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LOST CREEK ISR, LLC

June 11, 2009

Mr. Ronald Burrows
Project Manager
U.S. Nuclear Regulatory Commission
Mail Stop T8F5
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738

Re: Lost Creek Project Environmental Report; RAI Responses
Docket No. 40-9068
TAC No. LU0142

Dear Mr. Burrows,

Please find behind this cover, in duplicate, Lost Creek ISR, LLC's responses to the RAI issued by NRC on March 16, 2009 with regard to the Environmental Report.

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

Regards,

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

By: _____
John W. Cash, Manager EHS and Regulatory Affairs

Cc: Alan Bjornsen – NRC, Rockville
Nancy Fitzsimmons – Ur-Energy USA Inc., Littleton

Note on TR Comment Numbers cross-referenced in the following responses:

Lost Creek ISR, LLC (LC ISR, LLC) received a Request for Additional Information (RAI) on the Lost Creek Technical Report (TR) from the United States Nuclear Regulatory Commission (NRC) in November 2008. Each comment within the RAI was identified by TR section and comment number (e.g., TR Comment 2.7.2 #4). A series of responses to the RAI were submitted in December 2008, January 2009, and February 2009, and each response was identified by date, TR section, and comment number (e.g., December 2008 Response to TR Comment 2.7.2 #12).

Land Use

LCI has not provided sufficient information regarding the characteristics of land use surrounding the proposed Lost Creek site to enable the staff to prepare a National Environmental Policy Act (NEPA) document complete for public review. Land use characteristics should extend outward from the site boundary 5 miles because of the potential drawdown of the target aquifer from recovery wells.

1) ***From Sec. 2.2.1 TR and 3.1 ER provide a map needed that shows the predominant land use activities (e.g., grazing) within 5 miles of the site.***

   The attached map shows the predominant land use activities within five (5) miles of the site.

2) ***Provide details on the termination of any landowner agreements for grazing and other uses as a result of the proposed development of the land for ISL operations.***

   The land to be directly affected by mining activity is 100% owned by the United States Bureau of Land Management (BLM). The grazing lessee will have their lease payments reduced by a pro-rated amount that is reflective of the amount of land removed from grazing by mining activity. The BLM is responsible for contacting the lessee and determining the adjustment to the lease amount. LC ISR, LLC will make every effort to minimize the amount of land removed from grazing and commits to reclaiming affected lands using a native seed mix approved by the BLM and Wyoming Department of Environmental Quality (WDEQ).

   Hunting does occur in the area of the proposed facility but is only a minor activity due to the relative sparsity of wildlife. The Permit Area is within hunting areas of the Wyoming Game and Fish Department (WGFD) for antelope, deer, elk, and

mountain lion (see ER Section 3.1.1 and TR Section 2.2.1 for details). Hunting will be prohibited, with BLM permission, within the fenced areas of the facility in order to provide a safe environment for workers. However, areas outside the fencing will have unrestricted hunting access. There are no designated wildlife viewing locations in the study area.

Recreation activities within this area of the Great Divide Basin are limited due to the relatively harsh climate, remoteness and lack of scenery. According to BLM's Natural Resource Recreation Settings, the area is managed for Middle Country Designation, which does not restrict natural resource development and allows motorized and mechanized uses in most areas with some restrictions (see ER Section 3.1.1 for details). However, dispersed recreational activity takes place in the Green Mountains and Ferris Mountains, 8 miles to the north and 25 miles northeast of the Permit Area, respectively. Like hunting, recreation within the fenced areas of the facility will be prohibited with BLM permission. Recreation outside the fenced areas will be allowed.

Transportation

The analysis, while informative, was not comprehensive enough to understand and mitigate specific access routes, maintenance and upgrades necessary, and volumes of traffic to be generated by the proposed facility.

1) ***From Sec. 4.2 ER provide the roads planned to be used to access the site (both for construction and operation).***

Two primary roads will be upgraded to access the License Area during both construction and operation. (The road upgrades are described below in the Response to Transportation Comment #3). The main road from the west will connect the Permit Area with the Wamsutter-Crooks Gap Road while the main road from the east will connect to the Sooner road (BLM Road 3215). Both roads will run due east-west. During construction, it is estimated that 30 to 35 light trucks and 2 to 5 heavy trucks will travel to and from the site each day. During operation, it is estimated that about 20 light trucks and 2 to 5 heavy trucks will travel to and from the site each day, including the 1 to 2 trucks per week carrying yellowcake slurry. Additional detail about vehicles and related equipment is provided in the responses to Transportation Comments #5 and #6 below.

The License Area may be accessed from several routes:

- Light Truck Traffic
  - From Casper, Wyoming through Bairoil, Wyoming
    - WY-220 to US-287 to WY-73 to Bairoil Road to BLM Road 3215 to LC Site (106.5 miles)
  - From Rawlins, Wyoming via Mineral X Road
    - US-287 to Oil Road/Mineral X Road to BLM Road 3215 to LC Site (49.6 miles)
  - From Wamsutter, Wyoming via Wamsutter-Crooks Gap Road
    - Wamsutter-Crooks Gap Road to LC Site (38.8 miles)
  - From Jeffrey City, Wyoming via Wamsutter-Crooks Gap Road
    - Wamsutter-Crooks Gap Road to LC Site (32 miles)
- Heavy Truck Traffic
  - From Casper, Wyoming through Jeffrey City, Wyoming
    - WY-220 to US-287 to WY-73 to Wamsutter-Crooks Gap Road to LC Site (125 miles)
  - From I-80 via Wamsutter Crooks Gap Road
    - Wamsutter-Crooks Gap Road to LC Site (38.8 miles)

Within the License Area, there will be about 15 light trucks traveling to and from the mine units for monitoring and maintenance, and 10 drill rigs operating for well installation and ore delineation. These vehicles will travel primarily on existing or new two-track roads. The extent to which these two-track roads will be improved will depend on the frequency of use. For example, stripping of topsoil from and applying gravel to all two-track roads is not proposed because such actions may be more detrimental than soil compaction from traffic. Access routes for each mine unit will be specified in the associated Mine Unit Package.

2) ***Also from Sec. 4.2 ER provide the general potential destinations of the yellowcake slurry.***

The final destination of the yellowcake slurry is not known at this time. However, several drying facilities may be available for use. Section 4.2.1.2 of the ER discusses the distances of the closest and the furthest potential yellowcake drying facilities (Cogema Christiansen Ranch in Wyoming and Mestena Alta Mesa in Texas, respectively). Potential facilities include the Irigaray or Smith Ranch Facilities in the Powder River Basin of Wyoming or the Mestena or HRI facilities in Texas. It is LC ISR, LLC's desire to seek a license amendment to allow the construction and use of a drying facility at the Lost Creek Project as soon as possible after the facility is licensed.

3) ***From Sec. 4.3.2 ER identify the roads would be upgraded, and how would they be improved.***

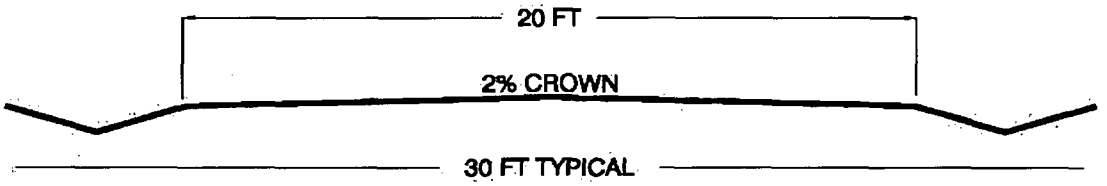
None of the Federal, State, County or Local roads are planned to be upgraded. The roads described above in the Response to Transportation Comment #1 will accommodate the traffic in their current condition. The two primary two-track roads used to access the site from the east and west will be upgraded to allow year-round site access during construction and operation.

Because the Lost Creek Project and the proposed access routes are on BLM property, they will upgraded to BLM Road Standards as detailed in the BLM Manual, Section 9113. Particularly, the main east-west access two-track roads will be upgraded to the BLM Functional Classification of "Local" for "Level and Rolling" terrain. This design standard has a minimum travelway width of 20 feet and a maximum grade of 10%. The preferred design speed for this specification is 40 miles per hour (mph). A schematic of this road cross-section is provided below.

Improvements will be in the following order:

1. Strip the topsoil from the road and borrow area and stockpile according to site protocols;
2. Grade and install culverts as specified by licensed design engineer;
3. Construct final road using 6-inch compacted road base on the 20-foot wide travel section;
4. Install BLM-approved cattleguards where roads cross existing or proposed fences; and
5. Install delineator posts, signage, and reseed as necessary.

TYPICAL ROADWAY CROSS SECTION



DITCH SLOPES 3:1 OR FLATTER

SLOPE VARIES TO MATCH TOPOGRAPHY

NOT TO SCALE

4) ***Also from Sec. 4.3.2 ER provide the general type of maintenance plan that would be proposed for the roads used to access the site.***

Road maintenance on the site access roads described in the Response to Transportation Comment #1 will be based on road use, weather, and temperature. Typical maintenance may be performed with a motor grader of suitable size to regrade, level and compact the driving surface and maintain the grade for proper drainage. Additional (and more typical) maintenance will include snow removal as required.

Normal maintenance will typically be performed once the ground is frost-free and there is adequate moisture to affectively regrade and compact the surface. This should occur from spring through fall.

All other roads described in the Response to Transportation Comment #1 are maintained by state and county equipment and are not the responsibility of LC ISR, LLC.

5) ***From Sec. 3.0 TR provide the types (and number) of vehicles (and equipment) that would be used to operate the site.***

Based on context, the above comment should likely read "Sec. 3.0 ER".

The vehicles used to operate the site are classified in three categories:

1. Company Owned, On Site Only
   a. Pickups: A total of approximately 24 ½-ton, ¾-ton and 1-ton pickups for supervision, construction, operations and maintenance in production, exploration and monitoring areas.
   b. Equipment: Approximately 3 All Wheel Drive (AWD) Forklifts: 2 Hard Surface Forklifts; 1 Motor Grader; 2 Backhoes; 3 Geophysical Logging Trucks; 1 All Terrain Vehicle (ATV); 3 Flat Bed Trailers; 3 Reel Trailers; 1 High-Density Polyethylene (HDPE) Fusion Cart; 9 Generators; 2 Water Trucks; 1 Mechanical Integrity Testing (MIT) Truck; and 6 Cementers.
2. Company Owned, On and Off Site
   a. Pickups: Approximately 3 ½-ton or ¾-ton pickups used by supervisors on site and to travel to and from the site.
   b. Vans: Approximately 4 vans to transport personnel to and from the site and Casper, Rawlins, or other town.
   c. Tractor/Trailer: One tractor will be used to mobilize two slurry trailers at the site. In addition, a side-dump or end-dump trailer (in conjunction with the tractor) is planned for waste transport to an approved 11(e)(2) byproduct waste disposal site.

3. Contractor Owned, On and Off Site
   a. Pickups: Approximately 10 ¾-ton and/or 1-ton pickups may be used by drilling contractors for travel to and from the site as well as travel on the site.
   b. Water Trucks: Approximately 10 80-barrel to 100-barrel water trucks will be used on site to support contract drilling operations.
   c. Truck-Mounted Drilling Rigs: Approximately 10 1500-Class drill rigs will be used on site to support contract drilling operations.
   d. Deliveries: Standard deliveries will occur of materials used for construction, operations as well as maintenance of the site. Frequency of deliveries will be based on production rate, usage, time of year and other needs. The materials can be separated into the following categories:
      i. Chemicals (weekly to monthly): Carbon dioxide, oxygen, salt, soda ash, peroxide, gasoline, and diesel;
      ii. Construction (weekly to monthly): Steel, polyvinyl chloride (PVC) and HDPE pipe, wire, valves, fittings, and structural steel;
      iii. Operations (weekly): Potable water, trash, and office supplies; and
      iv. Maintenance (weekly to monthly): Grease, oils, pipe, wire, and fittings.

6) Also from Sec. 3.2 ER provide the approximate number of vehicle trips (per day) that are expected for construction and operation.

The final construction contractor for the Plant has not been identified at the time of this response. Therefore, LC ISR, LLC is not sure whether the majority of the construction workforce will be commuting from the Rawlins, Casper, Wamsutter, and/or Lander areas. That being said, the following represents a reasonable estimate of traffic volume during the construction and operation phases.

- Construction
  - Drilling Contractors
    - 10 pickups per day to and from the site
  - Construction Contractors
    - 15 pickups per day to and from the site
    - 2 to 5 material deliveries per day
  - Lost Creek Personnel
    - 3 supervisor pickups per day to and from the site
    - 2 to 3 crew vans per day to and from the site

- Operations
  - Drilling Contractors
    - 10 pickups per day to and from the site
  - Lost Creek Personnel
    - 3 supervisor pickups per day to and from the site
    - 4 crew vans per day to and from the site
    - Approximately 5 single car loads depending on needs of individual employees

Surface Water

Sec. 7.1.5.1 ER provides general statements regarding the location of proposed work in relation to surface water features. In order to assess potential impacts to surface water features, specific locations and the specific feature is required.

1) ***Identify specific structures (e.g., road and pipeline crossings, buildings, storage areas, etc.) that would be located on/within surface (albeit ephemeral) water features (incl. wetlands).***

None of the Plant structures will be located within any water features. The main road will cross one ephemeral drainage, and an appropriate culvert will be constructed as discussed in Section 4.5.3.1 of the TR. Specific locations of structures within the mine units will be identified in the Mine Unit packages.

2) ***Provide the specific measures are currently proposed to minimize the potential impact upon these features.***

As noted in Section 4.2 of the TR, all construction and operations will be performed in compliance with a general Wyoming Pollution Discharge Elimination System (WYPDES) permit, requiring a WDEQ-approved Wyoming Surface Water Pollution Prevention Plan (SWPPP). The Great Divide Basin, an internally draining basin, is located in a semi-arid high desert environmental with relatively few drainages and infrequent ephemeral runoff. Drainage channels will be avoided to the extent possible during construction and operations. Given the small size and paucity of drainages on the property and the ability to adjust the location of wells, very few, if any, wells will be located within drainage channels. When a drainage feature cannot be avoided, an erosion control structure such as hay bales or silt fence will be established to minimize sedimentation. The erosion control structure will remain in place and in good repair until vegetation is re-established. Revegetation, using an approved native seed mixture, will take place as soon as the seasons and weather conditions allow. An alternative revegetation method will be to plant a vigorous annual cover crop such as millet to establish a

root system. The approved native seed mixture would be planted the following spring or as the weather and seasons allow.

In areas where long-term (greater than six months) disturbance within a channel is required, other methods of erosion control may be implemented. Examples of such methods commonly used to minimize potential operational impacts include rip-rap, vegetation armoring, culverts, and settling ponds. When such systems are used they will be engineered to handle the expected flow through the channel.

All erosion control structures will be inspected after any rain event greater than 1 inch to ensure they remain in good repair.

Groundwater

Groundwater analysis in the ER is insufficient to interpret the current conditions and assess the potential impact to the groundwater regime and regional supply wells.

1) ***From Sec 2.7.2 ER an additional table and figure is needed to illustrate the potential effect on existing and future locations of domestic and stock wells, given the drawdown predictions in the production aquifer.***

With respect to existing domestic and stock wells, a table and plate listing the wells within five (5) miles of the Permit Area, based on information from the Wyoming State Engineer's Office (WSEO) records and from the BLM, were submitted to NRC as part of the December 2008 Response to TR Comment 2.7.2 #4.

The reported total depths of 8 of these 15 wells are less than 350 feet. Therefore, it is unlikely that they would be impacted by pumping from the deeper HJ Sand. Depths of two of the wells are not known, and completion intervals for the other seven are not known. However, as discussed in Sections 7.1.5.2 and 4.1.5.2 of the TR and ER, respectively, LC ISR, LLC is planning to monitor water levels in the four wells closest to the property. In addition, LC ISR, LLC has estimated a 'worst case scenario' for drawdown in the HJ Sand (see December 2008 Responses to TR Comments 2.7.2 #12 and 3.2 #8). As additional information is gained during the Project, this estimate will be refined to more accurately reflect the actual impacts of the Project.

With respect to future locations of domestic and stock wells, LC ISR, LLC is not aware of any projects for which new domestic or stock wells would be needed. Given the presence of the Kennecott Sweetwater project to the southwest of the Lost Creek Permit Area, the predominance of BLM land in and around the Permit

Area, and the isolation of the site, it is possible that no new wells would be installed within five (5) miles of the Permit Area during the life of the Project. In addition, because of drilling and casing costs, it is likely that domestic and stock wells will be completed as shallow as possible, which would be above the HJ Sand.

2) ***Sec 3.5.2.2 indicates a pump test was planned for the fall of 2007 to assess the hydrologic relationship between the UKM and MKM sands. Please provide results.***

The pump test referenced in the comment was intended to characterize the MKM, which is not being licensed at this time and will not be impacted by mineral recovery in the HJ sand. Therefore, LC ISR, LLC will submit the pump test results to the NRC for review if and when a license amendment is sought to allow mining within the MKM or its overlying or underlying sands.

3) ***Sec 3.5.3 ER describes monitoring wells at the Kennecott Sweetwater Mill. Please state if the monitoring wells are still in use, or if they have been closed.***

In order to determine the status of the listed monitor wells, Mr. Oscar Paulson of the Kennecott Sweetwater Mill was contacted. The table below provides an update on the status of monitor wells at the mill site.

Well Name	Status as Described by Kennecott Personnel
J E S #1	In use
TMW-90	Abandoned
TMW-91	In use
Blue #5	Permit for a lake and not a well
DW-31	In use
DW-32	In use
DW-33	In use
DW-34	In use
DW-35	Abandoned
DW-36	Abandoned
DW-37	Abandoned
DW-38	Abandoned
DW-39	In use
DW-40	In use
DW-41	Never installed
DW-42	Never installed
TMW-14	Never installed
24-93W-3AC-M-1	In use

4) From Sec 3.5.5.2 ER provide a more descriptive plan of the proposed operation.

Based on clarification provided by Mr. Alan Bjornsen of NRC in a June 3, 2009 e-mail, the following response is directed toward providing more detail on mine unit design.

Mine Unit Location

The general location of the mine units provided in the ER and TR are preliminary in nature due to limited delineation drilling. The specific location of each mine unit is dictated by numerous factors of which economics of the mineralized zone is the most important. Factors effecting economics include: ore grade; market value of uranium; total pounds per well pattern; depth; solubility of ore in approved lixiviant; hydrologic properties; surface topography; and similar factors.

Pursuant to a recent NRC request, individual mine unit data packages will be submitted to the NRC for review and approval until such time that NRC staff is comfortable with Lost Creek's management. Each mine unit package will include a map showing the location of the respective mine unit in greater detail. The mine unit data package will also include information such as the results of pumping tests and baseline water chemistry from the production zone and monitor wells. The following discussion provides generalized design factors that are considered by engineers and geologists when laying out a mine unit.

Mine Unit Pattern Design

Assuming a uranium deposit is economic, the design of a uranium ISR mine unit is dictated largely by the nature of the ore deposit. Specifically, the criteria involve:

- Where the ore occurs:
    - Since production wells are drilled vertically, the wells and mine units must be located directly over the ore trend.
- The geometry of the ore body:
    - The uranium ore at Lost Creek occurs in the form of roll-front ore bodies. The geometry of a roll-front is that of a long, narrow, very sinuous ore body. Individually, each front is typically several hundred to thousands of feet long, 50 to 100 feet wide, and 10 to 25 feet thick. Furthermore, the Lost Creek deposit consists of multiple roll-fronts which are stacked vertically above each other, generally in sub-parallel alignment (see attached Figure 1 - Illustration of Roll Front Deposits). Therefore, the Lost Creek deposit represents a composite of several roll-fronts which are

collectively a few miles long, several hundred feet wide, and approximately 150 feet thick.

ISR production wells (injection and recovery wells) are laid out over the ore in '*patterns*'. Each pattern represents a 'unit cell' consisting of one recovery (production) well and associated injection wells which feed to it. Injection wells are shared by adjacent repeating patterns. There are three basic patterns which may be employed during production at Lost Creek (see attached Figure 2 - Mine Unit Patterns):

- 5-Spot: One recovery well fed by four injection wells; in a square configuration with the recovery well in the middle.
- Single Line-Drive: One recovery well fed by two injection wells; in a linear configuration over the center-line of the ore trend.
- Staggered Line-Drive: Similar to the Single Line-Drive, except that wells are staggered across the trend: injection wells on one side, and recovery wells on the opposite side.

The selection of pattern type is dictated largely by the width of the ore body. A 5-spot pattern is preferred over wider ore trends. A Line-Drive pattern will be employed where the ore trend is narrow.

In addition, one set of well patterns cannot be employed to collectively address all of the roll-fronts occurring at different depths. Rather, each individual roll-front ore trend must be addressed individually by its own set of well patterns. Therefore, mine units on the Lost Creek deposit (which consists of multiple stacked roll-fronts) will consist of multiple sets of well patterns, each set addressing an individual roll-front ore trend and each set at different depths. Where roll-fronts overlap each other (in map view), this situation may lead to multiple sets of well patterns occupying roughly the same area (see attached Figure 3 - Illustration of Well Pattern Distribution).

The precise location of monitoring wells (monitor well ring, overlying, underlying, and baseline) is not dictated by regulation. However, WDEQ-Land Quality Division (LQD) regulations provide for maximum spacing of overlying, underlying, and baseline monitor wells. WDEQ-LQD Guideline No. 4 "In Situ Mining" provides details on the proper distance for installing monitor ring wells. Both WDEQ-LQD and NRC, at least initially, will review and approve the placement of the monitor wells as part of the mine unit data package submittal.

Well Completion Intervals

The license application is for mineral recovery in the HJ Horizon which ranges approximately 350 to 500 feet below the ground surface. Numerous well types

will be completed within the HJ Horizon and in the overlying and underlying aquifers. The following paragraphs discuss completion (screened) intervals and the basis for determining the appropriate range of the completion.

Production and injection well completions are based on at least two factors. The most obvious is that wells will be completed across the thickness of the ore encountered by the well. However, industry experience has shown that large completion intervals, generally over 20 feet, result in inefficient recovery because the injected water will tend to flow to the most transmissive zone in the completion interval. This results in high recovery rates in the transmissive zones and low recovery rates in the tighter rock. Therefore, geologists are careful to minimize the length of the completion zone. In a thick ore horizon, the geologist may elect to install two injection wells instead of one. The geologist may also decide to use multiple wells to recover ore if there are significant differences in transmissivity within an ore horizon even if the horizon is relatively thin.

Overlying and underlying monitor wells are completed in the aquifers immediately overlying and underlying the aquifer in which mining will occur. There are no regulations or guidelines stating how long the completions should be, however, they are generally minimized in order to prevent sample dilution from waters which are less likely to be impacted by a vertical excursion. Baseline monitor wells are completed in the same fashion as recovery and injection wells since they are designed to characterize the water that will be impacted by mining. Monitor well ring completions focus on the zones that are representative of the completion intervals of the nearest injection wells. By focusing the monitor ring well completions, there is less opportunity for an excursion to be diluted by water from unaffected zones.

Auxiliary Systems

Pipelines and powerlines within the mine unit will be located to minimize the distance traversed but to allow ease of inspection. Both pipelines and powerlines will generally be located near roadways to minimize disturbance and to ease construction and inspections.

5) ***In Sec 4.5.1.3 ER comparative information is required to assess recharge rates (that Lost Creek water level recharge rates of 10-15 years [following uranium extraction] are comparable to predictions of other operations of similar scale).***

Water level recharge rates at Lost Creek will be dependent on a number of variables including, but not limited to: properties of the production zone aquifer; potential hydraulic communication with overlying and underlying hydrostratigraphic units; hydrologic boundaries; aquifer depth; infiltration rates;

initial hydraulic head; total drawdown; other consumptive uses in the area; and distance from recharge areas.

As discussed in the ER and TR, pump tests have been conducted at Lost Creek to assess aquifer properties. The effective transmissivity of the production zone (HJ Horizon) determined from the pump tests is on the order of 60 to 80 square feet per day (ft^2/d). The pump test results were influenced by the presence of the Lost Creek Fault, which resulted in greater drawdown (and subsequently a lower calculated transmissivity value) than would have resulted if the fault were not present. The fault effectively cuts the available aquifer by half, at least within the scale and duration of the pump tests. The actual transmissivity of the aquifer, away from the influence of the fault, would be approximately double the calculated value, or on the order of 120 to 160 ft^2/d.

For comparison purposes, the transmissivity at Cogema's Irigaray and Christensen Ranch Operations in Wyoming range from 30 to 150 ft^2/d. At Cameco's Smith Ranch/Highland Operation in Wyoming, transmissivity values range from 60 to 1,300 ft^2/d: however the typical value is approximately 300 ft^2/d. At Cameco's Crow Butte Operation in Nebraska, the transmissivity values range from 60 to 850 ft^2/d, with an average of approximately 350 ft^2/d. Based on these values, the Lost Creek production zone aquifer has similar transmissivity to Irigaray and Christensen Ranch and is lower than Smith Ranch/Highland and Crow Butte.

Although results of the Lost Creek pumping tests suggest minor hydraulic communication with overlying and underlying hydrostratigraphic units, it is not anticipated that significant recharge to the HJ Sand will occur from those units. The dominant source of recharge that will control the rate of water level recovery will be through flow in the HJ Sand from areas surrounding the permit area. Therefore, the aquifer properties of the production zone aquifer, the HJ Horizon, are the primary controlling factor on rate of recovery for Lost Creek.

The Lost Creek Fault locally affects drawdown from pumping in the vicinity of the fault. However, the fault only extends a few thousand feet and terminates within the Permit Area. Mining operations are planned for both sides of the fault for Mine Unit 1. Because operations are planned on both sides of the fault, and the fault is of limited lateral extent, it is not anticipated that long-term water level recovery will be strongly impacted (reduced) by the fault.

The HJ Horizon within the Permit Area is located at depths ranging from 300 to 450 feet below ground surface (bgs) with a thickness ranging from 110 to over 130 feet. Depth to water in the HJ Horizon is typically 170 to 180 ft bgs. Groundwater velocity calculated using site specific parameters of hydraulic conductivity, hydraulic gradient and porosity is in the range of 2 to 16 feet per

year (ft/yr). The K Sandstone, the production zone at Christensen Ranch is present at depths ranging from 200 to 400 feet bgs with a thickness of 120 to 260 ft. The depth to water for the K Sandstone ranges from 80 to 200 ft bgs. Groundwater velocity under static steady state conditions within the K Sandstone is from 2 to 7 ft /yr. The production zone (called the UISS) in the Irigaray mine is present at depths ranging from 120 to 270 bgs and is approximately 75 to 130 feet thick. Depth to groundwater in the UISS ranges from 10 to 100 ft. Groundwater velocity under static, steady state conditions for the UISS is 3 to 4 ft/yr.

Based on the geologic and hydrologic similarities between the HJ Horizon at Lost Creek and the UISS production zone at Irigaray, the recovery rates observed at Irigaray provide the best analogy to Lost Creek. Irigaray ceased all restoration activities by March 2001. By December 2002, water levels had recovered in all nine mine units to nearly static conditions. Unfortunately, the restoration and production phases at Irigaray were not continuous, so it is difficult to provide a direct comparison between Irigaray operations and the projected Lost Creek operations. However, the recovery of Irigaray to near static conditions within one and one half years after termination of pumping activities provides evidence that Lost Creek, with very similar hydraulic properties, will return to near static conditions within 10 to 15 years following termination of ISR operations.

6) ***General - provide (as currently known) the approximate number of exploratory and confirmation/delineation borings, completed and proposed, to be drilled at the Lost Creek site.***

As of April 2009, a total of 1,173 exploration holes and 159 wells had been drilled on the property. Future drilling will include approximately 2,000 exploration/delineation holes and 3,700 wells.

Ecology

A recent map (not included in the application), provided by the Wyoming Game & Fish Department, shows a sage grouse lek in the northeast portion of the site (on State land). Provide a discussion on how this could change proposed operations at the site, and what mitigation measures would be proposed.

The Crooked Well Lek referenced in the comment has been surveyed each year since 1986. However, no birds displaying lek behavior have been seen on the lek since 1994. The WGFD has not reclassified the lek as abandoned because not all of the surveys followed correct protocol. LC ISR, LLC, through the third party contractor LWR Consultants, Inc., has monitored the Crooked Well Lek since 2006 using standardized procedures. No birds displaying lek behavior have been seen on the lek during these surveys through the 2009 survey. It is LC ISR,

LLC's intent to request the WGFD to reclassify the lek as Unoccupied/Abandoned based on this information. The request for reclassification is consistent with WGFD guidelines for classifying leks and we believe it is likely that the lek will be reclassified. Therefore, assuming the lek is not reoccupied during the mine life, there will be no impact to the operation.

Noise

Sec 3.8 ER indicates field measurements were taken at the site. Provide the following information:

1) Type of instrument used.
2) Directionality of measurements.
3) Weather (meteorological) conditions at the time the measurements were taken.
4) Time of day when the measurements taken.
5) How the measurements recorded (continuous vs. averaged [over what period]).
6) The dB scale used.
7) The duration of the measurements.
8) Whether the measurements would be repeated at another time.
9) A table of the results along with a map of the locations of the measurements.

Background noise in the Permit Area under calm wind conditions is representative of a quiet rural area. Field measurements were made using a Sper Scientific Sound Meter 840005, which accurately measures noise between 40 and 80 A-weighted decibels dB(A) to within ±3.0 dB(A). At eight cardinal directions, noise levels were measured for three 30-second intervals facing a cardinal direction. The peak noise level of each interval was recorded. The mean of the these peak noise levels for each of the eight cardinal directions is presented in the table below.

Initial noise measurements were made on the afternoon of June 13, 2007, presumably at the Plant site. Meteorological conditions at the time of measurement were relatively calm, with an east wind averaging 4.8 meters per second (m/s). As shown in the table below, the measured noise levels were below the instrument detection limit of 40 dB(A).

Noise measurements at the Plant site were repeated on the morning of April 28, 2009, when no workers were on site and no heavy equipment was operational. Meteorological conditions at the time of measurement were windy, with a south-southwest wind averaging 11 m/s, and gusts up to 15 m/s. The table below shows the measured noise levels ranged from 68 to 89 dB(A), with the greatest noise

levels measured while facing west and southwest. The maximum peak noise level of a 30-second interval was 94 dB(A) facing east and west. The minimum peak noise level was 66 dB(A), facing north and south. The noise levels measured on April 28, 2009 were greater than on June 13, 2007 due to the high winds present.

There are no sensitive receptors near the Permit Area. The closest residence is in Bairoil, about 15 miles northeast from the Permit Area.

Field Measurements of Noise at the Plant Site		
Cardinal Direction	**Date**	
	June 13, 2007	**April 28, 2009**
	dB(A)	**dB(A)**
N	<40	69
NE	<40	73
E	<40	87
SE	<40	85
S	<40	68
SW	<40	89
W	<40	89
NW	<40	73

Sec 4.7.1.2 ER describes noise impacts. Please provide a list of equipment and vehicles that would be used at the site during construction and operation, and 'cut' sheets that present specifications (including noise levels) for those pieces of equipment.

LC ISR, LLC has taken measurements on several pieces of equipment currently used for exploration activities but that will also be present during mining operations. A Metrosonics Model db-4000EZ dosimeter was used with a dB(A) setting. The meter was checked against a factory calibrated source both before and after each use with a variance of 0.1 decibels or less. Each of the readings below was collected within 5 feet of the engine compartment unless otherwise denoted.

Lost Creek Equipment Noise Measurements	
Equipment	**Noise Level (dB[A])**
Pulstar Pulling Unit	77.0 (at operators station)
Eu 6500is Honda Generator	80.9
110KeV 75 Horsepower Generator	76.6
John Deere 710J Backhoe (idling)	81.5 (see factory specifications in table below)
Water Truck (idling)	76.6
Drill Rig 1 (operating)	95.6
Drill Rig 2 (operating)	83.8

Additionally, the local John Deere implement dealership provided the following information:

John Deere Equipment Noise Information	
Equipment	**Noise Level (dB[A])**
Backhoe per ISO 6393	107
Backhoe per ISO 6395	110
Blade per ISO 6393	108
Blade per ISO 6395	110

Light vehicles, 1 ton or less, operating at the site are expected to operate at 80 dB(A) or less in order to comply with United States Environmental Protection Agency (EPA) regulations pertaining to new vehicles.

Several pieces of equipment having standard small engines will be used at the site; including ATVs, a fusion cart, and compressors. However, noise information regarding these specific pieces of equipment is not available at this time.

The noise generating equipment contained within the Plant will include: air compressors; heating, ventilation, and air conditioning (HVAC) systems, and pumps. Because the Plant is enclosed the noise level outside is expected to be generally below 85 dB(A). However, an exact value will not be known until operations commence.

Public and Occupational Health

General

Additional information is needed for assessing radiological and non-radiological public health impact for the site environs, as required for an overall impact comparison for the planned project. An assessment of the public and occupational health impact is required.

1) ***Provide information on the background radiation levels in the general area (outside the site) for the proposed facility. Include an evaluation of the site baseline radiation monitoring data for identifying atypical radiation levels currently existing that are different than that for the surrounding area.***

Background radiological information was collected pursuant to guidance provided in NRC Regulatory Guide 4.14 and NUREG 1569. Regulatory Guide 4.14 recommends preoperational monitoring of various types of media within the area of the mill and mine, near site boundaries and in some cases at the nearest offsite residence. The results of the preoperational monitoring can be found in the following locations:

Surface Water Quality	ER Section 3.5.1.3
Groundwater Quality	ER Section 3.5.4
Passive Gamma	ER Section 3.7.2
Passive Radon	ER Section 3.7.2
Soil radiation Levels	ER Section 3.12
Background Gamma	ER Section 3.12
Radionuclides in Vegetation	See January 2009 Response to TR Comment 2.9 # 3
Airborne Radionuclide Particulate	See January 2009 response to TR Comment #4.

The area over which baseline radionuclide data was collected is substantially larger than that proposed to be affected by mining (proposed facility) as illustrated in Figure 2.1-1 of the TR. With the exception of groundwater quality, there are no discernable relationships between the location of the ore body and the concentration of radionuclides in the media measured. The concentrations of radionuclides in groundwater can be strongly correlated with the location of the uranium mineralization. It is interesting to note that uranium mineralization can be found in virtually every aquifer from surface to over 1,000 feet deep in the region of the Lost Creek Project as evidenced by thousands of geophysical drill logs and the presence of several historic uranium mines and deposits. The average concentration of uranium in all the samples collected during baseline monitoring was 0.306 milligrams per liter (mg/L) while the EPA drinking water Maximum Contaminant Level (MCL) is 0.03 mg/L. Radium concentrations were also extremely high, e.g., the radium-226 (Ra-226) concentration in HJ monitor well LC19M is 420.5 picoCuries per liter (pCi/L). The MCL for Ra-226 is 5 pCi/L.

2) ***Provide information on any public health studies (radiological and chemical) that may have been performed for the region that should be considered in evaluating existing public health impact.***

To the best of our knowledge, no such studies have been performed. However, additional related data are presented in the various regulatory submittals generated by Rio Tinto's Sweetwater Mill. Of specific interest is the August 5, 1994 Sweetwater Project Revised Environmental Report. Unfortunately, this document

cannot be found on the NRC ADAMS website but is available at NRC headquarters.

Other documents of interest include:

- Sheridan DM, Maxwell CH, Collier JT. 1961. Geology of the Lost Creek Schroeckingerite Deposits, Sweetwater County, Wyoming. Geological Survey (US). Bulletin 1087-J.
- Mason J, Miller K. 2005. Water resources of Sweetwater County, Wyoming. Geological Survey (US). Report No. 2004-5214.

Non-Radiological

In Sec 4.12.1.1 ER, Non-radiological Impacts, and Sec 4.13.1.1 ER, Gaseous Emissions and Airborne Particulates, provide information on non-radiological effluents, stating that such effluents would not be released into pathways that could impact public health and safety. However, no discussion is provided to substantiate this position.

Please find attached the Air Quality Permit Application submitted to the Wyoming Department of Environmental Quality-Air Quality Division and subsequent responses to resulting technical comments. These two letters provide significant detail regarding non-radiological airborne effluents.

Radiological

Sec 4.12.1.2 ER, Radiological Impact, provides assessments for the radiation exposure to members of the public and occupation exposure to radon. The details of the modeling\ provided are not sufficient to support a review and validation. Additional information is needed for evaluating the modeling used for estimating both the doses to members of the public and to occupationally exposed individuals for assess overall health effects. Sec 4.3 TR, does not discuss the handling and disposal of potentially elevated levels of radioactive material resulting from well installation. The drilling of the injection and extraction wells has the potential to result in residual surface soils with elevated levels of radioactivity from cuttings where drilling encounters the uranium/radium bearing ore. Provide information how these soils will be managed to ensure residual levels do not exceed acceptable levels.

The radon modeling performed for the Project uses an NRC-accepted computer code referred to as MILDOS-AREA. MILDOS-AREA was developed by Argonne National Laboratory for the purpose of predicting potential Total

Effective Dose Equivalent (TEDE) in areas surrounding uranium mill facilities. MILDOS-AREA predicts the transport of both point and area sources through Gaussian plume dispersion. Mechanisms such as radioactive decay, plume depletion by deposition, in-growth of decay products, and resuspension of deposited radiation are included in the transport model. Exposure pathways considered include inhalation, external exposure from groundshine and cloud immersion and ingestion. Dose commitments are calculated primarily on the basis of recommendations of the International Commission on Radiological Protection (ICRP). The model was successfully validated in a study of a uranium mill tailings impoundment near Monticello, Utah.

Section 4.12.1.2 of the ER and Attachment 7.2-1 of the TR (the entire volume 4) describe the findings of the model run. The MILDOS-AREA model is intended to show the potential dose to individuals, employees or members of the public, in the area of the operation. The MILDOS-AREA code was used to calculate doses to the 17 perimeter locations. The maximum potential TEDE to an individual at the 17 perimeter locations is 3.01 millirems (mrem) in the maximum year. This level is both well below the public limit of 100 mrem per year specified in 10 CFR 20 and is consistent with the modeled and measured levels at other similar in situ facilities. The potential dose calculation assumes that an individual remains at the receptor point 24 hours per day for an entire year.

Potential radon exposures to employees were modeled using MILDOS even though this is not the intended us of the code. The model showed that a worker positioned 100 meters from the ion exchange columns will receive less than 1 mrem per year from radon. Actual monitoring data from in situ facilities using similar process equipment and controls shows that radon exposures are well below regulatory limits. However, LC ISR, LLC will not rely on modeling or data from other facilities to protect employees. Section 5.7.3.2 of the TR describes in detail how radon monitoring will be performed as well as the corrective action levels. LC ISR, LLC will also monitor the radon levels at boundary locations as described in Section 5.7.7 of the TR.

The drilling method employed at Lost Creek is commonly referred to as rotary mud and is a standard method used throughout the uranium mining industry as well as the potable water industry. As the rotary drill bit cuts through the rock and sediment, a stream of drilling fluid is introduced from surface through the drill stem. The fluid exits through the drill bit and travels back to surface between the drill stem and the host rock. The purpose of the fluid is to carry cuttings to the surface, lubricate and cool the bit, and in some cases to introduce a wall cake of mud to the holes surface to prevent water loss. Once at the surface, the cutting laden drilling fluid passes through a trough to a mud pit. The cuttings settle out of the drilling fluid due to a difference in density and the drilling fluid is recycled numerous times down the hole. Upon completion of the drill hole, the pit is

allowed to air dry and the cuttings in the pit are covered with native soil and the site is revegetated.

If the cuttings which remain in the mud pit *have not* been exposed to mining lixiviant, they are classified as Technically Enhanced Naturally Occurring Radioactive Material (TENORM). If the cuttings *have* been exposed to mining lixiviant, they are classified as 11(e)(2) byproduct material per the Atomic Energy Act.

TENORM cuttings will be buried in the mud pits as described on Page 3-9 of the following report: EPA 402-R-05-007, revised June 2007, titled "Technologically Enhanced Naturally Occurring Radioactive Material From Uranium Mining, Vol. 1: Mining and Reclamation Background.". The cuttings from ore bodies amenable to in situ recovery typically have very low ore grades; on the order of 0.01 to 0.1 weight percent natural uranium. From July 1 to December 31 of 2008, five of the drill rigs at Lost Creek were fitted with Optically Stimulated Luminescent (OSL) dosimeter badges in an effort to measure the direct gamma being generated by the drill cuttings. Due to harsh field conditions, two of the badges were lost during monitoring and never recovered. The remaining three badges were left on the drill rigs near the mud pits 24 hours per day 7 days per week. A control badge was placed inside the maintenance trailer to measure background. Despite their close proximity to the uncovered drill cuttings for several months, the readings on all three badges were indistinguishable from background. Additionally, during the summer of 2008, a factory calibrated and source checked Ludlum Model 19 meter was used to measure direct gamma readings at ground level over approximately 12 covered mud pits immediately east of the office trailers in Section 20 of Township 25 North and Range 92 West. None of the readings were distinguishable from background. To ensure that burial of drill cuttings does not become an issue, upon licensure, a qualified member of the Health Physics staff will take direct gamma readings over at least 12 fresh backfilled drill pits on a semi-annual basis. If any readings are significantly above background, the Radiation Safety Officer will reassess the need to revise procedures for the disposal of cuttings as well as environmental and personnel monitoring.

On rare occasions, it may be necessary to drill a hole into an active mining zone or to recomplete a well within an active mining zone. On these occasions the cuttings are considered 11(e)2 byproduct material and will be collected in a lined mud pit during drilling or recompletion. The cuttings will be removed from the lined pit and dewatered by evaporation or other means before sending to disposal at a facility licensed to receive byproduct material. The rig crew will be trained on radiation safety prior to beginning work and will be monitored by radiation monitoring badges (or similar), bioassay, personnel monitoring, and direct gamma and alpha measurements of equipment and the work environment. After the liner

has been removed from the pit, the Health Physics staff will take the necessary readings to ensure the site has been adequately reclaimed.

Waste Management

Sec 4.13.1.2 ER describes the use of deep well injection for disposal of 11 (e)(2) by product liquid wastes. Such a disposal for the by-product material would constitute an alternative disposal of radioactive materials as covered by 10 CFR 20.2002. Provide an evaluation of potential radiological impact for such disposal, addressing proposed total radioactivity, potential radiological doses to members of the public for any feasible exposure pathways within the next 1000 years.

Subpart K of 10 CFR 20 discusses in part the waste disposal methods accepted by NRC and the process for seeking approval of waste disposal methods "not otherwise authorized" by the NRC. Specifically, 10 CFR §20.2001 lists four (4) approved methods for disposal of waste. LC ISR, LLC believes the use of deep wells for waste disposal is approved as a "release in effluents" in 10 CFR §20.2001(a)(3). If NRC concurs with this assessment, then it is not necessary to seek approval to use deep wells following the procedures outlined in 10 CFR §20.2002. Nevertheless, the following paragraphs attempt to answer the items of concern raised in the comment.

The 11(e)2 liquid waste will be largely managed by the use of deep injection wells. Deep disposal of liquid byproduct waste is a long used, proven and effective means of disposal at in-situ recovery facilities in Wyoming, Texas and Nebraska. Disposal well installation and operating procedures support multiple levels of control and safety for the environment and for personnel and the public.

Deep-well injection is regulated under the Safe Drinking Water Act (SDWA) (Underground Injection Control [UIC] Program). Under the SDWA, the State of Wyoming has obtained primacy from the EPA for Class I, Class III and Class V injection activities. At this time, based on regulatory guidance from the WDEQ, it is anticipated that Class I wells would be utilized at Lost Creek.

A UIC permit cannot even be issued unless potential Underground Sources of Drinking Water (USDWs) are protected. The entire premise of the Class I UIC program is that injected fluids will be permanently removed from the accessible environment. Although NRC may consider the technology an alternative, it is well understood and regulated under mature EPA and WDEQ programs.

Further, the premise of the UIC program is that the fate and transport of waste is well defined and understood. By definition, there cannot effectively be an

exposure pathway for injectate to reach the public if a permit is granted. EPA and other investigators have found that deep well injection is essentially the lowest risk option for managing low-concentration waste fluids and, when conducted in accordance with UIC regulations, is protective of human health and the environment.

The highly conservative approximate concentration of natural uranium and radium-226 to be disposed of into the deep well is 3 mg/L and 1,500 pCi/L, respectively. To calculate the total quantity of each isotope that would be disposed of over the life of the Project, several conservative estimates were made, including an average flow rate of 170 gallons per minute over a total period of 9 years. The result is 1,015 kilograms of natural uranium and 4.6×10^{12} pCi of radium-226 over the life of the Project.

Disposal of liquid 11(e)2 byproduct into UIC Class I wells at Lost Creek is expected to be into brine aquifers greater than between 6,000 and 8,000 feet below the ground surface. The process cycle for the waste fluid is as follows:

- Storage tanks (processing plant),
- Low pressure pumps (processing plant),
- Low pressure pipeline to temporary storage ponds and eventually/or deep well disposal,
- High pressure pump (disposal well building),
- High pressure piping, and
- Deep well disposal.

Each transfer step is planned to be supported by comparative instrumentation to assist in leak determination.

Liquid 11(e)2 byproduct components and mitigating factors are as follows:

Potential Pathway	Mitigating Factors
Release of fluid in the Plant	The Plant design incorporates concrete berms designed to contain the entire volume of the two (2) waste water storage tanks if a catastrophic failure of both occurred. The berms will also contain waste fluid released if either the piping or the transfer pumps were to fail. All the systems will utilize instrumentation in the form of level indication and pump operation indication to support leak detection. Redundant ventilation fans will be used to assure radon levels are maintained at appropriate levels. Ventilation from the tanks has been modeled in the MILDOS calculation.

Potential Pathway	Mitigating Factors
Temporary storage ponds	Detailed in TR Sections 4.2.5.4 and 4.2.5.5, the ponds are designed to supplement storage of liquid waste prior to deep disposal. The pond design and supporting reports were submitted to the NRC on January 16, 2009 in the RAI Responses to the TR. Radon release from the temporary storage ponds has been modeled in the MILDOS calculation.
Low pressure pipeline from the Plant to the disposal well	The hazards associated with piping are detailed in Section 4.2.5.5 of the TR. The piping used to pump 11(e)2 byproduct liquid from the Plant to the disposal well(s) will be HDPE. This material is corrosion resistant, flexible and exhibits safety factors that allow for a wide variety of operating conditions. The piping will be buried approximately six (6) feet below the surface, significantly reducing the potential for freezing. Instrumentation and measurement is planned to supplement standard leak detection. This will be in the form of point-to-point flow and pressure comparison with alarming if data are outside the specified range. Lines are anticipated to operate at low pressures (less than 160 pounds per square inch [psi]) and will not be vented to the atmosphere.
High pressure injection pump and house	The injection pump house is the point where the 11(e)2 byproduct liquid waste is pressurized to allow for deep injection in the disposal well. This is accomplished with either a rotary or centrifugal pump, which elevates the pressure to the appropriate level for injection (typically greater than 1,000 psi). The pump house will typically have a concrete floor with a berm to allow for alarm, shutdown and capture in the event of a leak. This will be augmented by ventilation and comparative instrumentation with respect to pressure and flow. Work time for employees in this area is limited and each disposal well area will be fenced off.

Potential Pathway	Mitigating Factors
High pressure pipeline from the pump house to the wellhead	The hazards associated with piping are detailed in Section 4.2.5.5 of the TR. The piping used to pump 11(e)2 byproduct liquid from the injection pump to the disposal wellhead will normally be stainless or coated carbon steel. Material selection is based on the maximum injection pressure, corrosion allowance and the rate of injection. The length of this section will be minimized as the pump house will be located as close as possible to the wellhead. The piping will also be buried approximately six (6) feet below the surface, significantly reducing the potential for freezing. Instrumentation and measurement is planned to supplement standard leak detection. This will be in the form of point-to-point flow and pressure comparison with alarming and shutdown if data are outside the specified range. Lines will not be vented to the atmosphere.
Injection wellhead and house	The house is a small, ventilated building that is primarily required to protect the injection wellhead, instrumentation and piping from the elements. The tubing is planned to hang in a 5½" by 2⅞" tubing head and a tree will be installed above the tubing hanger. It is anticipated that a nominal 3" tree (rated for 2,000 or 3,000 psi by ANSI or API) will include a bottom master valve, a flow tee with one side outlet and valve, a swab valve, and a pressure gauge above the swab valve. Instrumentation and measurement is planned to supplement standard leak detection. This will be in the form of point-to-point flow and pressure comparison with alarming and shutdown if data are outside the specified range. Injection and annulus pressures will be monitored and recorded for compliance. If either is outside the specified operating parameters, then the system will alarm and injection will stop.

Potential Pathway	Mitigating Factors
The disposal well	The well itself consists of multiple layers of casing designed to protect the formations penetrated by the well. Typical construction will be: • 72" steel vertical culvert to 6' below the ground surface (bgs), • 16" steel conductor casing cemented to 100' bgs, • 8⅝" surface casing cemented to 2,000' bgs, • 5½" production casing cemented to 8,400' bgs, and • 2⅞" or 3½" coated injection tubing with packer assembly set below the confining shale unit (approximately 6,200' bgs). The cement used to seal each of the zones and hold the casing in place is tested with a cement bond log prior to operation to ensure an adequate seal and zonal isolation. The annular space between the injection tubing and the production casing will also be continuously monitored to detect a leak in either the tubing, the production casing, the wellhead or the packer assembly.

Pathways for exposure and mitigating factors are as follows:

Potential Pathway	Mitigating Factors
Radial contamination of the injection zone	Prior to approval of the UIC Application by the WDEQ Water Quality Divison (WQD) and concurrence by the EPA, calculations of the cone of influence (COI) and the area of review (AOR) must be submitted by the applicant, LC ISR, LLC. From the data, a maximum injection rate for a specified period of time is approved as well as a maximum injection pressure below the fracture pressure for the formation of interest. Based on all the above, the injected byproduct material will not exceed the approved area of review, which in this case is approximately 6,000 to 8,000 feet below the ground surface in a confined zone with an elevated total dissolved solids (TDS) concentration (greater than 10,000 mg/L) as well as elevated levels of benzene.
Upward migration through the casing annulus	See discussion of "The disposal well" in the table above for installation methods. As previously discussed, a cement bond log and a casing pressure test are performed prior to operation to ensure an adequate seal and zonal isolation. In addition, at least every five (5) years or any time the tubing and packer are removed from the well, a temperature log and/or a radioactive tracer log or an oxygen activation log will be performed to verify isolation by the injection packer as well as the production casing and cement.
Oil and gas development through the injection zone	While there is substantial oil and gas development in the larger Great Divide Basin region, there is no oil or gas within several miles of the Lost Creek Project. Historic drilling in the area has not revealed the presence of oil or gas. There are no wells other than those used to characterize and monitor zones for in-situ uranium recovery within the AORs for the proposed disposal wells. The overlying and underlying confining layers for the proposed injection zone consist of low-permeability shales that are approximately 300 feet thick.

Potential Pathway	Mitigating Factors
Leakage of fluid through the casing into a USDW	See discussion of "The disposal well" in the table above for installation methods. As previously discussed, a cement bond log and a casing pressure test are performed prior to operation to ensure an adequate seal and zonal isolation. In addition, at least every five (5) years or any time the tubing and packer are removed from the well, a temperature log and/or a radioactive tracer log or an oxygen activation log will be performed to verify isolation by the injection packer as well as the production casing and cement. Additionally, injection fluid will be introduced to the injection zone through tubing. The tubing will prevent injection fluid from coming into contact with the casing. The annulus between the tubing and the casing will be pressurized with a gas such as nitrogen. The pressure on the gas will be continuously monitored. If the annulus pressure falls below a pre-determined safety level, the well will be shut in until the cause is determined and corrected as appropriate. The potential USDW in the area is essentially "triple" protected from the injectate by the injection tubing and its associated packer, the production casing and its cement, and the surface casing and its cement.
Injection well abandonment	Upon completion of use, each well will be abandoned in accordance with WDEQ and Wyoming Oil and Gas Conservation Commission regulations. This typically includes removing the injection tubing and packer, cementing the production casing from total depth to approximately 20 feet below the ground surface, cementing the surface casing as available, removing the wellhead at 5 to 10 feet below the ground surface and placing a dry hole monument at the surface.

Sec 4.2.2 TR - provide how storm water would be managed.

The Plant location is near the top of a topographic incline in a semi-arid region. Therefore, relatively little stormwater is expected. Most runoff will be generated from spring snow runoff and rarely from spring and summer thunderstorms. The land surface around the Plant and holding ponds will be contoured to divert stormwater around the structures. Precipitation onto the Plant and surrounding graveled or paved yard will be allowed to runoff. The facility will be designed to prevent stormwater runoff from contacting any sources of pollution. For example, all chemicals will be within tankage. Tanks containing hazardous chemicals, including gasoline and diesel, will be positioned within berms. 11(e)2 byproduct material will be stored in a closed container or will be otherwise sealed to prevent contact with stormwater.

During construction, stormwater runoff will be controlled through the installation of erosion control structures such as hay bales or silt fences in drainages. Construction within drainages will be minimized to the extent possible. Areas affected by construction will be revegetated as soon as the seasons allow so roots can become established and hold soil in place.

The facility will operate under a WYPDES stormwater permit and its conditions.

Sec 4.2.4 TR - provide the type of septic system being proposed. If collected in a tank, provide final disposal site.

Household sewage will pass through a holding tank and overflow into a leach field. The holding tank will be pumped out, as needed, by a licensed operator with the sludge sent to a local sewage handling facility permitted to handle such waste (i.e., City of Rawlins Public Works). A total of two to three septic systems with leach fields are anticipated and will be permitted through Sweetwater County.

Sec 4.3 TR - provide how solid wastes would be managed, including storage location and disposal location.

Section 4.13.1.3 of the ER and Section 4.3 of the TR explain the two general classifications of solid waste that will be generated by the facility: 11(e)(2) byproduct and non-11(e)(2) byproduct materials.

Small articles of 11(e)(2) byproduct material will generally be placed in 'super sacs' for temporary storage inside the Plant. When a 'super sac' is full, it will be closed and stored within the Plant or outdoors in a strong tight container until a sufficient quantity is accumulated for efficient disposal. The strong tight container must be capable of preventing the spread of contamination and contact

with precipitation. (Generally a covered waste roll-off which meets Department of Transportation specifications for shipment of Low Specific Activity (LSA) material will be used to store this material outdoors). Larger pieces of 11(e)(2) byproduct material that cannot be placed in 'super sacs' will be stored in the Plant until disposal or in the confines of the secure plant yard. Examples include large diameter piping and tankage. When such material is stored outdoors it will be covered or sealed in such a manner as to prevent contact of contaminated areas with precipitation or wind. Section 4.13.1.3 of the ER states that byproduct material will be disposed of at an NRC licensed facility. LC ISR, LLC intends for this statement to include facilities licensed by Agreement States as approved by the NRC. Currently, there are four facilities which accept 11(e)(2) byproduct material for disposal including which are being considered: EnergySolutions Clive site in Utah; Denison Mine Corp.'s White Mesa Mill in Utah: Pathfinder Mines Corp.'s Shirley Basin facility in Wyoming; and the recently licensed Waste Control Specialists LLC facility in Texas. Since LC ISR, LLC has not signed an agreement with any of these companies to dispose of waste, LC ISR, LLC expects that the NRC license will contain a condition preventing the startup of operations until such an agreement is in place.

Non-11(e)(2) byproduct materials will constitute the majority of solid waste generated by the facility and will include typical items such as office waste, packaging from receipt of materials, sewage sludge, and hazardous materials. Non-hazardous solid materials will be stored in commercial dumpsters located both within the secure plant yard and in the construction areas where waste is being generated. The commercial dumpsters will be emptied by a contracted waste disposal operator and taken to a permitted off-site solid waste disposal facility, such as the Carbon County Landfill. The commercial dumpsters will be maintained in good repair to minimize the loss of trash to Wyoming winds.

The facility will fall into the EPA designation of a Conditionally Exempt Small Quantity Generator of Hazardous waste. Examples of hazardous waste include rechargeable batteries, fluorescent light bulbs and used oil. Rechargeable batteries will be delivered to a recycling center for disposal. Fluorescent bulbs will be disposed of in the commercial dumpsters after packaging in accordance with EPA regulations. Used oil will be either burned on-site in accordance with EPA regulations to recover the heat value or sent to a facility permitted to handle used oil waste. Used oil will be stored in a strong tight container which will prevent spillage and contact with precipitation.

While tires do not meet the definition of a hazardous waste they do present storage and disposal issues. No more than 20 waste tires will be allowed to accumulate at the site at any given time. Waste tires will be stored in a manner that prevents the accumulation of water resulting in breeding grounds for

mosquitoes. The tires will be disposed of at a facility permitted to receive waste tires.

Facility Description

The descriptions of the facility design, controls, and operation are not well defined. Although there are general discussions of the processes and facility layout and general descriptions of control measures in the TR, there are few details to actually evaluate the effectiveness of an integrated design and operation. Specifically, information on facility design and operational controls for radioactive waste collection, processing, and storage should be provided. Also, the following additions would allow for a more complete impact assessment of the proposed action:

1) ***In Sec 3.0 TR a more complete description of the storage ponds is needed, including: 1) size; 2) depth; 3) liner material; 4) operation; 5) maintenance; and 6) monitoring.***

LC ISR, LLC submitted additional detail about the ponds in the January 2009 Response to TR Comment 4.2 #3, including design and specifications for the storage ponds ("Design Report, Ponds 1 & 2", dated January 2009, and "Technical Specifications", dated April 2008, both by Western States Mining Consultants [WSMC]), and geotechnical information ("Subsurface Exploration and Geotechnical Engineering Report" by Inberg- Miller Engineers, dated September 2008, in Appendix B of the January 2009 WSMC Design Report). Construction drawings were also submitted (WSMC, April 2008). These reports and drawings were included in Volume 2 of 2 in the January 2009 responses. Information from those reports is summarized in the following, along with cross-references to specific sections of these reports and the Lost Creek TR:

1. There are two identical ponds. Each pond will be approximately 155 feet wide and 260 feet long with a capacity of 2.3 acre-feet. Total capacity for two ponds is 4.6 acre-feet. (Section 1.0 of the Design Report)
2. The depth of the ponds is detailed in the "Construction Drawings". The average height of the pond embankment is 7 feet at a 3:1 slope and 3 feet of freeboard. (Construction Drawings)
3. The impermeable liner shall be a polypropylene geomembrane. (Section TS 4.2 of the Technical Specifications)
4. The storage or surge ponds are designed to supplement standard liquid waste disposal operations (deep disposal). TR Section 4.1.2 details the use of the ponds, and TR Section 4.2.5.4 expands on the purpose and operation of the storage ponds.

5. TR Sections 4.2.5.4 and 4.2.5.5 describe the detection monitoring program, and the pond inspection program is also detailed in TR Section 5.7.8.3.
6. As noted above, the pond inspection program is detailed in TR Section 5.7.8.3. Regular inspections will be required of the liner system to ensure the edges remain keyed in and there are no tears in the liner. The downstream slopes will require inspection for possible erosional rills. If rills begin to appear, they will be repaired. Regular inspection of any appurtenances that may be added will also be required to ensure they are in proper working order. Any defects such as leaking gaskets will be repaired in a timely fashion. If the leak detection system indicates leakage is occurring, the pond in question will be drained and inspected for damage. If damage is noted, then repairs will be affected.

2) ***In Sec 3.1 TR different types of storage tanks are mentioned, but more information is needed to describe them: 1) size; 2) type of tank; 3) contents; 4) location; 5) maintenance schedule; and 6) security/monitoring.***

The tankage for each chemical was selected based on its structural and chemical properties which allow for a life expectancy significantly greater than the life of the mine. Additional information is provided in the attached Tank Specifications.

Each of the tanks will be inspected on a daily basis with the results of the inspection documented. Routine maintenance on the tanks is not anticipated due to their design. However, if a routine inspection reveals a problem which may result in a leak or spill, the situation will be made safe as soon as possible or the tank will be emptied.

Security at the facility is described in detail in Section 5.6 of the TR. Additionally, for the security of chemicals, the following practices will be followed:

1. The download port for each tank or access to the tank will be kept locked;
2. Only standard industry accepted fittings will be used on download ports;
3. Chemical delivery drivers will be required to check in at the office before downloading;
4. Chemical deliveries will only be accepted during daylight hours unless pre-approved by management; and
5. Delivery drivers will be required to show identification on their first delivery and will be required to participate in site specific hazard training at least annually.

The facility will be manned 24 hours per day during operations which will provide significant visual monitoring of the tankage.

3) ***In Sec 3.1 TR the final product (yellowcake slurry) is described. Provide where the slurry would go to be final processed into dry yellowcake (provide distance from Lost Creek and the probable transportation route).***

The final destination of the yellowcake slurry is not known at this time. However, several drying facilities may be available for use including Irigaray, Smith Ranch, and Mestena. It is LC ISR, LLC's desire to seek a license amendment to allow the construction and use of a drying facility at Lost Creek as soon as possible after the facility is licensed. Additional information on transportation can be found in this response under Transportation item #1 and Section 3.2 of the ER.

4) ***Sec 5.0 TR describes the operation of the facility. Provide the number of people it would take to operate the facility, and the number of shifts that would run.***

The Project is slated to have about 60 full-time employees, total, in the following divisions: Management; Environmental Health and Safety (EHS); Operations; and Construction and Maintenance. The majority of the staff will work Monday through Friday, daylight hours. However, the Plant and the Mine Units will be staffed by two shifts, 24 hours a day, seven days a week. There will always be at least one Plant operator and one Mine Unit operator on site at all times. Management and EHS staff will be on-call accordingly.

<u>Alternatives</u>

The heart of the NEPA process is the alternatives analysis, and to adequately fulfill its requirements, a meaningful analysis of alternatives must be assessed. In that light, provide the consideration that was given to the following, and the steps that actually lead to the decision to use the ISL process to recover uranium:

1) ***Process that would be used.***

The ore grade, depth of ore, and current value of uranium make the use of conventional mining techniques, such as open pit and underground, uneconomic. The situ recovery technique also provides several benefits over conventional methods such as: no tailings; majority of uranium daughter products are left in the ground where they occur naturally; ease of surface reclamation; minimal surface disturbance; and outstanding occupational safety.

The use of deep disposal wells to dispose of waste water was selected over alternate because it is the most economic and most environmentally friendly when compared to surface irrigation, evaporation ponds, or enhanced evaporation methods such as boiling. The alternate methods, especially evaporation ponds,

leave the contaminated solution and salts at the surface thereby increasing the opportunity for spills. Further, the heavy metal content in evaporation ponds can become elevated as the brine is concentrated through evaporation.

2) ***Specific siting of the facility.***

The Plant site was selected for several reasons including: proximity to the known ore body; the area is relatively level and will allow for ease of construction; if necessary in the future this site has room for evaporation ponds; and finally, this area is outside the two-mile boundary of any known sage grouse leks.

3) ***Well field layout.***

The mine unit is located over the ore body as required. The pattern design is based on industry experience that allows for the most efficient hydrological sweep and economical recovery of mineral while minimizing disturbance.

4) ***Site development (facility layout).***

The facility layout is based on proven industry and engineering practices with the goal of creating an efficient process while providing a high degree of employee and environmental protection. For example, the wall between the Plant and the office will be constructed of cement blocks to minimize exposure to radiation. The vehicle pathway through the Plant will allow ease of access and maintenance for the majority of tanks. To the extent possible, both pipelines and powerlines will parallel roadways so they can be easily and frequently inspected. Mine units will be fenced to prevent entry by domestic animals which have a reputation for rubbing on equipment and causing damage.

5) ***Site sequencing.***

The sequencing of mine unit production and associated infrastructure at Lost Creek has considerable flexibility. Since there are no ecological issues controlling the order of development, the most important sequencing factor is LC ISR, LLC's understanding of the geology. A secondary concern is the pipeline system which is generally advanced from the first mine unit and then to each subsequent neighboring mine unit. However, the pipeline can also easily be advanced past the neighboring mine unit to the next unit. Road and powerline systems are developed in much the same fashion as pipelines.

At in situ facilities where a mine unit is surrounded by other mine units, the sequencing is very important due to groundwater restoration considerations. The ore body at Lost Creek is generally linear so there will be little groundwater interference between mine units being mined and those being restored.

6) ***Access (to the site and internal to various areas)***

Access to the site will be on the path of existing roads. The roads will be upgraded to allow for heavy traffic. The existing pathways take the most direct route and therefore minimize distance and the amount of land disturbed.

7) ***Structures (buildings and outside areas).***

The proposed site buildings were designed with several factors in mind of which functionality was the most important. Each building was designed to be as small as possible and still perform its intended function. Considerable engineering effort went into the process of making the Plant layout as efficient as possible to minimize energy and material requirements and to make it as safe as possible. For example, the HVAC system was designed to exchange Plant air in all areas with the ability to adjust air flow patterns as necessary during operations as conditions change. The HVAC in the Plant works in conjunction with the HVAC system in the office building to ensure contaminants flow away from the office and out of the Plant vents.

Other design features include: Plant curbing to contain spills from multiple tanks; wall design to minimize exposure to radiation and control the flow of air; energy efficiency built into pumping systems; piping design to allow for simple maintenance; and similar engineering considerations.

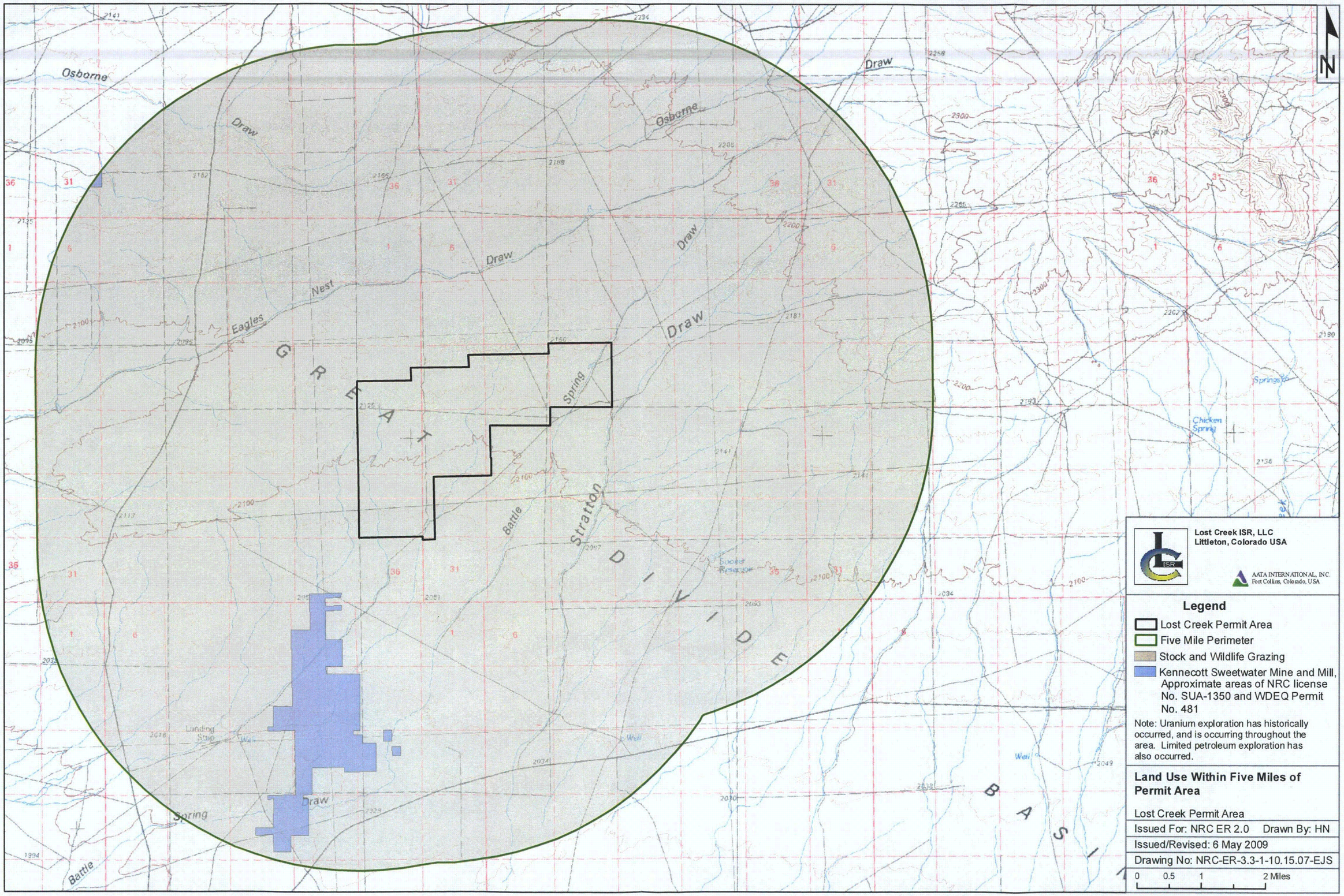
List of Information Included with the Responses
to
NRC Comments on Lost Creek ER
June 11, 2009

Land Use
Comment #1) Map of the predominant land use activities within five miles of the site.

Groundwater
Comment #4) Figure 1 - Illustration of Roll Front Deposits
Figure 2 - Mine Unit Patterns
Figure 3 - Illustration of Well Pattern Distribution

Facility Description
Comment #2 Tank Specifications

Public and Occupational Health - Non-Radiological
WDEQ Air Quality Permit and associated correspondence.


Osborne
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Spring
Battle
Stratton
D I V I D E
Draw
Spring
Battle
Draw
Landing Strip
Well
Well
Well
Chicken Spring
Springs
B A S I N
N
Lost Creek ISR, LLC
Littleton, Colorado USA
AATA INTERNATIONAL, INC.
Fort Collins, Colorado, USA
Legend
Lost Creek Permit Area
Five Mile Perimeter
Stock and Wildlife Grazing
Kennecott Sweetwater Mine and Mill, Approximate areas of NRC license No. SUA-1350 and WDEQ Permit No. 481
Note: Uranium exploration has historically occurred, and is occurring throughout the area. Limited petroleum exploration has also occurred.
Land Use Within Five Miles of Permit Area
Lost Creek Permit Area
Issued For: NRC ER 2.0 Drawn By: HN
Issued/Revised: 6 May 2009
Drawing No: NRC-ER-3.3-1-10.15.07-EJS
0 0.5 1 2 Miles

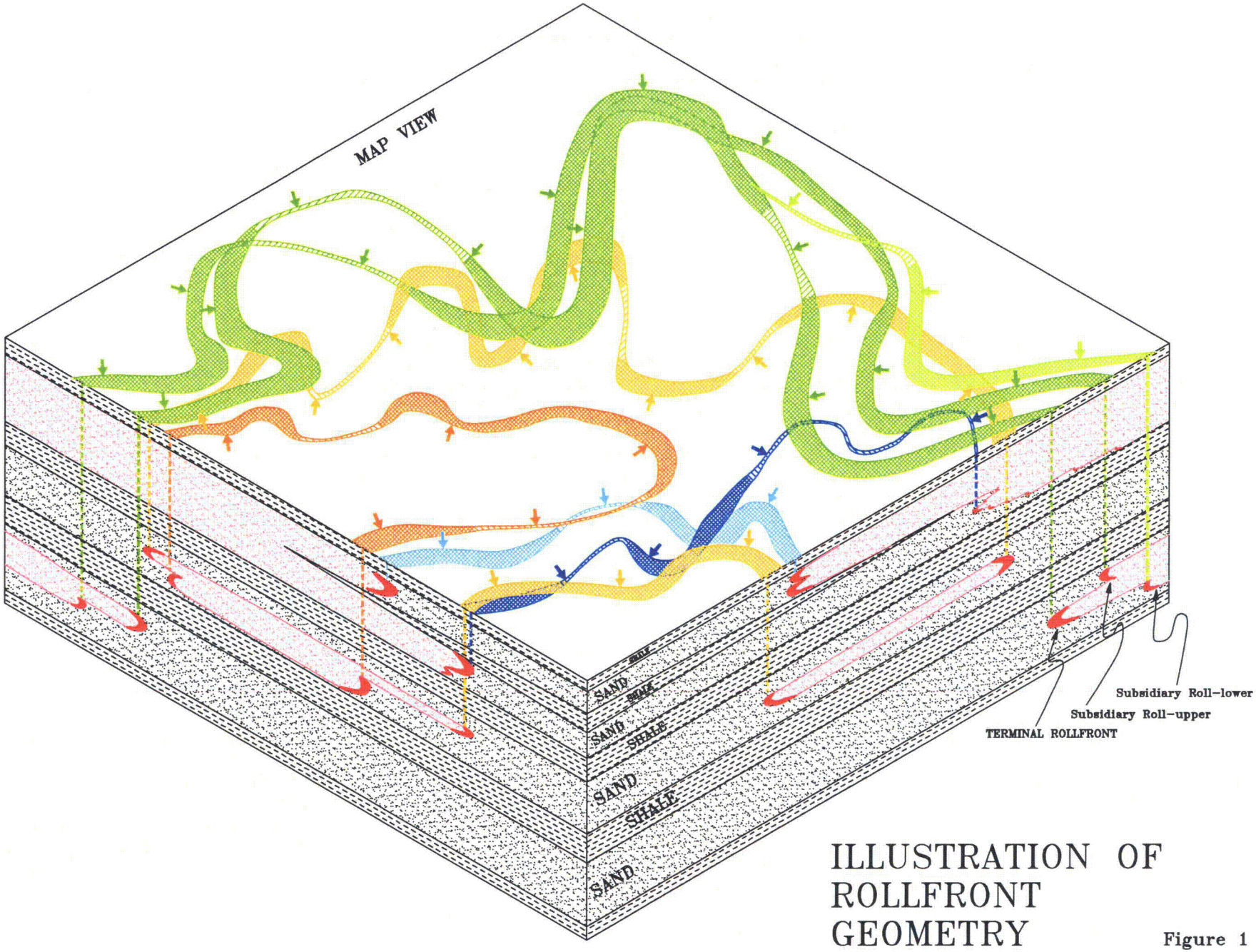
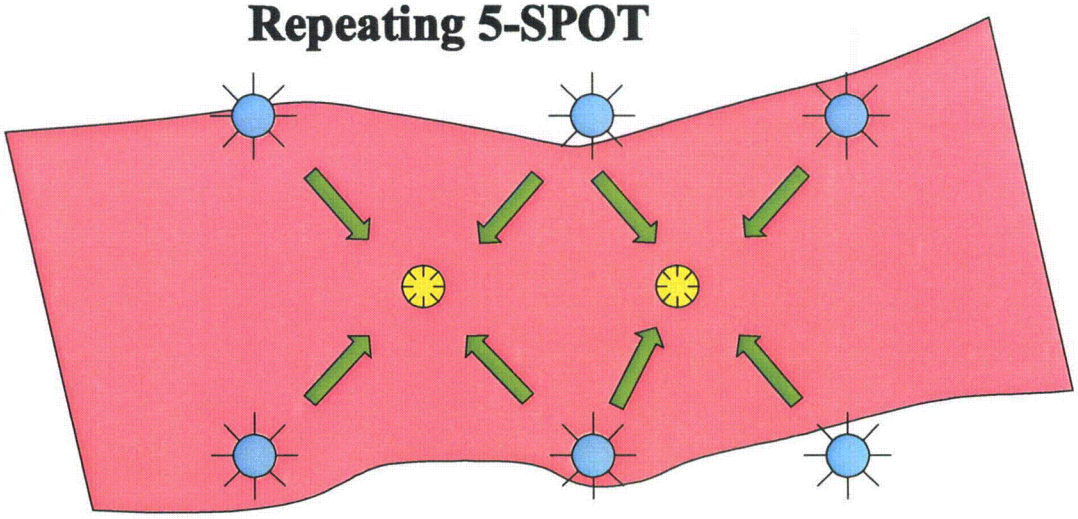


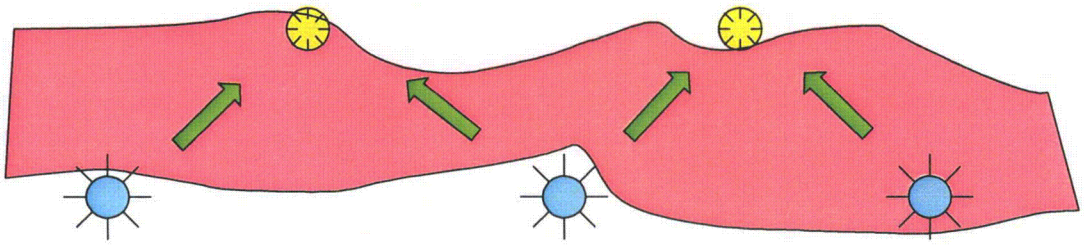
ILLUSTRATION OF ROLLFRONT GEOMETRY

Figure 1

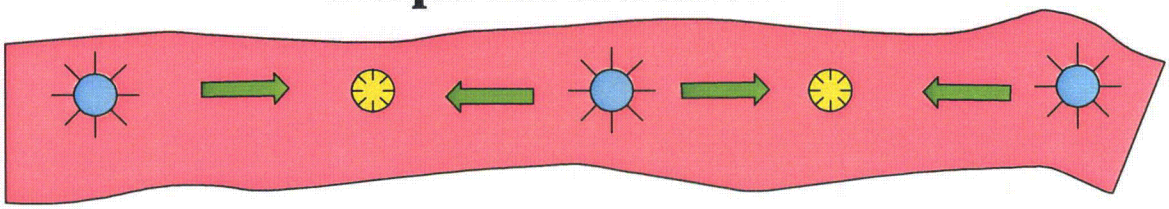
Repeating 5-SPOT



Staggered LINE DRIVE



Simple LINE DRIVE



MINE UNIT PATTERNS

Figure 2

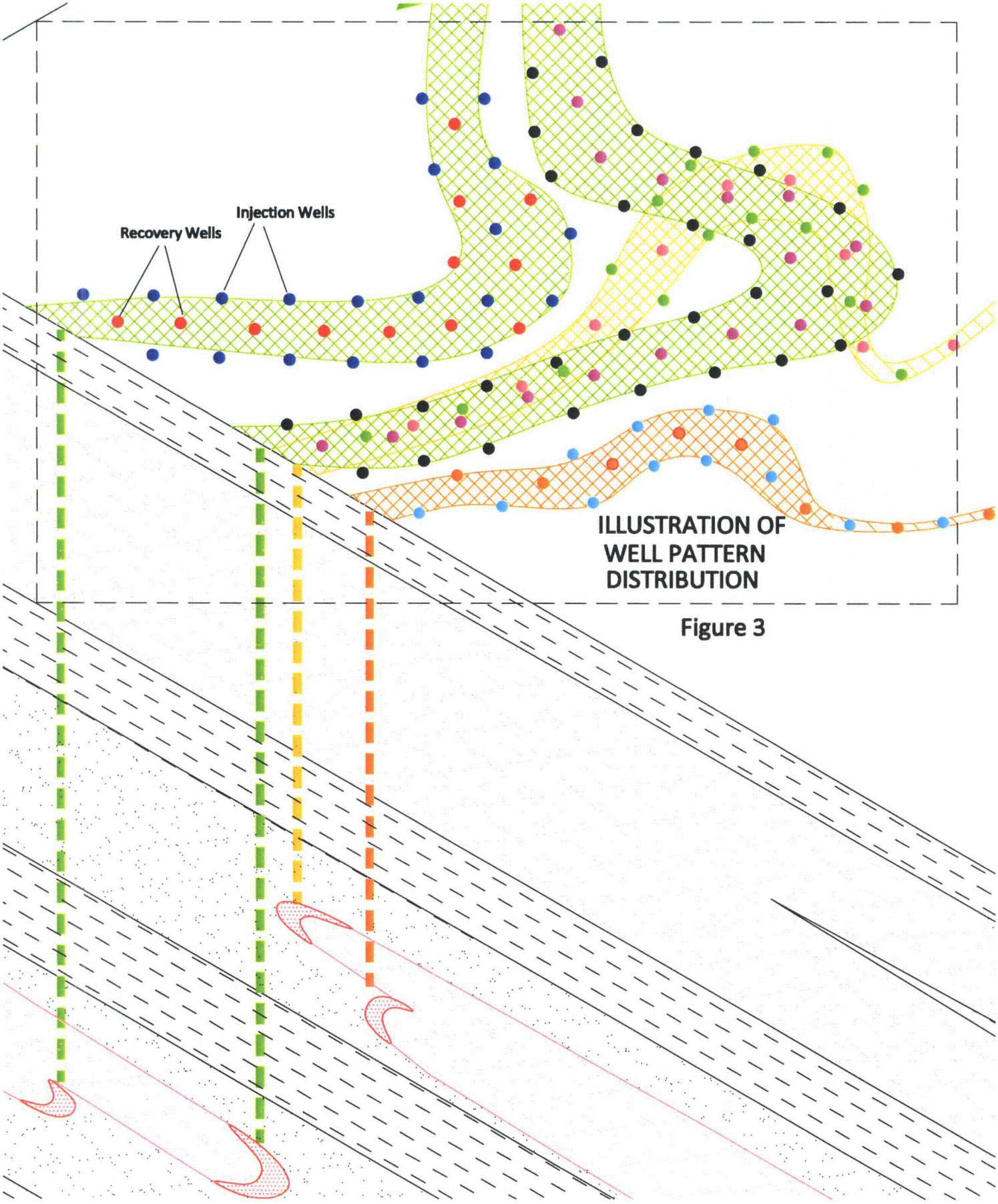

Injection Wells
Recovery Wells
ILLUSTRATION OF
WELL PATTERN
DISTRIBUTION

Figure 3

NRC ER RAI's - Lost Creek Project
Tank Specifications

Tank Designation	Tank #	Quantity	Diameter (feet)	Height (feet)	Orientation	Volume (cu. feet)	Volume (gallons)	Materials of Constr.	Contents	Location	Inspection/ Maintenance Schedule	Security
Ion Exchange Column	IX1 - IX10	10	9.5	9.5	Vertical	900	6700	CS/SS	IX Resin	Ion Exchange	1, 2	Plant Building
Elution Column	E1 - E2	2	9.5	9.5	Vertical	900	6700	CS/SS	IX Resin	Elution	1, 2	Plant Building
Guard Column	IX11 - IX12	2	7	8	Vertical	400	3000	CS/SS	IX Resin	Ion Exchange	1, 2	Plant Building
Restoration Column	IX13 - IX14	2	9.5	9.5	Vertical	900	6700	CS/SS	IX Resin	Restoration	1, 2	Plant Building
H2O2 Storage		1	9	16.5	Horizontal	1050	7900	Al	50% H2O2	Chemical	4	Plant Building
CO2 Storage		1	8	30	Horizontal	1640	12300	CS	CO2	Plant Pad	1	Plant Compound
Oxygen Storage		1	9.7	29.5	Vertical	2410	18000	CS	O2	Wellfield	1	Wellfield
Gas Storage		1	8	10.5	Horizontal	530	4000	CS	Gasoline	Plant Pad	4	Plant Compound
Diesel Storage		1	8	10.5	Horizontal	530	4000	CS	Diesel	Plant Pad	4	Plant Compound
Slurry Tank	YC1 - YC2	2	12.5	17	Vertical	2090	15600	CS	Yellowcake Slurry	Precipitation	4	Plant Building
Fresh Eluate Tank	FE1 - FE2	2	10	14	Vertical	1100	8200	FRP	Fresh Water, NaCl, Soda Ash	Elution	3	Plant Building
Intermediate Eluate Tank	IE1 - IE2	2	10	14	Vertical	1100	8200	FRP	Eluate	Elution	3	Plant Building
Rich Eluate Tank	RE1 - RE2	2	10	14	Vertical	1100	8200	FRP	Eluate	Elution	3	Plant Building
Precipitation Tank	PR1 - PR4	4	10	20	Vertical	1570	11700	FRP	Eluate, NaOH, H2O2, HCl	Precipitation	3	Plant Building
Fresh Water Tank	FW1 - FW2	2	14	18	Vertical	2770	20700	FRP	Fresh Water	Process Water	3	Plant Building
Resin Water Tank		1	14	18	Vertical	2770	20700	FRP	Resin Transfer Water	Process Water	3	Plant Building
Resin Water Decant Tank		1	14	18	Vertical	2770	20700	FRP	Resin Transfer Water	Process Water	3	Plant Building
Waste Water Decant Tank	WW1	1	14	18	Vertical	2770	20700	FRP	Waste Water	Process Water	3	Plant Building
Waste Water Tank	WW2	1	14	18	Vertical	2770	20700	FRP	Waste Water	Process Water	3	Plant Building
HCl Storage		2	12	12	Vertical	1360	10200	FRP/PE	37% HCl	Plant Pad	3	Plant Compound
NaCl Storage		1	12	20	Vertical	2260	16900	FRP	NaCl Mix	Chemical	3	Plant Building
NaOH Storage		1	12	20	Vertical	2260	16900	FRP	NaOH Mix	Chemical	3	Plant Building
Bicarbonate Storage		1	12	20	Vertical	2260	16900	FRP	Bicarbonate Mix	Chemical	3	Plant Building
Permeate Tank		1	10	14	Vertical	1100	8200	FRP	Restoration Permeate	Restoration	3	Plant Building
Soda Ash Storage		1	12	20	Vertical	2260	16900	FRP	Soda Ash	Chemical	3	Plant Building

1. All ASME code pressure vessels will be code inspected every 5 years.
2. All ion exchange vessels will be checked by site staff quarterly unless greater frequency is required.
3. FRP vessels will be inspected annually by site staff unless greater frequency is required.
4. All general duty vessels will be inspected annually by site staff unless greater frequency is required.

Notes: CS - Carbon Steel
SS - Stainless Steel
Al - Aluminum
FRP - Fiberglass Reinforced Plastic

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FAX: (307) 265-2801

LOST CREEK ISR, LLC

May 15, 2009

Mr. Andrew Keyfauver
Wyoming Department of Environmental Quality
Air Quality Division
Herschler Building
122 West 25th Street
Cheyenne, WY 82002

Re: Response to June 16, 2008 Questions
Permit Application No. AP-7896

Please find below responses to the three questions your agency posed in a letter dated June 16, 2008 with regard to an Air Quality Permit Application.

1. *Please provide engineering estimates, from each source, to quantify emissions of radon from the operation of the facility, as radon is a listed hazardous air pollutant (HAP) under Chapter 5, Section 3 of the Wyoming Air Quality Standards and Regulations.*

   Lost Creek ISR, LLC (LCI), through an experienced third party contractor, estimated the radon releases to the atmosphere using MILDOS-Area and the web-based Uranium Mill Tailings Radon Flux Calculator. The verbiage from the resulting report can be found behind this cover in Appendix A. A total of six sources of radon were identified with the total radon emissions shown in Table 6 of Appendix A. Results of the MILDOS modeling show that boundary receptors receive only about 3% of the 10 CFR 20 limit of 100 mrem per year total effective does equivalent.

2. *Please provide engineering estimates to quantify emissions of hydrochloric acid (listed HAP) and/or sulfuric acid used in the plant. These emissions are known to be generated during tank loading and operational usage based on the Division experience with acid tanks.*

   Hydrochloric acid, 37% solution, will be delivered to the facility via bulk shipments and blown into a storage vessel fitted with a scrubber. The remainder of the process involving acid occurs in solution with water at pH levels of 2.0 to 8.5. Therefore, the sources of acid fume emissions will be from the downloading of acid into the storage vessel and during storage. Please see Appendix B for an analysis of the hydrochloric acid emissions. The analysis is based upon the EPA's TANKS 4.09d program and from Chapter 7, Liquid Storage Tanks of EPA's Compilation of Air Pollutant Emission Factors (AP-42). Maximum short term emissions are estimated based on Texas Commission on Environmental Quality's Technical Guidance Package for Chemical Sources: Storage Tanks (February 2001). In summary, the analysis demonstrates that, with the assistance of pollution control mechanisms, the annual emission of hydrochloric acid will be approximately 10 pounds per year.

3. *Please clarify dry material handling at the facility (i.e. soda ash, salt)*

Soda Ash

The facility will store soda ash in a dry storage bin equipped with a fabric bag house. Material will be blown into the storage bin from the delivery truck. The soda ash will be conveyed with a screw auger or drag chain to a sealed tank filled with water. The soda ash emissions will be exclusively from the off-loading of material into the dry storage bin.

To calculate emissions of soda ash, factors from Section 8.12 of EPA's AP-42 were used. A factor of 5.2 pounds of particulate released (within the tank) per ton unloaded was used. Therefore:

5.2 lb/ton x 17.5 tons per event = 91 lbs or 0.05 tons of dust generated per shipment

And

5.2 lb/ton x 521.1 tons/year = 2,709.7 lbs or 1.35 tons of dust generated per year

To control the above emissions, a passive fabric filter will be used to capture the majority of the dust. Using an efficiency factor of 99.5% results in emissions to the atmosphere as follows:

1.35 tons/year x 0.005 released = 0.007 tons/year or **14 pounds/year**

Salt

Delivery trucks will offload salt into a water filled tank equipped with a bag house. Since the salt will be immediately dissolved in water, particulate will only be generated during off-loading.

EPA's AP-42 does not have a section pertaining specifically to salt. Therefore, since the salt will be in the form of coarse rock salt, factors from Table 11.19.2-4 of Section 11.19.2 "Crushed Stone and Pulverized Minerals Processing" were used. An emissions factor of 0.0099 lb/ton, which includes fabric filtration, was assigned.

0.0099 lb/ton x 17.5 tons per event = 0.2 lbs/event

And

0.0099 lb/ton x 1771.7 tons/year = **17.5 lbs/year**

If you need additional information please feel free to contact me at the Wyoming Office.

Sincerely

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

By: _____
John W. Cash, Manager EHS and Regulatory Affairs

Appendix A
MILDOS Calculations

Not included because it is part of the NRC submittals.

Appendix B
Analysis of Hydrochloric Acid Emissions

Tanks 4.0.9d

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Tank 1
City:	
State:	Wyoming
Company:	UR Energy
Type of Tank:	Vertical Fixed Roof Tank
Description:	37% HCl in water tank

Tank Dimensions

Shell Height (ft):		12.00
Diameter (ft):		12.00
Liquid Height (ft) :		11.72
Avg. Liquid Height (ft):		11.72
Volume (gallons):		9,915.47
Turnovers:		15.91
Net Throughput(gal/yr):		157,735.00
Is Tank Heated (y/n):	N	

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone	
Height (ft)		0.00
Slope (ft/ft) (Cone Roof)		0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Lander, Wyoming (Avg Atmospheric Pressure = 12.02 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Tank 1 - Vertical Fixed Roof Tank
, Wyoming

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Hydrochloric Acid	All	46.54	40.15	52.92	44.59	2.7080	1.5470	6.7700	36.4610			26.83	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Tank 1 - Vertical Fixed Roof Tank
, Wyoming

Annual Emission Calcaulations

Standing Losses (lb):	173.7080
Vapor Space Volume (cu ft):	45.8044
Vapor Density (lb/cu ft):	0.0182
Vapor Space Expansion Factor:	0.6048
Vented Vapor Saturation Factor:	0.9451
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	45.8044
Tank Diameter (ft):	12.0000
Vapor Space Outage (ft):	0.4050
Tank Shell Height (ft):	12.0000
Average Liquid Height (ft):	11.7200
Roof Outage (ft):	0.1250
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.1250
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	6.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0182
Vapor Molecular Weight (lb/lb-mole):	36.4610
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.7080
Daily Avg. Liquid Surface Temp. (deg. R):	506.2055
Daily Average Ambient Temp. (deg. F):	44.5708
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	504.2608
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,454.5508
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.6048
Daily Vapor Temperature Range (deg. R):	25.5297
Daily Vapor Pressure Range (psia):	5.2230
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.7080
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	1.5470
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	6.7700
Daily Avg. Liquid Surface Temp. (deg R):	506.2055
Daily Min. Liquid Surface Temp. (deg R):	499.8231
Daily Max. Liquid Surface Temp. (deg R):	512.5879
Daily Ambient Temp. Range (deg. R):	25.8417
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9451
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	2.7080

Vapor Space Outage (ft):	0.4050
Working Losses (lb):	370.8139
Vapor Molecular Weight (lb/lb-mole):	36.4610
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.7080
Annual Net Throughput (gal/yr.):	157,735.0000
Annual Turnovers:	15.9080
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	9,915.4672
Maximum Liquid Height (ft):	11.7200
Tank Diameter (ft):	12.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	544.5219

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Tank 1 - Vertical Fixed Roof Tank
, Wyoming

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Hydrochloric Acid	370.81	173.71	544.52

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

June 16, 2008

Mr. John Cash
Manger EHS and Reg. Affairs
Lost Creek ISR, LLC
5880 Enterprise Drive, Suite 200
Casper, WY 82609

Re: Permit Application No. AP-7896

Dear Mr. Cash:

The Air Quality Division (AQD) of the Wyoming Department of Environmental Quality has conducted an initial completeness review of the permit application for the Lost Creek Project. Before the application can be deemed complete, the following needs to be provided to the Division:

1. Please provide engineering estimates, from each source, to quantify emissions of radon from the operation of the facility, as radon is a listed hazardous air pollutant (HAP) under Chapter 5, Section 3 of the Wyoming Air Quality Standards and Regulations.

2. Please provide engineering estimates to quantify emissions of hydrochloric acid (listed HAP) and/or sulfuric acid used in the plant. These emissions are known to be generated during tank loading and operational usage based on the Division experience with acid tanks.

3. Please clarify dry material handling at the facility (i.e. soda ash, salt).

If you have any questions, you may contact me at (307) 777-7045.

Sincerely,

Andrew Keyfauver

Andrew Keyfauver
NSR Permit Engineer
Air Quality Division

cc: Tony Hoyt

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LOST CREEK ISR, LLC

June 5, 2008

Mr. David Finley, Administrator
Wyoming Department of Environmental Quality
Air Quality Division
Herschler Building
122 West 25th Street
Cheyenne, WY 82002

Re: Submittal of Air Quality Permits for the Lost Creek Project

Lost Creek ISR, LLC is seeking regulatory approval to construct and operate a uranium in situ recovery facility, known as the Lost Creek Project, in the northeast corner of Sweetwater County, Wyoming. Please find behind this cover, completed forms AQD-MN1, AQD-MN2, AQD-MN3, AQD-MN4, and other attachments as required by the Wyoming Department of Environmental Quality, Air Quality Division (AQD).

The above mentioned forms were designed with conventional mining applications in mind. However, the in situ recovery process to be employed at the Lost Creek Project has few similarities with conventional mining. As requested by AQD, the forms were completed to the extent possible, however, many portions are not applicable. The following discussion details how the forms were completed.

During construction, gaseous and particulate releases from drilling equipment will have a localized impact on air quality. Air-quality impacts during construction will come from dirt-moving activities during drilling and ground-clearing activities, as well as emissions from the use of heavy equipment. Atmospheric stability in the area is low due to the winds and any releases will be quickly dispersed. The closest off-site receptor, Bairoil is located 14.7 miles from the Permit Area and is not downwind of the prevailing wind direction.

Temporary roads will be used to access well sites. These will be two-track roads, with each track being approximately 1.5 feet wide, and a total width of eight feet. Installation of two-track roads will be minimized where possible. Other potential impacts during this period will come from dust from vehicular traffic on these unpaved roads and gaseous emissions (vehicular and heavy equipment). On-road cars and trucks will have the required emission control equipment.

Estimated vehicle requirements for construction, operations and maintenance may include a motor grader, trackhoe, scraper, compactor, drill rig, water truck, pipe truck, rig pick-up, backhoe, pick-up, generator,

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welding machine, air compressor, tractor/trailer, and fusion cart. **Table 1** shows the estimated amount of emission from these vehicles.

Non-stationary sources of air pollutants will be the diesel engines on the drill rigs and other construction equipment. Drilling will be conducted as the mine units are developed. Drilling equipment has the greatest use throughout the year while other equipment is used sporadically and will have negligible impacts.

Dust generation from surface disturbance during construction also has the potential to impact air quality (**Table 2**). However this impact is temporary, and revegetation of the disturbed areas not used for project facilities will reduce the amount of surface disturbance. Approximately 31 long-term topsoil piles will be created during the life of the project. These piles will be re-vegetated with a seed mixture approved by the Bureau of Land Management (BLM). Additionally, temporary topsoil stockpiles will be created from excavation of drilling pits and trunkline trenches. This soil will generally be replaced within a few days to a few weeks and will be re-seeded at the next appropriate season using a seed mix approved by the BLM.

Another source of dust will come from vehicular traffic, especially on unpaved roads. To estimate the amount of dust generated from project traffic, calculations using EPA Emission Factors for unpaved and paved roads were made.

Compilation of Air Pollutant Emission Factors, Volume I (EPA, 2006) contains the following equation for light-duty vehicles traveling on publicly accessible unpaved roads (equation 1b in the document):

$$E = \frac{k\ (s/12)^a (S/30)^d}{(M/0.5)^c} - C$$

where k, a, b, c and d are empirical constants provided in the document and:

- E = size-specific emission factor in pounds per vehicle miles traveled (lb/VMT),
- s = surface material silt content (percent),
- M = surface material moisture content (percent),
- S = mean vehicle speed (mph), and
- C = emission factor for 1980s vehicle fleet exhaust, brake wear, and tire wear.

To account for rainfall, which naturally mitigates dust generation, the following equation was used:

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$E_{ext} = E\,[(365-P)/365]$

where:

- E_{ext} = annual size-specific emission factor extrapolated for natural mitigation, lb/VMT;
- E = emission factor from Equation 1a or 1b; and
- P = number of days in a year with at least 0.01 inch (0.254 millimeter) of precipitation (see below).

For paved roads, the following formula was used:

$$E_{ext} = \left[k\left(\frac{sL}{2}\right)^{0.65}\left(\frac{W}{3}\right)^{1.5} - C \right]\left(1 - \frac{P}{4N}\right)$$

where:

- E = particulate emission factor (having units matching the units of k);
- k = particle size multiplier for particle size range and units of interest (see below);
- sL = road surface silt loading (grams per square meter [g/m^2]);
- W = average weight (tons) of the vehicles traveling the road;
- C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear;
- E_{ext} = annual or other long-term average emission factor in the same units as k;
- P = number of "wet" days with at least 0.01 inch (0.254 millimeter) of precipitation during the averaging period; and
- N = number of days in the averaging period (e.g., 365 for annual, 91 for seasonal, 30 for monthly).

For purposes of this calculation, the following estimates and assumptions were made:

- Weight for passenger vehicles used by employees was two tons, average weight (full versus empty) for supply/delivery truck was ten tons, and average weight of resin truck (full versus empty) was 20 tons.
- Distance of unpaved roads is equal to 19 miles. Speed limit of passenger vehicles was 35 mph, delivery and resin trucks were 15 mph.
- Resin trucks made 70 trips a year, delivery trucks made weekly trips (52 a year).

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- For employees, it was assumed that 70 percent would be commuting from Casper, and 30 percent from Rawlins. Eighty-seven employees carpool in 33 vehicles, driving 240 days each year (the number of work days take holidays and vacations into account).
- Emissions were calculated for the operation stage only.

The amount of emissions and dusts generated during the operation phase of the project will be less than those generated during the construction phase. Impacts on air quality will be limited to emissions and dusts from service vehicles from the Plant to the mine units, as well as the transportation of supplies, yellowcake slurry and workers in and out of the Plant. Most of the dust, generated from all vehicles, originates from the unpaved road. The greatest amount of dust will be generated from employee vehicles, with 169.9 tons per year for PM_{10}. The slurry truck is modeled to generate 4.3 tons of dust/year, and delivery trucks are modeled to generate 2.7 tons per year from vehicular traffic. Mine unit construction (mainly drilling) will continue throughout operations and emissions and dusts will be generated.

The closest receptors near the project area are approximately 15 miles away. The emissions and dusts generated by the Project during operations will be dispersed rapidly and are not expected to cause an exceedance of applicable air quality standards in the Permit Area.

Please feel free to contact me if you have any questions regarding this submittal or if you require additional information.

Sincerely

Wayne Heili,
President
Lost Creek ISR, LLC.

Cc: Bill Boberg, Ur-Energy USA, Inc.
John Cash Ur-Energy USA, Inc.
Dr. Wang Ping, AATA International

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Table 1 Estimated Emission (pounds/year) from Vehicles

NOx	53,777
CO	11,585
SOx	3,536
PM_{10}	3,780
CO_2	1,999,815
TOC	4,390

Table 2 Disturbance Type and Associated Stripped Acreage

Disturbance Type	Term of Disturbance	Acres
Roads		
Permanent main access road from the Sooner Road to the plant	Long term (≥ project life)	11.4
Permanent main roads - from plant into and through the mine unit	Long term (≥ project life)	3.4
Secondary roads- from main road to header houses	Long term (≥ project life)	4.5
Pipelines and Header Houses		
Header Houses	Long term (≥ project life)	0.4
Main Pipeline Ditch	Short term (2 weeks to 6 months)	1.0
Secondary lines (from main line to header house)	Short term (2 weeks to 6 months)	1.5
Tertiary lines (from HH to wellheads)	Short term (2 weeks to 6 months)	5.4
Mud Pits		
Mud Pits (I/P wells)	Short term (2 weeks to 6 months)	10.4
Mud Pits (Monitoring wells)	Short term (2 weeks to 6 months)	1.2
Mud Pits (Delineation Holes)	Short term (2 weeks to 6 months)	7.4
Field construction laydown areas	Short term (6 to 20 months)	1.4
Lost Creek plant compound	Long term (≥ project life)	10.0
	Total	58.0

STATE OF WYOMING

Department of Environmental Quality - Air Quality Division

Mining/Quarry Operations - Non Coal

Permit Application Form

(Submit three (3) copies of the complete application)

Company Name: Lost Creek ISR, LLC

Contact: John Cash Title: Manager EHS and Reg. Affairs

Mailing Address: 5880 Enterprise Drive, Suite 200

City: Casper State: WY Zip: 82609

Phone: (307) 265-2373 Fax: (307) 265-2801 E-Mail: john.cash@ur-energyusa.com

Mine Name: Lost Creek Project

Size of Mine: +/-4,220 Acres See attached Permit to Mine & legal description

Legal Description: 1/4: _____ 1/4: _____ Section: _____ T: _____ N R: _____ W

Latitude: 42 deg 8 min Longitude: 107 deg 51 min

County: Sweetwater

Number of residences within 1 mile radius: None Distance to nearest residence: 14.7

Type of Material Mined (This form is Not for Coal Mines): Uranium

Total Material Available: 4,350 Tons Max Annual Production: 500 Tons per year

Hours of Operation: 24 Hours/day 7 Days/week 52 Weeks/year

Equipment/Operations planned at this site: (mark all that apply)

- ☐ Crushing *
- ☐ Screening *
- ☐ Hot Mix Plant *
- ☐ Wet Screening *
- ☐ Stock Piling
- ☐ Blasting
- ☐ Concrete Batch Plant *

* **Operation of crushers, screens, hot mix asphalt plants or concrete batch plants at the quarry will only be allowed if so designated on this application**. Note: Any crushers, screens, hot mix asphalt plants, or concrete batch plants **must have a separate, valid air quality permit**.

Brief Process Description: Recovery of uranium will occur through the in situ process. Mining solution will be injected into the ore zone via wells. The solution will dissolve uranium as it is drawn to a recovery well. The uranium is recovered from the solution at a processing plant.

All applications must include:

1. **Documentation that the proposed site is located in accordance with proper land use planning as determined by the appropriate state or local agency charged with such responsibility.**
   (Per Chapter 6, Section 2(c)(iv) of the WAQSR.)
2. **A map identifying the site location and mining activities (for operations 10 acres or less) or a mine plan (for operations more than 10 acres). The mine plan from the Land QualityDivision (LQD) application [Item 9 on LQD Form 1(s)] may be used. A reclamation plan is not required.**
3. **Completed Attachments A, B, and C (Forms MN-2, MN-3, and MN-4).**

I, Wayne Heili, President,

Responsible Official **Title**

state that I have knowledge of the facts herein set forth and that the same are true and correct to the best of my knowledge and belief. I further certify that the maximum production rate listed in this application reflects the maximum anticipated production rate listed in this application reflects the maximum anticipated production rate at this quarry. The facility will operate in compliance with all Wyoming Air Quality Standards and Regulations.

Signature: _____ **Date:** _____

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division
Chapter 6, Section 2 Permit Application
Mining/Quarry Operations - Non Coal
Attachment A - Mined Material Information

Disturbed/Open Acreage

Acreage Subject to Wind Erosion: 58 Acres

Topsoil

Removal Equipment: Scraper and backhoe

Tons/day Removed: 12.8 Tons/year Removed: 4,690

Fugitive Particulate Control Method: Soil kept moist during removal at plant

Control Application Frequency: Wetted twice per day during removal at plant

Topsoil Stockpiles - No of Piles: 31 Size of Piles (tons or yd^3): 611 tons

Stockpile Fugitive Control Method: Long term stock piles are revegetated

Control Application Frequency: Once per long term stock pile

Overburden N/A

Removal Equipment: _____

Tons/year Removed: _____

Fugitive Particulate Control Method: _____

Control Application Frequency: _____

Overburden Stockpiles - No of Piles: _____ Size of Piles (tons or yd^3): _____

Stockpile Fugitive Control Method: _____

Control Application Frequency: _____

Blasting N/A

Number of Blasts/year: _____

Type of Blasting Agent Used: _____ Amount of Blasting Agent Used Annually (tons): _____

Operational Practices used for Emission Control: _____

Mined Material N/A

Removal Equipment: _____

Tons/year Removed: _____

Operational Practices used for Emission Control: _____

Material Stockpiles - N/A No of Piles: _____ Size of Piles (tons or yd^3): _____

Stockpile Fugitive Control Method: _____

Control Application Frequency: _____

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division
Chapter 6, Section 2 Permit Application
Mining/Quarry Operations - Non Coal
Attachment B - Mined Material Information

Access & Haul Roads *

Maximum Distance Material will be Hauled until Reaching Pavement: 19 Miles

Fugitive Particulate Control Method: Minimize traffic

Type of Chemical Dust Suppressant Used: N/A

Control Application Frequency: N/A

* The application **MUST include a map** identifying all haul roads, including county roads and other unpaved roads, associated with the mining activities.

Haul Trucks (Trucks that Transport Product from the Quarry) N/A

Truck Type 1 (Description): _____

No. of Trucks: _____ Capacity (tons): _____ Empty Weight (lbs): _____

Truck Type 2 (Description): _____

No. of Trucks: _____ Capacity (tons): _____ Empty Weight (lbs): _____

Truck Type 3 (Description): _____

No. of Trucks: _____ Capacity (tons): _____ Empty Weight (lbs): _____

Crushing/Screening N/A

The appropriate forms must be completed if Crushing/Screening occurs at the mine.

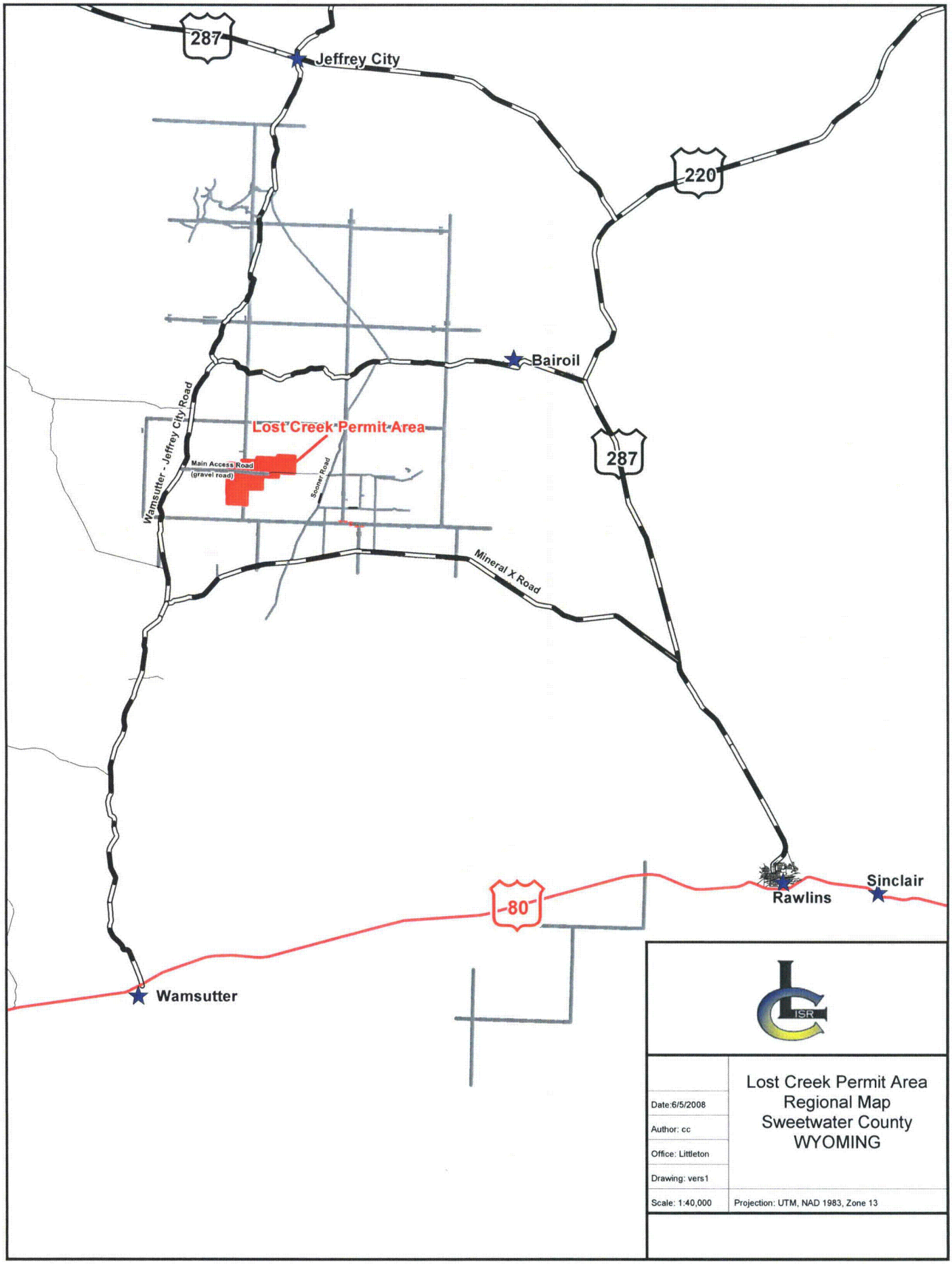
Other N/A

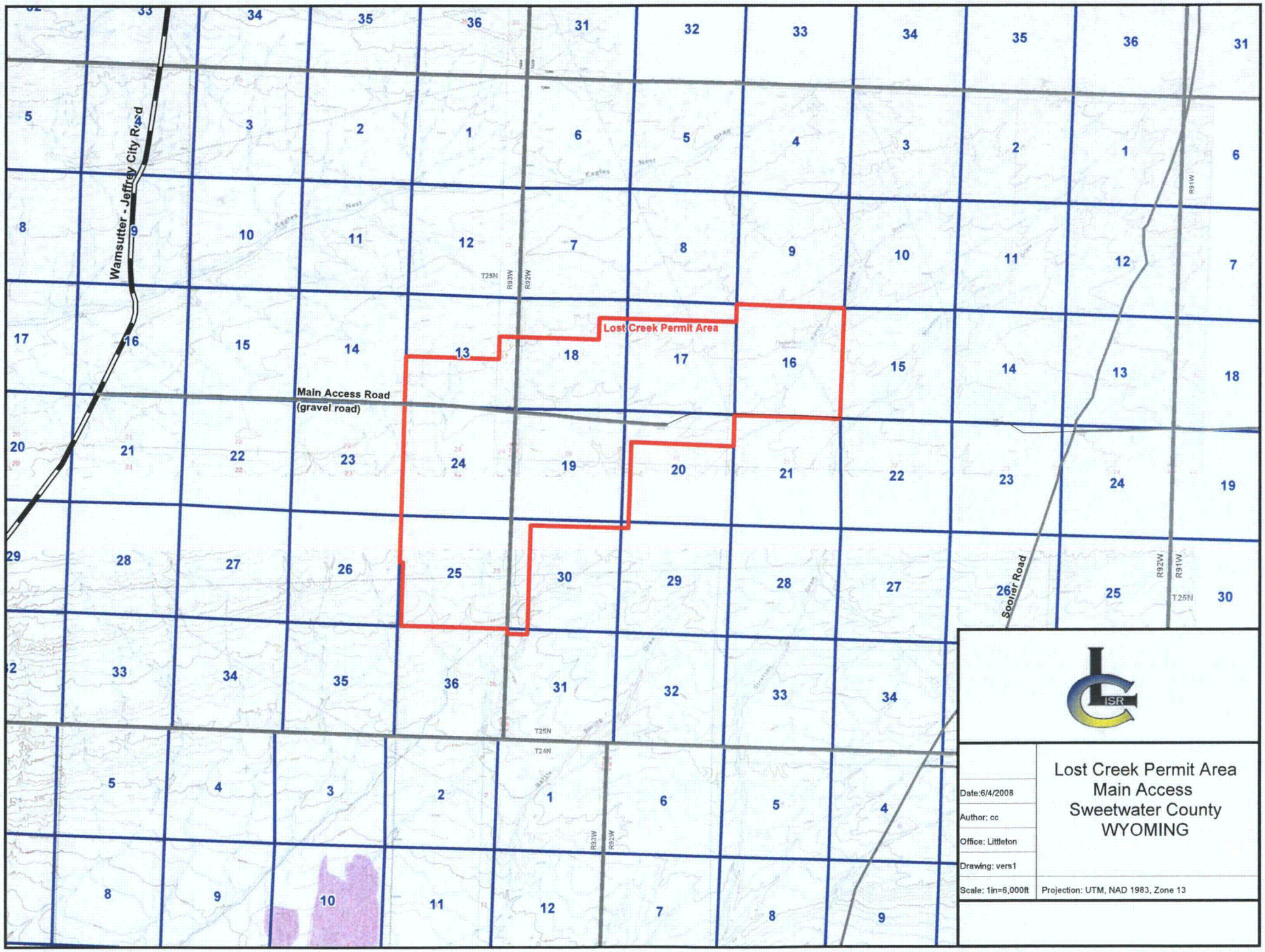
Other Emission Sources and Control:

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division
Chapter 6, Section 2 Permit Application
Mining/Quarry Operations - Non Coal
Attachment C - Equipment List

Equipment List
Include: Trucks*, Loaders, Bulldozers, Graders, Scrapers, Portable Generators, etc.
* Only include trucks that haul material within the mine. (List haul trucks that transport product from the quarry on Form AQD-MN-3.)

Equipment Description (Include Horsepower for Portable Generators)	No. of Units	Type of Fuel	Annual Fuel Usage (Indicate Units)
Generator (10 HP)	2	Gas	3,700 gal
Backhoe	3	Diesel	6,300 gal
Drilling Rigs	10	Diesel	52,500 gal
Motor Grader	1	Diesel	1,200 gal
Scraper (limited to initial construction)	1	Diesel	480 gal
Trackhoe	1	Diesel	630 gal
Water Truck	10	Diesel	10,500 gal
Pipe Truck	10	Diesel	1,750 gal
Light Trucks	22	Gas	10,000 gal
Welding Machine	2	Gas	648 gal
Tractor Trailer (takes ore off-site)	1	Gas	200 gal
Compactor	1	Diesel	200 gal


287
Jeffrey City
220
Bairoil
Lost Creek Permit Area
Main Access Road
(gravel road)
Wamsutter - Jeffrey City Road
Scooter Road
287
Mineral X Road
Rawlins
Sinclair
80
Wamsutter
ISR
Lost Creek Permit Area
Regional Map
Sweetwater County
WYOMING
Date:6/5/2008
Author: cc
Office: Littleton
Drawing: vers1
Scale: 1:40,000
Projection: UTM, NAD 1983, Zone 13


Wamsutter - Jeffrey City Road
Lost Creek Permit Area
Main Access Road
(gravel road)
Sooner Road
T25N
T24N
R93W
R92W
R91W
ISR
Lost Creek Permit Area
Main Access
Sweetwater County
WYOMING
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