09) -

Surface Water

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

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

Groundwater

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

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

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

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

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 Snad): (1) Darcy Strip, and (2) Theis Analysis and both approaches have their limitations. The reviewer performed independent calculations using the Theis approach and produced estimates similar to those presented in the text.

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

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

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

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

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

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

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

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

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

LQD (12/10) - Adding a permit commitment to monitor existing wells on or near the proposed permit perimeter of Lost Creek will resolve this impact/mitigation item (specifically Sweetwater pit lake). These wells would be checked for water levels at some frequency (i.e. quarterly) to determine if the model is correct and if impacts are possibly occurring.

An item regarding Plate OP-4 listed under RP-5: the October 2010 LQD comment made reference to providing a complete legend to Plate OP-4. Plate OP-4 has been replaced by Plates OP-4a and OP-4b. The Note section appears to be an attempt to address the reviewer's prior comment, but the notes provided are unclear as to what they are pertaining to. Can you address this?

LC ISR, LLC (1/11) – Please see the response to Comment OP #105.

LQD (1/11) – During the January 20, 2011 meeting, Brian Wood presented LC personnel with revised text for Cumulative Hydrologic Impacts section of the Operations Plan. LC personnel thought they could accept that language but would need to review it before formally submitting it. **The LQD awaits the submittal of a revised version of the Cumulative Hydrologic Impacts section in the Operations Plan.**

LC ISR, LLC (2/11) - Please see the response to Comment OP #105.

Comment on newly submitted Well Completion Logs) **LQD (1/11)** – The newly submitted well completion logs do not have a P.G. stamp. This oversight was pointed out to John Cash by Melissa Bautz in an e-mail dated January 26, 2011. **The LQD awaits the submittal of the completion logs with a P.G. stamp.**

LC ISR, LLC (2/11) - Please find a set of completion logs with P.G. stamps for the WDEQ-LQD Lander Field Office included in this submittal. A set of stamped logs were sent to the Cheyenne WDEQ-LQD Office as part of the last round of responses.

RESPONSES TO THE JANUARY 2011 WDEQ-LQD COMMENTS on the MINE UNIT 1 PACKAGE

for the
LOST CREEK PROJECT
Wyoming

February 2011

The responses are organized as follows:

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

This document combines outstanding comments from the following:

February 2010:	LQD comments, on the Mine Unit 1 Application;
April 2010:	New LQD comments, on the Mine Unit 1 Application;
July 2010:	LQD comments on the Main Permit Document, relevant to the Mine Unit 1 Application;
October 2010:	LQD comments on the Main Permit Document, relevant to the Mine Unit 1 Application; and
December 2010:	LQD comments, on the Mine Unit 1 Application.

RESPONSES TO WDEQ/LQD FEBRUARY 2010 COMMENTS

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

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

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

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

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

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

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

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

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

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

LC ISR, LLC (11/10) - On November 12, 2010, LC ISR, LLC provided the LQD with a numerical model, prepared by Petrotek, of the first mine unit. The numerical model demonstrates that a monitor well ring placed 500 feet away from the production zone and with 500-foot spacing between monitor wells is adequate to detect an excursion and allow timely recovery (typically less than 30 days). The language in Section 5.1.4 of the MU1 Application was revised to discuss the results of the numerical model in support of the spacing of the monitor well ring.

LQD 12/10 - This item is not resolved. The Petrotek numerical model is referenced in Section 5.1.4 and provides a scientific demonstration of the effectiveness for the 500 foot spacing of the monitoring ring wells. The following comments are in reference to the newly submitted model:

f) *The Operations Plan, Section 3.6.3 states that the projected bleed rate will be between 0.5 and 1.5 percent, yet the model used 0.52 to 0.77 percent. Why was not the maximum bleed rate of 1.5% utilized as a conservative approach? How would the maximum bleed rate affect the five-foot drawdown contour?*

LC ISR, LLC (1/11) - The 0.5 to 1.5 percent bleed cited in the Operations Plan represents the typical range for an ISR operation. The model indicates that a bleed rate of 0.77 percent or less during production is adequate to control lixiviant; therefore, there was no need to increase the bleed above that value. The results of the modeling are based on site specific aquifer properties determined from numerous hydrologic tests. It should also be noted that the maximum bleed during production operations was 38.2 gpm (Table 4); but during RO, the net extraction was 67.6 gpm. The five-foot drawdown contour from the RO simulation (Figure 17) provides a reasonable assessment of the worst case scenario with respect to drawdown impacts to the HJ Horizon.

LQD 1/11 - There is a discrepancy in the drawdown presented on Figure 14 in the new Hydrologic Model versus the drawdown presented on Plate OP-4a. During the January 20, 2011 meeting, Errol from Petrotek acknowledged the discrepancy and will need more time to determine which representation is correct. **LQD awaits LC's response to this item.**

LC ISR, LLC (2/11) – Plates OP-4a and OP-4b from the Operations Plan of the Lost Creek Permit to Mine Application were submitted in November 2010 in response to WDEQ-LQD comments. The Plates, dated 11/12/2010, contained contours representing the maximum simulated drawdown resulting from production (OP-4a) and restoration (OP-4b) operations at the proposed Lost Creek ISR uranium mine. The contours presented on those Plates are incorrect. Figures 14 and 17 that were provided in the report "Numerical Modeling of Hydrologic Conditions at the Lost

Creek Insitu Recovery Uranium Project, Wyoming" (Petrotek Engineering Corp., 2010) show the correct drawdown contours. Revised Plates showing the correct drawdown contours resulting from the modeling are included in this submittal.

The intent of the Plates was to show the extent of the ISR impacts to groundwater in the production zone (the HJ Horizon) on maps that included hydrologic features within the area, including water supply wells and reservoirs. ARC-GIS, Version 10.0 (ESRI, Inc.) is the platform that was chosen to display the Plates. The error occurred during transformation of the model output into ARC-GIS compatible files. The explanation of the error follows.

The initial output from the model code is in the form of binary files that can then be converted into grid files that can be read by various contouring programs. In this case, the conversion of the binary files to grid files was accomplished using the preprocessor Groundwater Vistas, Version 5.41 (Environmental Simulations). Surfer, Version 9, (Golden Software) is the contouring software used to prepare the figures shown in the modeling report. In order to place the contours on a map that showed hydrologic and geographic features of the area in the ARC GIS platform, the grid files were imported into Global Mapper for contouring. Global Mapper, Version 10, is more compatible with the ARC-GIS platform than Surfer. Unfortunately, the base map in Global Mapper used for this project is in metric units. When the grid files were imported, the contours were incorrectly transformed from metric (meters) to English units (feet), even though the values in the grid file already represented English units of feet. This conversion resulted in an increase of 3.281 times the original value at each grid node and the subsequent incorrect display provided in the original Plates.

Of key interest with respect to potential groundwater impacts is the drawdown that might occur at the Sweetwater Mill Pit located approximately 3 miles southwest of the Lost Creek ISR Permit Boundary. The simulated drawdown from the modeling effort indicates that maximum drawdown at the Sweetwater Pit resulting from Lost Creek production at Mine Unit 1 will be less than one foot. During restoration of Mine Unit 1, the maximum drawdown at the Sweetwater Pit is also simulated at less than 1 foot. Lost Creek ISR, LLC intends to sequentially mine uranium from several mine units. This may result in simultaneous production and restoration from separate mine units. The cumulative drawdown resulting from concurrent production and restoration operations can be estimated by summing the drawdown caused by each activity. The projected drawdown at the Sweetwater Pit, based on the modeling performed, would therefore be less than 2 feet. That value would be slightly higher or lower, depending on the relative position of Mine Units placed in production following Mine Unit 1. The modeling estimate assumes that the HJ Horizon is continuous and uniform in properties from Mine Unit 1 extending to the Sweetwater

Pit and that there is hydraulic connection between the two sites. It is recognized that faulting has been documented in the area between the two sites that may disrupt the continuity of the HJ Horizon, and that correlation of the production zone at Lost Creek and stratigraphic units exposed at the Sweetwater Pit is speculative and has not been confirmed. Therefore, the assumption of hydrologic continuity between the two sites may be incorrect, and if that is the case, it is possible that there may be no discernable impacts at the Sweetwater Pit resulting from ISR operations at the Lost Creek Project.

23) *LQD (2/10) - Section 5.2.1: This section addresses monitoring of the LFG and UKM sands across the fault. Figures MU1 5-1 and MU1 5-2 depicts pattern areas in the UHJ and LHJ respectively that are juxtaposed with either the LFG or UKM sands on the opposite side of the fault. Those figures also depict monitoring wells in the LFG or UKM sands to demonstrate that LC will be able to readily detect cross-fault excursions of lixiviant during solution mining. The depiction of the UHJ and LHJ pattern areas in Figures MU1 5-1 and 5-2 implies that there are also middle HJ (MHJ) pattern areas in the Mine Unit. Assuming there are MHJ pattern areas, they should be discussed in this section and they should be depicted on an additional figure to demonstrate that they, too, will be adequately monitored across the fault.*

Lastly, to more clearly depict pattern areas near the fault, please provide a localized cross section at each of the pattern areas near the fault to indicate the known displacement and juxtaposition of the sands across the fault. Along cross section A-A' on Attachment MU1 2-1, Figure 2-7, there is connection of the HJ horizon north of the fault with the FG Horizon south of the fault, and connection with the HJ horizon south of the fault with the KM horizon north of the fault. Regardless of whether the production zone is in the upper, middle or lower HJ with the entire aquifer under production and under pressure the possibility of an excursion either direction outside the production zone exists and needs to be presented and discussed. Please review all possible connections between upper and lower aquifers and the production zone, and present the engineering controls for avoiding an excursion, and the additional monitoring wells to be used to ensure that a cross formation excursion does not occur.[11] ***(MLB, AB)***

LC ISR, LLC (3/10) - The requested review has been completed by LC ISR, LLC and Section 5.2.1 has been revised to include a discussion of the MHJ Sands. Additional maps showing the possible cross fault connections have been provided in the Mine Unit 1 Application, and an additional cross section has been included in the Attachment MU1 2-1. LC ISR, LLC staff also met with LQD staff in the WDEQ Lander office on March 18, 2010 and presented a detailed discussion on these issues. Please see Response to Comment MU1 #33 regarding engineering controls.

LQD (4/10) – Response not acceptable. As noted in a March 24th email from the Division to John Cash, the information presented during the March 18th meeting in Lander was helpful, but additional information was requested for submittal in the Mine Unit package:

i. *To better demonstrate LC's ability to detect excursions in the overlying and underlying aquifers, the 21 'cross stitches' and map showing the stitch locations relative to the HJ production zones should be included in the MU package. All screened intervals in the monitoring wells should be indicated on the cross sections, so that it is clear that the well is screened appropriately to detect an excursion from a production zone juxtapositioned across the fault. In addition, please provide a Table which presents each of the potential juxtaposition scenarios, the production zone interval versus the monitoring well intervals, the distance from the fault of the nearest monitoring well, and the Figure No. which illustrates the juxtaposition.* ***(AB)***

   LC ISR, LLC (11/10) - The requested stitches were previously submitted to LQD on September 9th to assist with the review. However, LC ISR, LLC, pursuant to LQD's request, is incorporating the stitches into the MU1 Data Package. Therefore, please insert Plates MU1 5-2 and MU1 5-3 into the MU1 document. The cross section maps indicate where there is juxtaposition across the fault and also indicate how the monitor wells are completed. Finally, LC ISR, LLC wishes to point out again that the fault acts as a significant barrier to flow and leakage through the fault during operations is unlikely but will be monitored nonetheless.

   LQD (12/10) - The addition of Plates MU1 5-2 and MU1 5-3 is a welcome addition to the document. Please also provide a table summarizing the juxtaposition scenarios as originally requested. This item is not resolved. (AB)

   LC ISR, LLC (1/11) - The information requested is already presented in the plates and figures in the MU1 Package. Presenting the data in the requested tabular form would be redundant and provide no additional benefit to the reviewer or to the public. Therefore, LC ISR, LLC declines to resupply existing data in a non-required format.

   LQD (1/11) – Based on discussion during the meeting held on January 20, 2011, LC is preparing a summary table of the juxtapositions following the format provided by Amy Boyle. **LQD awaits LC's response to this item in the form of the submittal of a table.**

   LC ISR, LLC (2/11) - The table provided by Amy Boyle has been modified with additional information and is included with this submittal as Table MU1 5-3.

NEW INFORMATION

LC ISR, LLC (11/10) - Pursuant to discussions with LQD, LC ISR, LLC has inserted new language in Section MU1 4.1 and inserted new Figures MU1 4-2a, b, and c to describe the recompletion of monitor wells on the ring.

NC-12/10) *LQD - (This is a new comment resulting from the new information in LC ISR's 11/10 submittal). It is unclear how the sections noted as "open hole" on Figures MU1-4b and MU1-4c will isolate the intervals not intended to be monitored. That is, the text in the bottom of the second paragraph on Page MU1-14 (Section 4.1) states "Each of the three recompletion techniques involves placing a screen through the interval being monitored and a blank or casing across the intervals being isolated [emphasis added] from monitoring. However, the presence of "open hole" appears to contradict the text. Please clarify. (MLB)*

LC ISR, LLC (1/11) - The term "open hole" is used to indicate that the annulus is not cemented in place. In the examples provided in Figures MU1-4b and MU1 4c, the open hole at the depth contains a blank to prevent the inflow of water from non-monitored zones into the well bore. During well development, the energy exerted in the annulus behind the blank is minimal so the area will fill with poorly sorted fines that inhibit flow. The zones adjacent to screens will be exposed to considerable energy during well development thus creating a well sorted gravel pack which will become the preferred flow path. The differential sorting will result in the majority of water being produced from the zones targeted for sampling.

LQD (1/11) – During the January 20, 2011 meeting, Steve Hatten changed the figures on his laptop computer to replace the term "open hole" with "blank casing". Melissa Bautz reviewed that proposed change and said it would work well. **The LQD awaits the submittal of new versions of these figures.**

LC ISR, LLC (2/11) - Figures MU1 4-2b and c were revised as requested and are included with this submittal. Figure MU1 4-2a did not contain the verbiage "open hole" and was therefore not revised.

INDEX SHEET FOR MINE PERMIT AMENDMENTS OR REVISIONS

Date: **2/2/2011**
TFN: **4 6/268**

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

Statement: I, **John Cash**, an authorized representative of **Lost Creek ISR, LLC** declare that only the items listed on this and all consecutively numbered Index Sheets are intended as revisions to the current permit document. In the event that other changes inadvertently occurred due to this revision, those unintentional alterations will not be considered approved. Please initial and date. JMC 2/2/11

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

VOLUME NUMBER	PAGE, MAP OR OTHER PERMIT ENTRY TO BE REMOVED	PAGE, MAP OR OTHER PERMIT ENTRY TO BE ADDED	DESCRIPTION OF CHANGE
5 of 5 Ops Plan & Rec Plan	Pages OP-56 through OP-59	Pages OP-56 through OP-59	Updated in response to LQD comments
	Plate OP-4a	Plate OP-4a	Updated in response to LQD comments
	Plate OP-4b	Plate OP-4b	Updated in response to LQD comments

OP 3.6.3.2 Mine Unit Interference

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

OP 3.6.3.3 Cumulative Drawdown - Mine Unit Operations

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

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

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

Drawdown will be greatest in the immediate vicinity of the mine units. A numerical model was used to assess drawdown impacts from Lost Creek ISR operations. The model was developed using site-specific data based on geologic and hydrologic information collected from site characterization activities. The model development, calibration and simulations are described in the report "Numerical Modeling of Hydrologic Conditions at the Lost Creek In-Situ Recovery Uranium Project, Wyoming" found in Addendum 5-1 of the MU1 Volume. Simulations were run representing the full production-restoration sequence for Mine Unit 1. The simulation included a production phase at a maximum rate of 5,838 gpm (with a net bleed of 38 gpm or 0.65%) for a period of 26 months (791 days), groundwater sweep at 30 gpm for 12 months (365 days), and treatment with RO at 541 gpm for 18 months (548 days). The total simulation period was 56 months (4.75 years). During RO, the simulated consumptive use (reject brine)

was 67.6 gpm. Simulated drawdown during the maximum production rate is shown on **Plate OP-4a**. Drawdown during the RO phase is shown on **Plate OP-4b**. The 5-foot drawdown contour extends a maximum of 3.3 miles (17,250 feet) beyond the Permit Area boundary. The maximum drawdown outside the Permit Area boundary is slightly greater than 25 feet. This occurs where Mine Unit 1 is closest to the Permit Area boundary. Although this simulation only represents production and restoration from Mine Unit 1, the production and RO rates are maximized. During a portion of the Lost Creek ISR operations, full production and restoration could occur simultaneously; thus, the cumulative effect is represented by combining the predictions represented on **Plates OP-4a** and **OP-4b** and accounting for some shift in mine unit location.

The nearest surface water body to the Permit Area is the Sweetwater Mill Pit Lake (**Plates OP-4a** and **OP-4b**). It is unknown if the Sweetwater Mill Pit intercepts strata that are the stratigraphic equivalent of the HJ Horizon. The effects of the Sweetwater Mill Pit Lake on the hydrology of the HJ Horizon, or vice versa, are unknown. Regardless, performing the Cumulative Effect Analysis described in the previous paragraph of projected Lost Creek ISR operations, approximately two feet or less of drawdown is projected at distances as far as the Sweetwater Mill Pit Lake. The Sweetwater Mill operation (Permit 481) has collected water level data from the Pit Lake for approximately 20 years. Based on a review of the Permit 481 Annual Report, it appears that Pit Lake water levels have remained relatively constant over 12 years. Water elevation records for the Pit Lake are believed to be of sufficient length to provide a reasonable baseline of expected fluctuations. In conjunction with the data collected as specified in the Monitoring Plan (see **Attachment OP-8**), LC ISR, LLC will utilize the data available in the Permit 481 Annual Report to perform an ongoing assessment of impacts. In the event that the Sweetwater Mill Pit Lake experiences unacceptable drawdown (greater than two feet), LC ISR, LLC will cooperate with the owner of the Sweetwater Mill to determine the cause of the drawdown. If the Lost Creek ISR operations are determined to be the cause of the drawdown, LC ISR, LLC will work with the Sweetwater Mill Pit Lake owner to develop and implement a mutually agreeable solution.

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

OP 3.6.3.4 Cumulative Drawdown - Water Supply Wells

Drawdown will occur in aquifers that are pumped to meet the water supply requirements for dust suppression, drilling, plant process and wash water, and potable water. Water supply wells will include two wells completed in the FG Horizon, one well completed in

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

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

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

The calculated drawdown is as follows:

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

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

Use of the Theis solution implies numerous assumptions that are not fully applicable. In particular, because the Theis solution does not account for recharge to the aquifers, the

predicted drawdown is overestimated. Therefore, the drawdown resulting from water supply wells will most likely be less than five feet in the FG, KM and N Horizons at distances greater than three miles from the center of the Permit Area (or generally two miles outside the Permit Area). Furthermore, if excessive drawdown were to occur to the shallow FG Horizon during water supply pumping, the allocation of pumping rates would be shifted so as to withdraw a greater proportion of water supply from the other water supply wells completed in the deeper aquifers.

OP 3.6.4 Excursion Monitoring and Control

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

INDEX SHEET FOR MINE PERMIT AMENDMENTS OR REVISIONS

Date: **2/2/2011**
TFN: **4 6/268**

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

Statement: I, **John W. Cash**, an authorized representative of **Lost Creek ISR, LLC** declare that only the items listed on this and all consecutively numbered Index Sheets are intended as revisions to the current permit document. In the event that other changes inadvertently occurred due to this revision, those unintentional alterations will not be considered approved. Please initial and date. JWC 2/2/11

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

VOLUME NUMBER	PAGE, MAP OR OTHER PERMIT ENTRY TO BE REMOVED	PAGE, MAP OR OTHER PERMIT ENTRY TO BE ADDED	DESCRIPTION OF CHANGE
1 of 2	Pages MU1-iii & MU1-27	Pages MU1-iii & MU1-27	Revised in response to LQD comments.
	Figure MU1 4-2b	Figure MU1 4-2b	Revised in response to LQD comments.
	Figure MU1 4-2c	Figure MU1 4-2c	Revised in response to LQD comments.
	--	Table MU1 5-3	Added in response to LQD comments.
2 of 2 (MU1 North & South Tests)	In Appendix A, completion logs for Wells M-101, M-103, M-104, M-105, M-106, M-107, M-108, M-110, M-111, M-114, M-116, M-117, M-118, M-120A, M-121, M-123, M-127, & M-128	In Appendix A, completion logs for Wells OW1-1, TW1-1, M-101, M-103, M-104, M-105, M-106, M-107, M-108, M-110, M-111, M-114, M-116, M-117, M-118, M-120A, M-121, M-123, M-127, & M-128	**Note: This revision is only for the WDEQ-LQD Lander Field Office. All other parties have the current completion logs.** See list at beginning of Appendix A for location of these logs within the appendix. Log for Well OW1-1 is under the *KM Horizon* (New Completion). Log for Well TW1-1 is under the *HJ Horizon* (New Completion). Remainder of wells are under the *HJ Horizon* (Recompletes). Logs updated in response to LQD comments.

PLATES

ATTACHMENTS

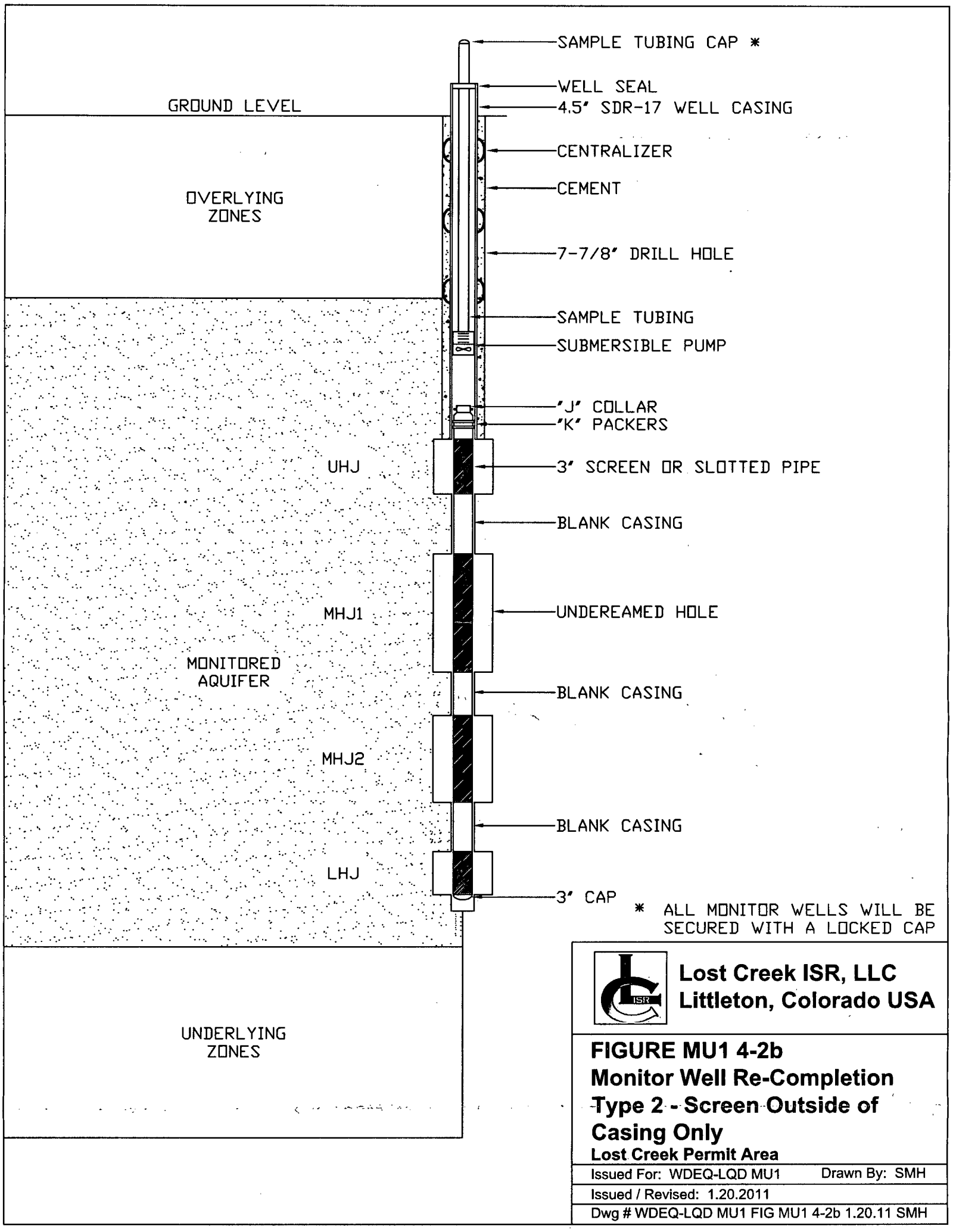
the structure of the fault. This fact is illustrated on **Plate D5-1d** of the main permit document. Therefore, LC ISR, LLC has examined these areas to ensure that a monitoring strategy to detect excursions into these juxtaposed sands is in place prior to the start of mining. Section 2.1 (Structural Geology) provides a more detailed discussion of the Lost Creek Fault.)

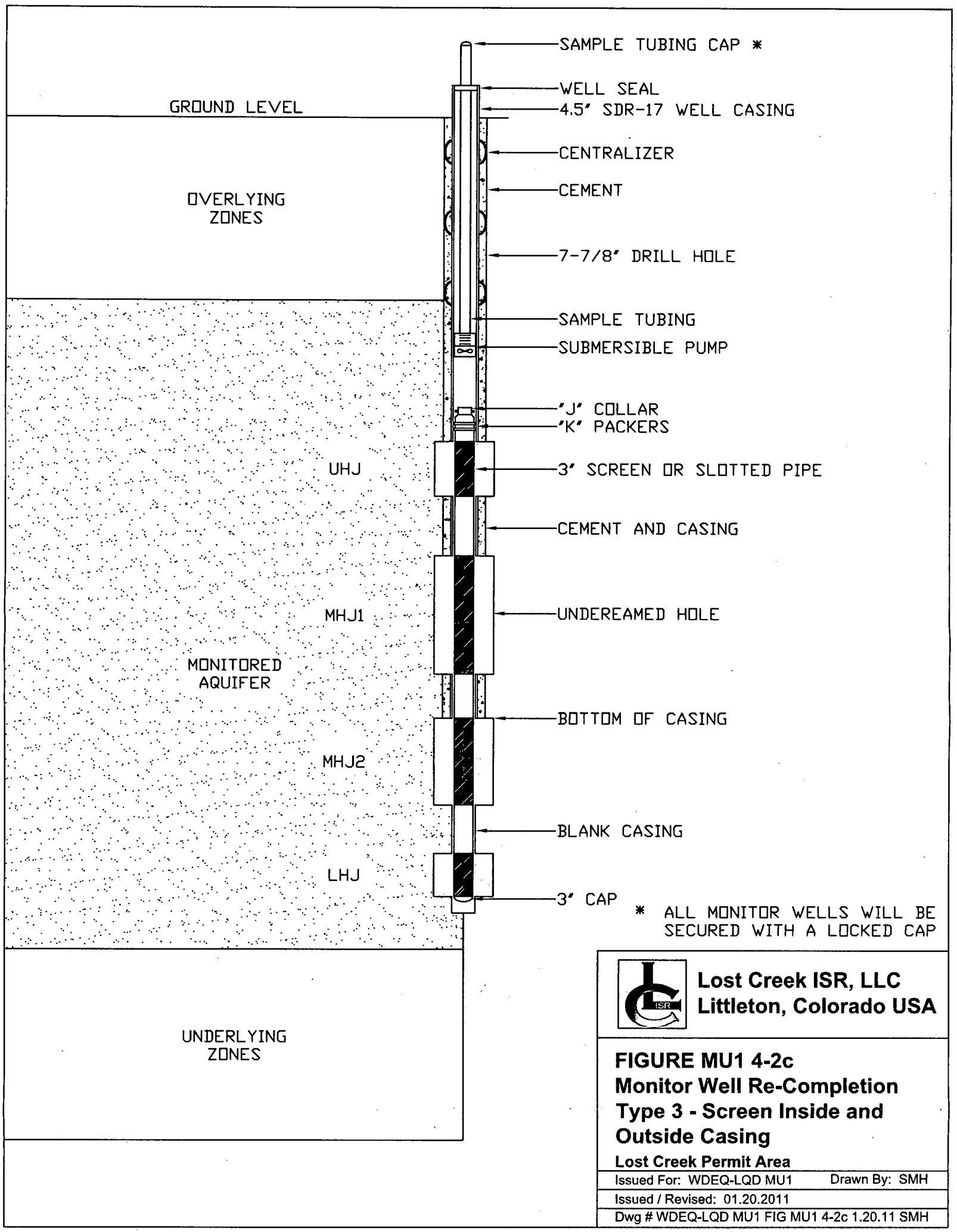
LC ISR, LLC has designed MU1 so none of the individual patterns cross the fault. However, there are patterns screened in the Upper HJ (UHJ) Sand that are positioned across from the LFG Sand on the down thrown side of the splinter fault of the Lost Creek Fault. **Figure MU1 5-1** shows the pattern locations, outlined in red, where this occurs. In order to monitor the LFG Sand at this location, LC ISR, LLC has recompleted well MO-114 in the LFG Sand and will use this well to monitor for mining solutions that may cross the Lost Creek Fault from the UHJ mining patterns. Well MO-114 was not included in the MU1 baseline sampling program conducted April through June 2009. However, a baseline sampling program for well MO-114 has been completed and the data has been incorporated into the database for MU1. Also indicated on **Figure MU1 5-1,** there is a set of patterns (outlined in red) north of the Lost Creek Fault screened in the UHJ Sand that are positioned across from the LFG Sand on the down thrown side of the Lost Creek Fault. Monitor well MO-113, which was sampled as part of the original baseline wells, is positioned to monitor the LFG Sand to detect potential excursions that may occur across the fault at this location. A summary of monitoring across the fault can be found in **Table MU1 5-3.**

Also indicated on **Figure MU1 5-2,** there is a set of patterns north of the Lost Creek Fault screened in the Middle HJ1 (MHJ1) Sand that are positioned across from the LFG Sand on the down thrown side of the Lost Creek Fault. Monitor wells MO-113 and MO-109 are positioned to monitor the LFG Sand to detect potential excursions that may occur across the fault at these locations.

The Middle HJ2 (MHJ2) Sand is the only sand unit that is positioned across from both the LFG and the UKM Sands. **Figures MU1 5-3a and b** show the pattern areas (outlined in red) where this occurs. The MHJ2 pattern areas north of the Lost Creek Fault (**Figure MU1 5-3a**) are positioned across from the LFG Sand on the down thrown side of the Lost Creek Fault. Monitor well MO-114 is positioned to monitor the LFG Sand to detect potential excursions that may occur across the fault from these patterns. **Figure MU1 5-3b** shows the MHJ2 pattern areas that are screened across from the UKM Sand. Monitor well MU-111 is positioned to monitor the UKM Sand to detect potential excursions that may occur north across the Lost Creek Fault from the MHJ2 pattern areas located south of the fault in the western portion of the of the mine unit.

Finally, there are patterns screened in the LHJ Sand that are positioned across from the UKM Sand as shown on **Figure MU1 5-4.** LC ISR, LLC believes there is sufficient monitoring positioned in the UKM Sand (MU wells) that leakage across the Lost Creek Fault into the UKM sand will be detected. Monitor well MU-111 is positioned to monitor the UKM Sand to detect potential excursions that may occur north across the Lost Creek Fault from the LHJ pattern areas located south of the fault in the western portion of the mine unit.


SAMPLE TUBING CAP *
WELL SEAL
GROUND LEVEL
4.5" SDR-17 WELL CASING
CENTRALIZER
OVERLYING
ZONES
CEMENT
7-7/8" DRILL HOLE
SAMPLE TUBING
SUBMERSIBLE PUMP
"J" COLLAR
"K" PACKERS
UHJ
3" SCREEN OR SLOTTED PIPE
BLANK CASING
MHJ1
UNDEREAMED HOLE
MONITORED
AQUIFER
BLANK CASING
MHJ2
BLANK CASING
LHJ
3" CAP
* ALL MONITOR WELLS WILL BE
SECURED WITH A LOCKED CAP
UNDERLYING
ZONES
Lost Creek ISR, LLC
Littleton, Colorado USA
FIGURE MU1 4-2b
Monitor Well Re-Completion
Type 2 - Screen Outside of
Casing Only
Lost Creek Permit Area
Issued For: WDEQ-LQD MU1
Drawn By: SMH
Issued / Revised: 1.20.2011
Dwg # WDEQ-LQD MU1 FIG MU1 4-2b 1.20.11 SMH



Lost Creek ISR, LLC
Littleton, Colorado USA

FIGURE MU1 4-2c
Monitor Well Re-Completion
Type 3 - Screen Inside and Outside Casing
Lost Creek Permit Area

Issued For: WDEQ-LQD MU1	Drawn By: SMH
Issued / Revised: 01.20.2011	
Dwg # WDEQ-LQD MU1 FIG MU1 4-2c 1.20.11 SMH	

Table MU1 5-3 Aquifer Juxtaposition and Monitoring Summary * (Page 1 of 2)

Production Zones NORTH of the Fault

STITCH	Production zone NORTH of FAULT	Thickness of Production Zone Juxtaposed to Overlying/Underlying Aquifer** (ft bgs)	Juxtaposed Overlying/Underlying Aquifer SOUTH of FAULT	Monitoring Well	Screened Interval (ft bgs)	Distance from Monitoring Well to Nearest Proposed Injection
1	UHJ	345-365 (20')	LFG	MO-113	346-366 (20')	320'
	MHJ1	365-370 (5')	LFG	MO-113	346-366 (20')	100'
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
2	UHJ	335-368 (33')	LFG	MO-113	346-366 (20')	320'
	MHJ1	368-369 (1')	LFG	MO-113	346-366 (20')	100'
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
3	UHJ	333-356 (23')	LFG	MO-113	346-366 (20')	320'
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
4	UHJ	334-354 (20')	LFG	MO-113	346-366 (20')	320'
	MHJ1	354-368 (14')	LFG	MO-113	346-366 (20')	690'
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
5	UHJ	na	--	--	--	--
	MHJ1	363-373 (10')	LFG	MO-109	330-355 (25')	560'
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
6	UHJ	na	--	--	--	--
	MHJ1	375-386 (11')	LFG	MO-109	330-355 (25')	90'
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
7	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
8	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
9	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
10	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
11	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
12	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
13	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
14	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
15	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
16	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	379-391 (12')	LFG	MO-114	366-386 (20')	360'
	LHJ	na	--	--	--	--
17	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
18	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
19	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
20	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
21	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--

Table MU1 5-3 Aquifer Juxtaposition and Monitoring Summary * (Page 2 of 2)

Production Zones SOUTH of the Fault

STITCH	Production zone SOUTH of FAULT	Thickness of Production Zone Juxtaposed to Overlying/Underlying Aquifer** (ft bgs)	Juxtaposed Overlying/Underlying Aquifer NORTH of FAULT	Monitoring Well	Screened Interval (ft bgs)	Distance from Monitoring Well to Nearest Proposed Injection
1	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	478-507 (29')	UKM	OW1-1	500-525 (25')	140'
2	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	490-520 (30')	UKM	OW1-1	500-525 (25')	150'
3	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	462-464 (2')	UKM	OW1-1	500-525 (25')	80'
	LHJ	464-507 (43')	UKM	OW1-1	500-525 (25')	260'
4	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
5	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
6	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
7	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
8	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
9	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
10	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
11	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
12	UHJ	na	--	--	--	--
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
13	UHJ	388-398 (10')	LFG (North of Splay Fault)	MO-114	366-386 (20')	450'
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
14	UHJ	385-396 (11')	LFG (North of Splay Fault)	MO-114	366-386 (20')	450'
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
15	UHJ	387-399 (12')	LFG (North of Splay Fault)	MO-114	366-386 (20')	450'
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
16	UHJ	386-390 (4')	LFG (North of Splay Fault)	MO-114	366-386 (20')	110'
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
17	UHJ	376-380 (4')	LFG (North of Splay Fault)	MO-114	366-386 (20')	110'
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
18	UHJ	373-389 (16')	LFG (North of Splay Fault)	MO-114	366-386 (20')	110'
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
19	UHJ	377-386 (9')	LFG (North of Splay Fault)	MO-114	366-386 (20')	820'
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
20	UHJ	380-382 (2')	LFG (North of Splay Fault)	MO-114	366-386 (20')	820'
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--
21	UHJ	377-383 (6')	LFG (North of Splay Fault)	MO-114	366-386 (20')	820'
	MHJ1	na	--	--	--	--
	MHJ2	na	--	--	--	--
	LHJ	na	--	--	--	--

* This table is a supporting document to plan view maps (Figures MU1 5-1 to MU1 5-4) and stitch cross sections (Plates MU1 5-2 and MU1 5-3) and should be used in conjunction with both. Also, for proposed pattern areas outlined in red in Figures MU1 5-1 to MU1 5-4, a distance filter of 300 feet from the outermost proposed injection well to the nearest intersection of stitch cross section and the fault was used to establish monitoring need, which the above table reflects.

** The status "na" indicates production zones that are either not juxtaposed with an over or underlying aquifer or no production in the vicinity across the fault. Depth ranges and thicknesses of production zones are gross approximations and may not reflect more discrete completion intervals anticipated during production. Correlations in the stitch cross sections do not account for topographic and stratigraphic variability or dip.

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

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

THESE DRAWINGS CAN BE ACCESSED WITHIN THE ADAMS PACKAGE WITHIN THIS PACKAGE...

D01

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

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

THESE DRAWINGS CAN BE ACCESSED WITHIN THE ADAMS PACKAGE WITHIN THIS PAKAGE...

D02x