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6.0 GROUNDWATER QUALITY RESTORATION, SURFACE RECLAMATION, AND FACILITY DECOMMISSIONING

A variety of restoration and reclamation activities will be phased in throughout the project life as mine units are depleted of uranium. Final facility decommissioning and reclamation will occur once the Plant is no longer in use. **Figure 1.7-2** includes a schedule of activities for the Project, including the restoration and reclamation activities. This schedule is an alternate schedule pursuant to 10 CFR 40.42. While LC ISR, LLC believes the groundwater restoration and surface reclamation can be completed within 24 months for each mine unit, the associated regulatory reviews and approvals will lengthen the schedule beyond 24 months. LC ISR, LLC understands that any revision to the alternate schedule must be requested through a license amendment application.

For each mine unit, LC ISR, LLC will submit a decommissioning plan as part of the mine unit package. For the processing and support facilities that will not be removed until the end of the Project, LC ISR, LLC will submit a decommissioning plan for those facilities at least 12 months prior to removal of those facilities. The decommissioning plans will include a quality assurance program as discussed in TR Section 5.2.

Reclamation of each mine unit and associated header houses involves:

1) groundwater restoration,
2) radiological decontamination,
3) equipment removal/decommissioning (e.g. well abandonment), and
4) surface reclamation (e.g., well site reseeding).

Groundwater restoration may start once uranium recovery is complete at that header house, and restoration of a header house may occur contemporaneously with operation of another header house in the same mine unit. To ensure maximum ore recovery and avoid interference between header houses, contemporaneous production and restoration of adjacent header houses and/or mine units will be carefully evaluated. Once groundwater restoration is complete, decontamination and other reclamation activities will start. Decontamination of equipment and other surface reclamation activities will start when all of a mine unit is restored.

Reclamation of the Plant and support facilities involves similar activities, including:

1) radiological decontamination,
2) equipment removal/decommissioning (e.g., building demolition), and
3) surface reclamation (e.g., road removal, topsoil replacement, and reseeding).

The following sections describe the criteria used to determine when production is complete, the status of the mine unit at the end of operations, the subsequent restoration and reclamation activities, and the criteria used to determine when restoration and reclamation have been successful.

6.1 Completion of Production Operations

Technical, economic, and operational criteria can be reviewed to determine if uranium recovery is complete in a given header house and/or mine unit. The technical criteria comprise the percentage recovery of the estimated ore reserves, the uranium concentration in the production fluid, and the header house flow rates. Typically, the technical criteria for considering production operations complete are:

- a uranium recovery of at least 80 percent;
- a production fluid uranium concentration reduced to a level not significantly greater than the injection fluid; and,
- in some instances, a reduced groundwater flow rate.

The economic criteria comprise the corporate financial objectives, the price of uranium, and the annual production targets. When production targets are no longer being met, and operational changes will not improve the possibility of meeting those targets, then ISR operations may be considered complete.

The Plant ion exchange and processing capacity may also factor into determining if ISR operations have been completed in a given header house or mine unit. If there is unused ion-exchange-recovery and waste-management capacity that can be filled by continued operation of an area, which is essentially depleted but will continue to supply a low-concentration production fluid, it may be economic to continue operation of that header house. Such an extension allows for the recovery of uranium for a period of a few months after the header house operations might normally be considered complete. In addition, such an extension allows for higher percent recovery of uranium, which may facilitate subsequent groundwater restoration. This extension will end when there is no longer sufficient capacity for low-concentration production fluid or the quantity of uranium recovered is insufficient to cover operating costs.

The decision to take a mine unit (out of production and place it into restoration will be based solely on the considerations outlined above. As long as a mine unit is economic and there are not technical issues preventing production, the mine unit will remain in production status. Pursuant to 10 CFR 40.42(d), if an area must be temporarily shut down for any reason, decommissioning will commence within 24 months unless NRC grants an exemption.

For each mine unit, LC ISR, LLC will inform NRC of the transition from production to restoration. Four conditions would trigger NRC notification of decommissioning (restoration) activities: the license has expired, a determination to permanently cease principal activities, no principal activities have been conducted for 24 months under the license, or no principal activities have been conducted in a specific wellfield. Cessation of injection marks the end of principal activities.

A hydrologic bleed sufficient to control mining or restoration solutions will be maintained during all phases, including any hiatus in production, until active restoration is complete. The anticipated water quality in the production zone before restoration is included in Table 6.1-1.

6.2 Plans and Schedules for Groundwater Quality Restoration

The objective of restoration and reclamation is to return the affected groundwater and land surface to the uses for which they were suitable before commencement of the Project operations. To achieve this objective LC ISR, LLC will use Best Practicable Technology (BPT) to return the groundwater in the pattern area to the quality described in 10 CFR Part 40 Appendix A Criterion 5B(5) or to baseline if baseline is higher. If LC ISR, LLC determines that despite the implementation of BPT that the groundwater cannot be returned to background, an Alternate Concentration Limit will be requested. The proposed methods for groundwater restoration are described in this section. Before discussing restoration methodologies, the chemistry of the system is briefly reviewed.

6.2.1 Conditions in the Mineralized Zone Before and After Operations

The uranium deposits underlying the Permit Area are similar to those found at other ISR operations in the US. They are primarily roll front deposits in fluvial sandstones, and the uranium was deposited when oxidized groundwater containing the uranium entered reducing conditions in the subsurface aquifers. The reducing agents were probably organic matter and pyrite and, to a lesser degree, hydrogen sulfide.

ISR operations essentially reverse the natural processes that deposited the uranium. Injection wells introduce lixiviant into the mineralized zone to oxidize the reduced uranium and to complex it with bicarbonates. Pumping from production wells draws the solution through the mineralized zone, oxidizing additional ore between the injection and production wells.

In turn, groundwater restoration essentially reverses the effects of the oxidation during ISR operations and re-establishes the reducing conditions that were present prior to production, to the extent possible. Groundwater sweep removes much of the groundwater oxidized during operations. During the RO phase, residual uranium and other metals mobilized under the oxidized conditions are removed, and the treated water reinjected. As necessary to accomplish restoration, specific reductants such as hydrogen sulfide may be added. Biorestoration may also be applied, if site conditions are suitable for this restoration technology.

6.2.2 Restoration Requirements

LC ISR, LLC commits to return the groundwater to baseline water quality in accordance with NRC regulations. However, if after the application of Best Practicable Technology (BPT), the water quality has not been returned to baseline quality, LC ISR, LLC may seek an alternate restoration standard pursuant to NRC regulations. During all stages of operations, approved standby modes and active restoration, a hydrologic bleed will be maintained on the mine unit such that mining solutions are maintained within the exempted aquifer. The hydrologic bleed will be stopped during stabilization.

Prior to operation of each mine unit, groundwater baseline quality will be determined on the basis of the water quality data collected in accordance with WDEQ regulations and NRC guidance found in NUREG 1569 Section 3.1.3 and 10 CFR 40.31(g). For the wells in the perimeter monitor ring and for wells in overlying and underlying aquifers, the baseline will be determined on a well-by-well basis. For the pattern area, baseline water quality data from monitor wells in the pattern area will be averaged to determine the overall baseline water quality.

Baseline water quality data will be collected from the monitor wells in the perimeter ring, in the pattern area, and in the overlying and underlying aquifers before ISR operations in each mine unit, in accordance with the Testing Proposal which will be submitted to WDEQ-LQD for review and approval. A minimum of four samples will be collected from each well, at least 14 days apart. Each of the four samples will be analyzed for the parameters required per WDEQ-LQD Guidelines 4 and 8, as listed in **Table 6.2-1** with the exception of silver for which LC ISR, LLC is seeking an exemption.

6.2.3 Groundwater Restoration Methods

The following sections discuss the active phases that will be used under the groundwater restoration program. Following completion of groundwater restoration, stability monitoring will commence to demonstrate that the chemical constituents of the groundwater in the mine unit are in equilibrium with their immediate surroundings.

Restoration activities are designed to: optimize restoration equipment used in treating groundwater; minimize the number of pore volumes circulated during the restoration stage; and minimize net consumptive use of groundwater resources. LC ISR, LLC will monitor the quality of selected wells during restoration to determine the efficiency of the operations and to determine if additional or alternate techniques are necessary.

Restoration consists of three phases:

- groundwater sweep,
- groundwater treatment, and
- recirculation.

A reductant may be added at anytime during the restoration process to lower the oxidation potential of the production zone. Reductants have been used successfully in some mine units in Wyoming, but have been relatively ineffective in others, in part because the minerals present in one mine unit may respond differently than other minerals present in another mine unit. (For example, the solubility of manganese increases with decreasing oxidation conditions.) Therefore, the use of reductants will be evaluated on a case by case basis. A sulfide or sulfite compound may be added to the injection stream in concentrations sufficient to reduce the mobilized species. Prior to use of a reductant, a safety plan for that reductant will be developed, approved by the SERP, and implemented. Biological reductants may be evaluated as experimental technology if warranted, depending on-site conditions; however, no biorestoration will be conducted without prior NRC approval. Additional descriptions of the active phases of groundwater restoration are presented below.

The progress of groundwater restoration is often measured on the basis of the number of 'pore volumes' treated in each phase. One pore volume is equivalent to:

- the volume of water within the pattern area (thickness of the ore sand times the pattern area times the effective porosity of the sand); plus
- the volume of water at the edge the pattern area affected by the horizontal 'flare' from the injection wells along the edge of the pattern area; plus
- the volume of water above and below the injection interval affected by the vertical 'flare' from the injection wells throughout the pattern.

The thickness of the ore sand and pattern area are readily measurable, and the effective porosity was determined from core samples collected from numerous drill holes within the Permit Area. The extent of the horizontal and vertical flare can be estimated from hydrogeologic data for each mine unit. For preliminary purposes, LC ISR, LLC has estimated the horizontal flare and vertical flare are both 20 percent of the volume in the pattern area, based on information from other Wyoming operations.

LC ISR, LLC uses six pore volumes as an estimate for restoration because it is an industry standard that has been accepted by NRC in the past and continues to be used by many licensees (including Christensen Ranch and Smith Ranch). Attachment 6.2-1 provides a comparison of the anticipated restoration conditions at the Lost Creek Project with those at the Christensen Ranch and Irigaray ISR Projects, with emphasis on the number of pore volumes. As LC ISR, LLC gains experience at restoring mine units at Lost Creek, it may become necessary to adjust the number of pore volumes needed to restore a mine unit. If a pore volume adjustment becomes necessary, , LC ISR, LLC will update the annual surety and restoration schedule as part of an amendment request.

Pump tests have shown that aquifer properties at Lost Creek are higher than at many other in situ facilities, which will allow for sustained operational pumping rates that are more amenable to ISR. This should enable LC ISR, LLC to produce and restore the mine unit more quickly than at other facilities. Also, LC ISR, LLC has committed to the WDEQ to install all significant restoration equipment (pipelines and reverse osmosis systems) before mining starts and to initiate groundwater restoration without unnecessary delay upon completion of mining. Finally, and perhaps most importantly, LC ISR, LLC will treat approximately 200 gallons per minute of production water with reverse osmosis before piping that water back out to the field. This practice will result in several pore volumes of groundwater treatment during production and will reduce the number of pore volumes of treatment needed during restoration.

As stated in Section 3.2.2, the ore sub-rolls within the HJ Horizon will be mined at the same time as is standard industry practice. Likewise, restoration of the sub-rolls will occur at the same time. The use of bioreductants may result in a reduced number of pore volumes required for restoration. However, LC ISR, LLC will not propose a reduced number of pore volumes for bonding purposes until technical justification is provided.

6.2.3.1 Groundwater Sweep

During groundwater sweep, water is pumped from the mine unit, without re-injection, causing an influx of baseline quality water from the perimeter of the mine unit, which 'sweeps' the affected portion of the aquifer. The perimeter baseline quality water has lower ion concentrations, which helps strip cations (e.g., sodium cations) that were mobilized by the lixiviant but subsequently attached to the clays in the pattern area during ISR operations. These remaining cations can be readily removed from the clays and affect groundwater quality; hence the need to remove them. The affected water near the edge patterns of the mine unit is also drawn back into the pattern area, making the later restoration phases more efficient.

The sweep water is treated or passed through the ion exchange circuit to capture uranium and then pumped to the UIC Class I wells. The number of pore volumes of groundwater sweep is dependent on the capacity of the wastewater disposal system and the effectiveness of the groundwater sweep in lowering the TDS. Past experience at other ISR operations in Wyoming and elsewhere indicates that this phase is more effective in capturing affected water near the edge of the mine unit than it is in lowering TDS levels and that the majority of benefits from groundwater sweep are realized in one pore volume. Typically, one pore volume or less is recovered before moving to the groundwater treatment phase.

6.2.3.2 Groundwater Treatment

Following the groundwater sweep phase, water will be pumped from the mine unit to treatment equipment and then re-injected into the mine unit. Ion exchange and RO circuits are used during this phase as shown on the generalized restoration flow diagram on **Figure 6.2-1**.

All water recovered from restoration will be passed through the ion exchange circuit to capture any remaining uranium. The ion exchange columns exchange the majority of the soluble uranium for chloride or sulfate. Once the solubilized uranium is removed, a small amount of reductant may be metered into the water being re-injected to reduce any pre-oxidized minerals. The concentration of reductant injected (if used) into the formation is determined by the concentration and type of trace elements encountered. The goal of reductant addition is to reduce those minerals that are solubilized by carbonate complexes in order to prevent the buildup of dissolved solids, which would increase the time for restoration to be completed.

A portion of the restoration recovery water can be sent to the RO unit. The use of an RO unit: 1) reduces TDS in the impacted groundwater; 2) reduces the quantity of water that must be removed from the aquifer to meet restoration limits; 3) concentrates the dissolved constituents in a smaller volume of brine to facilitate waste management and disposal; and 4) enhances the exchange of ions from the formation due to the large difference in ion concentration.

As previously mentioned, the water is pumped through the ion exchange circuit prior to RO. The RO unit contains membranes that pass about 60 to 75 percent of the water through, leaving the dissolved salts in the water that will not pass the membranes. **Table 6.2-2** shows typical RO manufacturers' specification data for removal of ion constituents. The clean water, called "permeate," will be re-injected, sent to storage for use in the ISR process, or to the wastewater disposal system. The 25 to 40 percent of water that is rejected, called "brine," contains the majority of dissolved salts in the groundwater recovered from the mine unit and is sent for disposal in the waste system. Make-up water may be added to the mine unit injection stream to control the amount of "bleed" in the restoration areas.

If reductant is added to the injection stream during the groundwater treatment stage, it will scavenge oxygen and reduce the oxidation-reduction potential (Eh) of the aquifer. During ISR operations, certain trace elements are oxidized. By adding a reductant, the Eh of the aquifer is lowered, thereby decreasing the solubility of these elements. As warranted, hydrogen sulfide, sodium sulfide (Na_2S), or a similar compound may be added as a reductant. LC ISR, LLC is more likely to use sodium sulfide as a reductant due to the chemical safety issues associated with proper handling of hydrogen sulfide. A comprehensive safety plan regarding reductant use will be implemented.

The number of pore volumes treated and re-injected during the groundwater treatment phase will depend on the efficiency of the RO in removing TDS and the effectiveness of the reductant, if used, in lowering the uranium and trace element concentrations. LC ISR, LLC will monitor the quality of selected wells throughout restoration to determine the effectiveness of the treatment/re-injection phase of groundwater restoration and to determine if additional or alternate techniques are necessary. Restoration at other ISR facilities within Wyoming has shown that the rate of TDS reduction drops off rapidly after five to seven pore volumes of RO treatment and re-injection.

6.2.3.3 Recirculation

At the completion of the groundwater treatment phase in a mine unit, recirculation will be initiated. Recirculation consists of pumping from the mine unit and re-injecting the recovered solution to recirculate solutions and homogenize the groundwater conditions. It is anticipated that one pore volume of groundwater will be recirculated.

The sequence of the activities will be determined by LC ISR, LLC based on operating experience and the wastewater system capacity. Not all phases of the restoration phases will be used if deemed unnecessary.

Once the active restoration activities are completed, LC ISR, LLC will collect groundwater samples to determine if the restoration requirements have been met. If so, LC ISR, LLC will start the stabilization monitoring phase and will submit supporting documentation that the restoration parameters are at or below the restoration standards. If at the end of restoration activities the parameters are not at or below the standards, LC ISR, LLC will either re-initiate certain of the restoration phases or submit documentation to the agencies that BPT has been used in restoration. The documentation will include an evaluation of the water quality data and a narrative of the restoration techniques used.

6.2.4 Stabilization Phase

Upon completion of active restoration a groundwater stabilization monitoring program will begin in which some or all of the production monitor wells used to evaluate restoration success will be sampled. The wells and sampling parameters used to evaluate stability will be based on the overall conditions at the end of restoration with agency approval.

The stability monitoring data collected from the production monitor wells will be representative of the entire HJ Horizon since the HJ Horizon is a single confined aquifer overlain by the Lost Creek Shale and underlain by the Sage Brush Shale. While the HJ Horizon contains several interbedded low permeability units, these units are localized in areal extent and do not divide the HJ Horizon into separate, confined aquifers. The interbedded low permeability units caused the oxidation/reduction chemical boundary to divide and coalesce, resulting in 'sub-rolls', i.e., ore deposition at different levels within the Horizon, hence the terms UHJ for the uppermost ore within the HJ Horizon. The water quality throughout the HJ is significantly consistent regardless of the vertical position. The ore sub-rolls in the HJ Horizon will be mined and restored as a single horizon as has been and is the practice at virtually all in situ recovery mines. The ore zone monitor wells will be completed to target discrete ore levels within the Horizon at a density and spacing prescribed by WDEQ and NRC regulations.

In addition, each production monitor well will be sampled at the beginning of stabilization and once per quarter for a period of nine months and analyzed for parameters in Table 6.2-1. This will yield a total of four sample rounds. This time frame is considered appropriate in the Lost Creek setting because the intent of the restoration procedures is to return the groundwater oxidation/reduction conditions to the reduced state present before mining. Mobilization of the uranium requires its oxidation, which in this case requires injection of a bicarbonate lixiviant under pressure. The restoration procedures are designed to remove the oxidizing material introduced during mining. Once the oxidizing material is removed, then the groundwater conditions revert to the reduced state present before mining. Remobilization would again require introduction of an oxidizing agent which cannot readily happen. In addition, the restoration monitoring is designed to provide information throughout the mine unit, i.e., both in the production zone and in the adjacent monitor ring. This allows for identification of 'hot spots' in the production zone, i.e., production wells possibly requiring well-specific treatment, which have historically been a cause for difficulties in meeting restoration standards.

Historically, slow restoration of mine units at other operations can generally be attributed to maintenance of production at the expense of restoration, inefficient monitoring, and similar operational practices which LC ISR, LLC has committed to avoid. Also LC ISR, LLC will be using reverse osmosis even during production, which will improve restoration efficiencies.

6.2.4.1 Statistical Analyses

Following the end of the stability period, LC ISR LLC will perform a linear regression analysis on each monitored constituent within the pattern monitor wells. This statistical method will assist in determining if the concentration of a given constituent exhibits a significantly increasing trend during the stability period. The regression analysis will be performed in accordance with Chapter 17 on trend analysis in the EPA guidance document, "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance" (EPA, 2009)

If a constituent exhibits a strongly increasing trend (or in the case of pH a strongly increasing or decreasing trend), the action that LC ISR, LLC will take to resolve this situation will depend on the constituent and the status of the restored groundwater system. As stated in the EPA guidance document, statistical analysis provides a "workable decision framework". However, due to the complexity of the aqueous geochemical groundwater systems involved, these statistical techniques should not be relied on as the sole determinant when evaluating the effectiveness of groundwater restoration. Therefore LC ISR, LLC will consider which constituent(s) is showing an increasing trend in concentration and base the decision on further action on the status of the mining zone groundwater geochemistry. These actions may include extending the stability period or LC ISR, LLC may return to a previous phase of active restoration to resolve the issue. The phase of active restoration that will be used will be determined by the constituent and the process required to bring it to stability.

If the analytical results continue to meet the appropriate standards for the mine unit and do not exhibit significant increasing trends, LC ISR, LLC will submit supporting documentation to the regulatory agencies that the restoration parameters have remained at or below the restoration standards and request that the mine unit be declared restored.

6.2.4.2 Identification of 'Hot Spots'

For one or two parameters, localized, elevated concentrations above the restoration criteria (**Section 5.7.8.2**) may remain in the production zone following restoration. These isolated, residual elevated concentrations, referred to as 'hot spots', could potentially impact groundwater outside of the exempted portion of the aquifer. Per guidance provided by NRC (November 2009), the primary indicator of a hot spot for a specific constituent or parameter will be the mean production zone concentration plus or minus two standard deviations. If a constituent or parameter at a production zone monitor well exceeds that criterion, the location of the well will be identified as a hot spot. Once a hot spot is identified, additional evaluation will be conducted to determine potential impacts that such a hot spot could have on water quality outside of the exempted aquifer. The additional evaluation may include collection of additional water samples, analysis of added parameters (to assess post-restoration redox conditions), trend analysis, or flow and transport modeling. Based on the results of the evaluation, additional stability monitoring or restoration would be conducted as needed to ensure the protection of water quality outside the exempted aquifer.

6.2.5 Reporting

During the restoration process LC ISR, LLC will perform daily, weekly, and monthly analyses as needed to track restoration progress. These analyses will be summarized, along with the restoration methods, and discussed in the Semiannual Radiological Effluent and Environmental Monitoring Report submitted to NRC. This information will also be included in the final report on restoration. During active restoration, the perimeter, underlying, and overlying monitor wells will continue to be sampled for excursions at least twice per month, and no less than ten days apart, for UCL parameters.

Upon completion of restoration activities and before stabilization, the wells in the monitor ring, the overlying and underlying monitor wells, and the monitor wells in the pattern area will be sampled for the parameters required per WDEQ-LQD Guidelines 4 and 8, as listed in **Table 6.2-1**. The water quality data from each well in the monitor ring and from each overlying and underlying well will be compared with the baseline water quality data for that well. The average of the water quality data from the monitor wells in the pattern area will be compared with the baseline average from the pattern area. In addition, the water quality data will be compared with the EPA MCLs, if greater than baseline concentrations, to help ensure the groundwater outside the area exempted for ISR operations will be protective of human health. If the concentrations are at or below those approved by WDEQ and NRC, LC ISR, LLC will submit supporting documentation that the restoration parameters are at or below the restoration standards.

During stabilization monitoring the monitor ring, overlying, and underlying monitor wells will be sampled for the UCL parameters once every two months.

During stabilization, quarterly samples will be collected to ensure the oxidation/reduction conditions do not fluctuate significantly. The wells and sampling parameters used to evaluate stability will be based on the overall conditions at the end of restoration with agency approval, except that the final sample will be for the parameters required per WDEQ-LQD Guidelines 4 and 8, as listed in **Table 6.2-1**. At the end of a nine-month stabilization period, LC ISR, LLC will compile all water quality data obtained during restoration and stabilization and submit a final report to the regulatory agencies with the data and description of the restoration methods. If the analytical results continue to meet the appropriate standards for the mine unit and do not exhibit significant increasing trends, LC ISR, LLC will request the mine unit be declared restored. Following agency approval, mine unit reclamation and plugging and abandonment of wells will be performed as described in **Section 6.3**.

6.3 Mine Unit Reclamation

6.3.1 Preliminary Radiological Surveys and Contamination Control

Radiological surveys will be conducted prior to dismantling or disposing of any of the mine unit facilities at which radiological materials could be concentrated in accordance with the procedures outlined in **Section 6.4.1.**

6.3.2 Well Abandonment

Once the NRC and WDEQ review and approve LC ISR, LLC's assessment that the groundwater restoration is complete in a given mine unit, all of the wells will be abandoned in accordance with applicable regulations, unless a well is needed for continued monitoring of another mine unit or retention of the well for future use has been requested and approved. Currently, the applicable well abandonment statutes and rules include:

- Wyoming Statute 35-11-404;
- WDEQ-LQD Rules and Regulations Chapter VIII;
- WDEQ-WQD Rules and Regulations Chapter XI, Section G; and
- WSEO Rules and Regulations Part III, Chapter VI, Section 5.

The regulations will be reviewed prior to well abandonment to ensure that the following procedures are still appropriate.

1) A drill rig, tremie pipe, or similar equipment will be used to ensure proper grouting through the entire length of the well.
2) The grout properties will be: a ten-minute gel strength of at least 20 pounds per 100 square feet and a filtrate volume not to exceed 0.824 cubic inches (13.5 cubic centimeters).
3) The volume of fluid necessary to grout the entire length of the well will be calculated and recorded.
4) A mud and/or water retention pit will be constructed by removing topsoil and subsoil from the pit area near the well. The depth of topsoil removed will be based on the soil characteristics of the area; and the removed material will be stockpiled and protected from wind and water erosion.
5) The grout will be mixed in a manner to ensure the appropriate fluid properties are obtained and will be introduced into the well through the drill pipe to the bottom of the well. The grout will be pumped until the grout rises to the well collar. The water displaced from the well will be directed to the water retention pit. The amount of grout pumped into the well will be compared with the calculated volume to ensure there are no major discrepancies, which could indicate bridging or another problem with the abandonment procedure.
6) The well will be left open for at least 24 hours to allow the grout to set.
7) If the grout has settled no more than 40 feet below ground surface the top of the well will be sealed with bentonite chips, pellets, or additional grouting material will be used. If the grout has settled more than 40 feet, then additional grout will be introduced on top of settled grout through a tremie pipe.
8) Once the grout is set, the soil around the well collar will be excavated so the final plug depth is at least three feet below ground surface. The well casing above that depth will be removed.
9) A concrete plug will be set in place above the top of the casing, along with a steel plate with the permit number, well identification number, and date of plugging.
10) The excavated soil will be replaced into the hole around the abandoned well and into the mud/water retention pit and leveled with the surrounding surface or mounded slightly above it to ensure depressions are not created.
11) The disturbed area will be reseeded with the seed mixture listed in **Table 6.3-1**.
12) A written well abandonment report will be completed and sent to WSEO.

6.3.3 Facility and Road Reclamation

With the exception of any facilities, access roads, or utility corridors required for the operation of others, all of the facilities associated with a specific header house or mine unit will be removed once groundwater restoration in that header house or mine unit has been deemed complete.

The header houses and pump stations will be moved to new locations in others in the Permit Area or dismantled and disposed of in accordance with applicable regulations. Soil will be replaced at each header house or pump station in accordance with the depths and acreages salvaged during construction, as described in more detail in the Hydrologic Testing Proposal and subsequent Test Report submitted to WDEQ-LQD for review and approval prior to development of each mine unit. Soil replacement and reseeding will be done in accordance with the methods described below in **Section 6.6**.

Topsoil will be windrowed along pipeline routes; and buried piping will be excavated. Any contaminated piping will be disposed of at an NRC-licensed facility, and non-contaminated piping will be removed for salvage or for disposal in accordance with applicable regulations. Topsoil along the pipeline route will be re-spread and the disturbed area reseeded with the seed mixture listed in **Table 6.3-1**.

Unless approval for leaving a specific road is obtained for post-mine use, all roads will be reclaimed. Improved or constructed roads will be reclaimed by removal of culverts, removal of road surfacing materials, recontouring, as necessary, preparation of the seed bed, and reseeding in accordance with the procedures outlined below in **Section 6.6**.

Post-reclamation radiological surveys will be conducted in accordance with the methods described below in **Section 6.5**.

6.4 Reclamation and Decommissioning of Processing and Support Facilities

The facilities that require reclamation and decommissioning include:

1) processing and water treatment equipment, which includes tanks, filters, ion-exchange columns, pipes, pumps, and related equipment;
2) buildings and structures, processing facilities, shipping areas, and offices;
3) waste storage, treatment, and disposal facilities, including the UIC Class I wells;
4) buried pipes;

5) engineering control structures, such as dams and culverts; and
6) roads.

With the exception of any facilities, including roads, approved for post-operational use, all of the facilities associated with the Project will be removed once uranium processing operations have been completed. Approval for post-operational use must be supported by the landowners and/or lessees request, and approval from the BLM, which is the surface management agency of the Permit Area, and WDEQ. If any facility, including a road, is left post-operations, the responsibility for long-term maintenance and ultimate reclamation of the facility or road will be transferred to the accepting party.

6.4.1 Preliminary Radiological Surveys and Contamination Control

Throughout the Project, radiation levels of the affected areas and facilities will be monitored for the safety of employees and the environment; and elevated radiation levels will be addressed during the course of the Project. In addition, requirements for spill remediation and similar 'quick response' actions reduce the extent of contamination. Therefore, the need for contamination control prior to reclamation is expected to be confined to the equipment related to uranium concentration and shipping. However, radiological surveys will be conducted prior to dismantling or disposing all of the facilities in accordance with the Program developed for the Project (**Section 5.7**). Records of the surveys will be maintained in accordance with the Program specifications; and any remediation activities necessary prior to further decommissioning will be conducted in accordance with the SOPs for the Project.

Prior to decommissioning, LC ISR, LLC will perform a soil radiometric study in a manner similar to that used to determine baseline conditions (TR Section 2.9.1). In addition to the general survey of the area to be decommissioned, LC ISR, LLC will review the spill records and perform an additional survey in any impacted location. Locations impacted by a spill will be surveyed on a one-meter grid using a properly calibrated instrument capable of detecting activities exceeding the decommissioning standards. As contaminated piping is removed, a survey of the trench will be performed at least every fifteen feet to ensure no spills went undetected. Any soil which does not meet the clean-up criteria will be removed and disposed of at an NRC or Agreement State licensed facility. Soil cleanup will not be complete until the cleanup criteria in 10 CFR 40 Appendix A Criterion 6 are reached. Soil verification Analysis is discussed in Section **6.5.2**.

6.4.2 Removal and Disposal of Equipment and Structures

Prior to demolition of the buildings and structures, all equipment will be decontaminated, if necessary, based on preliminary radiological surveys. Particular attention will be given to equipment and structures in which radiological materials could accumulate, including piping, traps, junctions, and access points. Materials which can be decontaminated may include piping, valving, instrumentation, and various other types of equipment. Decontamination (where possible) will be accomplished by completing a preliminary radiological survey to determine the location and extent of the contamination and to identify any hazards. The preliminary review will be in the form of an alpha survey. The primary step will be to remove loose contamination from the object by use of high pressure washing. If required, secondary decontamination will consist of washing with a dilute acid or equivalent compatible solution. Upon completion of decontamination, a final alpha survey will be performed to insure that the unrestricted release limits noted below are met:

- Removable alpha contamination of 1,000 dpm/100 square cm.
- Average total alpha contamination of 5,000 dpm/100 square cm. over an area no greater than one square meter.
- Maximum total alpha contamination of 15,000 dpm/100 square cm. over an area no greater than 100 square cm.

Equipment which cannot be decontaminated to these standards will be either used on site or sent to an NRC licensed facility for disposal. Those materials meeting the above decontamination standard will be released unrestricted and shipped to the nearest public landfill (Carbon County Landfill).

Radiological materials will either be decontaminated to NRC unrestricted release standards or removed for disposal at an NRC-licensed facility. Processing and water treatment equipment, including tanks, filters, ion exchange columns, pipes, and pumps, will be prepared, including decontamination if necessary, for use at another location or dismantled and disposed of in accordance with applicable regulations. Radiologically contaminated materials will be disposed of at an NRC-licensed facility; and materials contaminated with other industrial constituents will be disposed of at an appropriately licensed facility. Decontaminated and non-contaminated materials will be removed for salvage, disposed of on-site at a designated location and depth, or disposed of at an appropriately licensed solid waste facility. Any materials disposed of on-site will be covered with a minimum of four feet of overburden and topsoil, over any other required cover. The contours of the disposal area shall blend with those of the surrounding area.

Structures will be decontaminated, if necessary, and moved to a new location, salvaged, or dismantled and disposed of on-site at a designated location and depth, or disposed at an appropriately licensed solid waste facility. Concrete flooring, foundations, and foundation materials will be decontaminated, if necessary, broken up, and either buried in place, disposed of at a designated location and depth on-site, or disposed of at an appropriately licensed facility. Any materials disposed of on-site will be covered with a minimum of four feet of overburden and topsoil, over any other required cover. The contours of the disposal area shall blend with those of the surrounding area. All materials to be buried on site must meet material release limits established by the NRC. The RSO will have procedures in place to ensure only releasable materials are buried on site. Material release records will be maintained for all materials, originating from potentially contaminated areas, that are disposed of on site.

10 CFR Part 40, Appendix A, Criterion 2 clearly prohibits disposal of 11(e)(2) material at a site such as Lost Creek, and LC ISR, LLC is not proposing to dispose of 11(e)(2) material at the site. LC ISR, LLC may seek a permit for a "construction" landfill at the site from the Bureau of Land Management and WDEQ. This type of landfill can be used to dispose of wood, brick, plastic, and other construction material. If such a landfill is permitted, only non-contaminated items will be placed in the landfill. Any item which has been in a process area (e.g., the Plant, active header house, or active mine unit) will not be disposed of in the landfill unless it has been surveyed by the Radiation Safety Officer (RSO) or Health Physics Technician and meets the release standards outlined in Section 5.7.6.2 of the TR. If an item may be contaminated and cannot be adequately surveyed due to its shape or other factors, it will be considered contaminated and will be disposed of as 11(e)(2) material at an off-site facility licensed by the NRC or an Agreement State. If an on-site landfill is used, the RSO will ensure a stringent Standard Operating Procedure for usage and maintenance of the landfill is written and implemented with employee training.

Records of equipment decontamination, distribution, disposal, and related decommissioning activities will be maintained in accordance with the specifications of the Program (**Section 5.7**); and any necessary decontamination activities will be conducted in accordance with the SOPs for the Project.

Soil will be replaced at sites from which structures are removed in accordance with the depths and acreages salvaged prior to installation of the structures as described in **Section 3.0** (Proposed Operations). Soil replacement and reseeding will be done in accordance with the methods described below in **Section 6.6**.

6.4.3 Waste Storage, Treatment, and Disposal Facilities

Those facilities for which a separate license has been obtained, e.g., a UIC Class I Well for process water injection, will be transferred to another owner or operator in accordance with applicable requirements or reclaimed in accordance with the separate license requirements.

Any sludge accumulation in the Storage Ponds, the pond liner, and, if necessary, the leak detection equipment will be removed, in accordance with the SOP for handling of contaminated materials, and disposed of at an NRC-licensed facility. The soil underneath the pond will be surveyed for radiological contamination, and any areas in which concentrations exceed limits for unrestricted use will be excavated and the contaminated material disposed of at an NRC-licensed facility. Confirmation surveying and sampling will be conducted in accordance with applicable requirements to ensure all contaminated material has been removed. The area will then be reclaimed in accordance with the procedures outlined above in **Section 6.4.2**.

All other waste facilities will be reclaimed in accordance with the procedures outlined above in **Section 6.4.2**.

6.4.4 Buried Piping and Engineering Control Structures

Buried piping and engineering control structures will be decontaminated and removed. All the reclamation will be done in accordance with the procedures outlined above in **Section 6.4.2**.

6.4.5 Roads

Improved or constructed roads will be reclaimed by removal of culverts, removal of road surfacing and road bed materials, and recontouring, as necessary. Unimproved roads will be recontoured, if necessary, and scarified, ripped, or disced to reduce compaction. The roads will then be reclaimed through preparation of the seed bed and reseeding, in accordance with the procedures outlined below in **Section 6.6**.

6.5 Post-Reclamation and Decommissioning Radiological Surveys

Gamma surveys will be conducted in the Permit Area, at all locations affected by the Project activities, once all of the equipment and facility removal is complete in a given area. As header houses and mine units are reclaimed, the radiological surveys will be conducted prior to reseeding; so if elevated concentrations are found, remedial actions can be taken without jeopardizing revegetation success.

6.5.1 Determination of Site Soil Cleanup Criteria

The pre-existing baseline conditions are presented in **Section 2.9** of this report. Elevated radiation levels resulting from the prior exploration activities and from naturally-occurring conditions will be used in the calculation of appropriate cleanup levels.

The Appendix A cleanup criteria for radium-226 are specified in 10 CFR 40. "Impacted areas" of the site, as defined in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), will be identified based on a "historical" site assessment and characterization survey prior to development of a decommissioning plan. Direct gamma surveys as well as soil sampling protocols will be developed in accordance with the number and extent of impacted areas. The "benchmark approach" will be used to define the cleanup criteria for other radionuclides, as described in Appendix E to NUREG 1569. Impacted soils will be excavated or treated to meet those criteria.

The cleanup criterion for uranium in soil will be determined at the time the decommissioning plan is developed in accordance with Appendix E to NUREG 1569. It is premature to develop the criterion prior to operation of the facility as situations and surrounding land uses might change, and the "benchmark dose" is sensitive to the land use scenarios used in the calculations.

6.5.2 Soil Verification Survey Methodology

A GPS-based gamma radiation survey will be performed of the area to be decommissioned (i.e., mine unit or facility area) using techniques similar to those that were used to determine baseline site conditions. A statistically defensible number of soil samples will be collected throughout the site at varying soil radium-226 concentrations (based on the gamma radiation survey). The soil samples will be analyzed for radionuclides of concern and the results will be plotted against the readings from the area survey. In this manner, a correlation between the two measurement types can be established. If the decommissioning survey reveals any location which appears to approach the decommissioning standard, the baseline background will be subtracted from that location's apparent Ra-226 concentration. If the apparent concentration thus calculated approaches the decommissioning standard, a soil sample will be collected and analyzed to determine actual radionuclide concentrations and to assist in determination of an appropriate remedial action.

The verification survey and final status survey methods will be developed on a statistically valid basis to provide 95 percent confidence that the survey units meet the cleanup guidelines, and those methods will be described in each decommissioning plan.

Several statistical approaches, including but not limited to MARSSIM, will be considered in designing the surveys.

6.5.3 Decommissioning of Non-radiological Hazardous Constituents

During decommissioning, LC ISR, LLC will decommission tanks and piping associated with chemicals which are classified as hazardous (e.g., hydrochloric acid or sulfuric acid). Any remaining bulk quantities of material will be sold to another responsible company or will be transferred to other LC ISR, LLC properties for use. The tanks will then be washed out to remove any residual chemicals, in accordance with appropriate protocols outlined below, and sold or moved to another property for use.

The piping associated with hazardous chemicals will be washed out with water, in accordance with appropriate protocols outlined below. If the piping cannot be re-used by LC ISR, LLC or sold to another company for similar use, the EHS Department shall verify the pipe does not constitute a hazardous material and the piping will be sent to an off-site licensed landfill for disposal. All of the hazardous chemicals proposed for usage at LC ISR, LLC are highly soluble and should be easy to remove from tanks and piping.

All tank and pipe cleaning shall be performed in a manner that is protective of the employees and the environment. A qualified individual in the EHS Department shall review tank and pipe decommissioning plans and operations to ensure operations are carried out in a protective manner. All potentially affected employees shall be trained in the hazards of chemicals and how to protect themselves. Equipment and fluids used for cleaning will be collected and disposed of in accordance with applicable regulations.

All sanitary waste will typically be collected and taken into Rawlins, WY or other nearby town and properly disposed of in a licensed landfill.

As discussed in Section 4.3.1 of the TR, non-radiological hazardous wastes will be stored in accordance with OSHA and EPA requirements and disposed of off-site by a licensed contractor.

6.6 Soil Replacement and Revegetation

Areas in which reclamation will be required within the Permit Area include the mine units, in particular where the header houses and roads have been removed, and the Plant area. Disturbed areas will be reclaimed to the approved post-operations land use by regrading the surface to the approximate pre-operations contour, re-establishing drainages, replacing salvaged soil, and revegetating the areas, in accordance with the procedures outlined below.

6.6.1 Post-Operational Land Use

The post-operations land use will be livestock grazing and wildlife habitat, which is the same as the pre-operations land use. Buildings, roads, wells, or other facilities constructed as part of the Project will be removed and the disturbance reclaimed, unless prior approval in obtained from the NRC and WDEQ to leave the facilities in place to improve post-operational access or land use.

6.6.2 Surface Preparation

Disturbed surfaces will be graded to approximate pre-operational contours and drainage patterns. Seed bed preparation will be performed under appropriate soil and climatic conditions. In areas where soil was not removed but was compacted due to site operations, e.g., two-track roads used to access monitor wells, soils will be scarified, ripped, or disced as necessary to aid in revegetation. In areas where soil was removed, the disturbed areas will be scarified, ripped, or disced as necessary to ensure soil stability after replacement.

6.6.3 Soil Replacement

Soils will be replaced where excavated, whenever possible. Due to the relatively uniform soil characteristics across the site, the similarity of the topsoil and subsoil, and the relative thinness of the topsoil and subsoil, separate handling of the topsoil and subsoil is not required, as described in **Section 3.1.1** of the Operations Plan. The soil thickness will generally be uniform and approximate the disturbance thickness. The replacement will be along the contour, where necessary to prevent soil erosion. To avoid clods, soils will not be replaced when the ground is wet or frozen. The replaced topsoil will be disced to create a proper seed bed.

6.6.4 Seed Mix, Reseeding Methods, and Fencing

The permanent seed mix and seeding rates for revegetation of the Permit Area are provided in **Table 6.3-1**. This seed mix will adequately support the post-operational land uses, livestock grazing and wildlife habitat, and was approved by Mark Newman of the BLM Rawlins Office on November 17, 2006 and by Melissa Bautz of the WDEQ-LQD Lander Field Office on November 3, 2006 (e-mail communications). If any of the approved seed is unavailable or prohibitive in cost at the time of seeding, other locally adapted and certified seed may be substituted with prior approval of BLM and WDEQ-LQD.

Two methods of seeding, pit and broadcast, will be used. Seeding will be performed as a continuous operation when conditions allow. In general, seeding will be completed during the spring or fall, whichever is the first normal period for favorable planting after the seed bed preparation.

Pit seeding will be the primary method. Areas with little gradient will be pit seeded with the rows of pits perpendicular to the direction of the prevailing wind. Where necessary to prevent erosion, pit seeding will be done along the contour. Pit seeding increases the likelihood of successful vegetation in the Permit Area by sheltering seeds from aeolian erosion and capturing moisture in the area of the seed.

Broadcast seeding will be performed on any steep slopes and drainage areas that may be disturbed in the Permit Area. The seed will be distributed uniformly over the area using a mechanical seed spreader.

Immediately after seeding, the areas will be raked or dragged along the contour. This will cover the seeds with approximately one-quarter inch of soil.

Temporary fencing may be installed to restrict access to reseeded areas until vegetation is successfully re-established. The fence specifications follow those of the BLM. Upon demonstration of successful revegetation, the fencing will be removed.

6.6.5 Revegetation Success Criteria

Revegetation shall be deemed complete no earlier than the fifth full growing season after seeding and when:

- the revegetation is self-renewing under the site conditions;
- the total vegetation cover of perennial species (excluding noxious weed species) and any species in the approved seed mix is at least equal to the total vegetation cover of perennial species (excluding noxious weed species) before operations;
- the species diversity and composition are suitable for the post-operational land use; and
- the total vegetation cover and species diversity and composition are quantitatively assessed in accordance with procedures approved by WDEQ-LQD.

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

6.7 Decommissioning Health Physics and Radiation Safety

All decommissioning activities will be conducted in accordance with the same procedures used during ISR operations, as described in the Contaminant Control Program in **Section 5.7.2.**

6.8 Financial Assurance

LC ISR, LLC will establish and maintain appropriate surety arrangements with NRC and WDEQ to cover the costs of groundwater restoration, radiological decontamination, facility decommissioning, and surface reclamation. The surety will be reviewed annually and adjusted to reflect changes in cost and in the Project. The existing surety amount will be automatically extended if NRC has not approved the extension at least 30 days prior to the expiration date. However, it should be noted that per WDEQ requirements, reclamation bonds do not expire, and the bonds for in situ operations are generally held by WDEQ, with the amounts based on review and approval by NRC and WDEQ. LC ISR, LLC also commits to increase the surety arrangement within three months of NRC approval of a revised closure plan which includes an increased surety amount. Again, it should be noted that WDEQ will not approve changes to restoration/reclamation plans *until* any surety amount increase is in place. LC ISR, LLC will provide NRC with a copy of WDEQ's surety review and final surety arrangement.

The Land Quality Division of the WDEQ is the lead agency for approving and holding adequate bonding from LC ISR to cover site decommissioning. WDEQ finds the following types of bonds acceptable: Corporate surety bonds, certificates of deposit that are FDIC insured, Cash, Treasury bills or notes that can be placed on deposit with the state on a non-interest bearing basis, letters of credit, self-bonding, or any combination thereof. ISR LLC is committed to providing bonding acceptable to the state, the BLM and the NRC and will choose the best method from the options available to it. A substantial, if not all, of the requirements will be in some form of cash, whether it is used to secure letters of credit, secure some form of self-funding, purchase securities or make a cash deposit.

The surety estimate for the Project, including surface reclamation of all the facilities and groundwater restoration of the first year of activity, is $6,866,693 based on current US dollars. Restoration costs for additional mine units will be added to the surety as the mine units are brought online. The bond calculation will be updated annually to reflect proposed installations, construction and operations for the upcoming year. A detailed description of this surety estimate is provided in **Table 6.8-1**. The table includes a summary page and a series of worksheets with itemized costs for the reclamation and restoration activities. Each worksheet covers a particular task or associated tasks, such as Building Demolition. Worksheets are provided for:

- Groundwater Restoration,
- Building Demolition (including disposal),
- Pond Reclamation (including disposal of pond materials),
- Well Abandonment,
- Mine Unit Equipment, and
- Topsoil and Revegetation;

along with two worksheets, which provide information on quantities and weights of equipment for the demolition calculations. The Surety will be updated at least 90 days prior to initiating any major construction not previously covered in the bond.

Table 6.1-1 Anticipated Production Zone Water Quality Before Restoration

Parameter	Range (in mg/L unless shown otherwise)	
	Low	High
Sodium (Na)	400	1,000
Calcium (Ca)	20	150
Magnesium (Mg)	2	35
Potassium (K)	5	50
Manganese (Mn)	0.4	2.0
Carbonate (CO_3)	2	40
Bicarbonate (HCO_3)	1,000	2,200
Chloride (Cl)	300	600
Sulfate (SO_4)	100	400
Uranium (as U_3O_8)	1	15
Vanadium (as V_2O_5)	.01	3
Selenium (Se)	.001	.3
Total Dissolved Solids	1,500	3,000
pH in standard units	7.0	9.0
Radium-226	200 pCi/L	2,500 pCi/L

Table 6.3-1 Permanent Seed Mixture

Common Name [1]	Scientific Name	Application (pounds per acre)
Thickspike wheatgrass	*Agropyron dasystacum*	4.0
Slender wheatgrass	*Agropyron trachycaulum*	2.5
Western wheatgrass	*Agropyron smithii*	2.0
Indian ricegrass	*Achnatherum hymenoides*	2.0
Great Basin wildrye	*Leymus cinereus*	2.0
Winterfat	*Ceratoides lanata*	1.5
Sandberg bluegrass	*Poa secunda*	1.5
Big Sagebrush	*Artemesia tridentata*	1.0
TOTAL		**16.5**

[1] Alternative selections if one or two of primary selections (other than Big Sagebrush) are not available: Needle-and-thread (*Stipa comata*); and Bottlebrush squirreltail (*Elymus elymoides*).

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

I GROUNDWATER RESTORATION - Worksheet 1	$3,719,492
II DECOMMISSIONING AND SURFACE RECLAMATION	$1,385,856

A. Plant Equipment Removal and Disposal - Worksheet 2	$73,724
B. Plant Building Demolition and Disposal - Worksheet 3	$331,514
C. Storage Pond Sludge and Liner Handling - Worksheet 4	$405,997
D. Well Abandonment - Worksheet 5	$207,589
E. Wellfield Equipment Removal and Disposal - Worksheet 6	$173,896
F. Topsoil Replacement and Revegetation - Worksheet 7	$72,944
G. Miscellaneous Reclamation Activities - Worksheet 8	$120,193

SUBTOTAL RESTORATION AND RECLAMATION	**$5,105,348**
III TOTAL CONTINGENCY	$1,761,345

Miscellaneous Costs Associated with Third Party Contractors			
Project Design	**2%**	**=**	**$102,107**
Contractor Profit & Mobilization	**8%**	**=**	**$408,428**
Pre-Construction Investigation	**1%**	**=**	**$51,053**
Project Management	**5%**	**=**	**$255,267**
On-Site Monitoring	**0.5%**	**=**	**$25,527**
Site Security & Liability Assurance	**1%**	**=**	**$51,053**
Longterm Administration	**2%**	**=**	**$102,107**
Contingency	**15%**	**=**	**$765,802**

TOTAL RESTORATION AND RECLAMATION	**$6,866,693**

Table 6.8-1 Surety Estimate (Page 2 of 47) (Revised 3/17/2010)

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
Technical Assumptions:			
Wellfield Area (Square Feet)	1,057,797	Proposed area	Data
Wellfield Area (Acres)	24.28		Calculated
Affected Ore Zone Area (Square Feet)	1,057,797	Proposed area affected	Data
Average Completed Thickness (Feet)	12.0	Proposed thickness	Data
Affected Volume:			
Factor For Vertical Flare	20%	Vertical flare estimate	Estimated
Factor For Horizontal Flare	20%	Horizontal flare estimate	Estimated
Total Volume (Cubic Feet)	18,278,732	= Area * Thickness * Vertical flare * Horizontal flare	Calculated
Porosity	25.0%	Typical value for host sand	Data
Gallons Per Cubic Foot	7.48	Conversion factor	Constant
Gallons Per Pore Volume	34,181,229	= Volume * Porosity * gal/ft³	Calculated
Number of Wells in Unit(s)			
Production Wells	120	Proposed well count	Data
Injection Wells	208	Proposed well count	Data
Monitor Wells	69	Proposed well count	Data
Average Well Spacing (Feet)	95	Proposed well spacing	Data
Average Well Depth (Feet)	410	Proposed well depth	Data

Table 6.8-1 **Surety Estimate (Page 3 of 47)** (Revised 3/17/2010)

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
I GROUNDWATER SWEEP			
A. PLANT & OFFICE			
Operating Assumptions:			
Flow Rate (Gallons per Minute)	40	Planned flow	Data
Pore Volumes Required	0.3	Required value	Data
Total Gallons For Treatment	10,254,369	= Gallons per Pore Volume * Number of Pore Volumes	Calculated
Total Kilogallons for Treatment	10,254		Calculated
Cost Assumptions:			
Power			
Average Connected Horsepower	20	Proposed pump horsepower	Data
Kilowatt-hours per Horsepower	0.746		Conversion Factor
Cost per Kilowatt-hour	$0.060	Estimate based on supplier	Unit Rate
Gallons per Minute	40	Planned rate	Data
Gallons per Hour	2400		Calculated
Cost per Hour	$0.90		Calculated
Cost per Gallon	$0.00037		Calculated
Cost per Kilogallon	$0.373		Calculated
Chemicals			
Antiscalent (Cost per Kilogallon)	$0.120	Based on required dosage/estimated cost	Unit Rate
Repair & Maintenance (Cost per Kilogallon)	$0.035	Estimate	Unit Rate
Analysis (Cost per Kilogallon)	$0.030	On-site laboratory analysis	Unit Rate

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
I GROUNDWATER SWEEP (continued)			
A. PLANT & OFFICE (continued)			
Total Cost per Kilogallon	$0.558		Calculated
Total Treatment Cost	$5,722		Calculated
Utilities			
Power (Cost per Month)	$225	Estimate	Unit Rate
Propane (Cost per Month)	$225	Estimate	Unit Rate
Time for Treatment			
Minutes for Treatment	256,359	=Total Gallons for Treatment Divided by Flow Rate (gpm)	Calculated
Hours for Treatment	4,273		Calculated
Days for Treatment	178		Calculated
Average Days per Month	30.4		Calculated
Months for Treatment	5.9		Calculated
Utilities Cost	$2,634		Calculated
TOTAL PLANT & OFFICE COST	$8,356		

Table 6.8-1 **Surety Estimate (Page 5 of 47)** (Revised 3/17/2010)

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
I GROUNDWATER SWEEP (continued)			
B. WELLFIELD			
Cost Assumptions:			
Power			
Average Flow per Pump (Gallons per Minute	32	Estimate from pumping	Data
Average Horsepower per Pump	7.50	Estimate from pumping	Data
Average Number of Pumps Required	1.3	Estimate from pumping	Data
Average Connected Horsepower	14.4	Pumps plus 5 horsepower for HH	Data
Kilowatt-hours per Horsepower	0.746		Conversion Factor
Cost per Kilowatt-hour	$0.060	Estimate based on supplier	Unit Rate
Gallons per Minute	40	Planned flow	Data
Gallons per Hour	2400		Calculated
Cost per Hour	$0.64		Calculated
Cost per Gallon	$0.0003		Calculated
Cost per Kilogallon	0.268		Calculated
Repair & Maintenance (Cost per Kilogallon)	$0.115	Estimate	Unit Rate
Total Cost per Kilogallon	$0.383		Calculated
TOTAL WELLFIELD COST	$3,928		Calculated
TOTAL GROUNDWATER SWEEP COST	$12,284		Calculated

Table 6.8-1 Surety Estimate (Page 6 of 47) (Revised 3/17/2010)

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
II REVERSE OSMOSIS			
A. PLANT & OFFICE			
Operating Assumptions:			
Flow Rate (Gallons per Minute)	760	Estimate from pumping	Data
Pore Volumes Required	6.0	Required value	Data
Total Gallons for Treatment	205,087,375	= Gallons per Pore Volume * Number of Pore Volumes	Calculated
Total Kilogallons for Treatment	205,087		Calculated
Feed to Reverse Osmosis Unit (Gallons per Minute)	760	Planned flow	Data
Permeate Flow (Gallons per Minute)	570	= Planned Flow * Average Reverse Osmosis Recovery	Calculated
Brine Flow (Gallons per Minute)	190	= Planned Flow - Permeate Flow	Calculated
Average Reverse Osmosis Recovery	75.0%	Reverse Osmosis Design	Data
Cost Assumptions:			
Power			
Average Connected Horsepower	300.00	Average value for each area	Data
Kilowatt-hours per Horsepower	0.746		Conversion Factor
Cost per Kilowatt-hour	$0.060	Estimate based on supplier	Unit Rate
Gallons per Minute	760	Planned flow	Data
Gallons per Hour	45600		Calculated
Cost per Hour	$13.43		Calculated
Cost per Gallon	$0.00029		Calculated
Cost per Kilogallon	$0.294		Calculated
Chemicals			
Sulfuric Acid (Cost per Kilogallon)	$0.090	Estimate	Unit Rate
Caustic Soda (Cost per Kilogallon)	$0.023	Estimate	Unit Rate
Reductant (Cost per Kilogallon)	$0.113	Estimate	Unit Rate
Antiscalent (Cost per Kilogallon)	$0.124	Based on required dosage/estimated cost	Unit Rate
Repair & Maintenance (Cost per Kilogallon)	$0.068	Estimate	Unit Rate
Sampling & Analysis (Cost per Kilogallon)	$0.030	Estimate	Unit Rate

Table 6.8-1 Surety Estimate (Page 7 of 47) (Revised 3/17/2010)

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
II REVERSE OSMOSIS (continued)			
A. PLANT & OFFICE (continued)			
Total Cost per Kilogallon	$0.742		Calculated
Total Pumping Cost	$152,169		Calculated
Utilities			
Power (Cost per Month)	$560	Estimate	Unit Rate
Propane (Cost per Month)	$225	Estimate	Unit Rate
Time for Treatment			
Minutes for Treatment	269,852		Calculated
Hours for Treatment	4,498		Calculated
Days for Treatment	187		Calculated
Average Days per Month	30.4		Calculated
Months for Treatment	6.2		Calculated
Utilities Cost	$4,867		Calculated
TOTAL PLANT & OFFICE COST	$157,036		Calculated

Table 6.8-1 Surety Estimate (Page 8 of 47) (Revised 3/17/2010)

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
II REVERSE OSMOSIS (continued)			
B. WELLFIELD			
Cost Assumptions:			
Power			
Average Flow per Pump (Gallons per Minute)	32.00	Average value for each area	Data
Average Horsepower per Pump	7.50	Average value for each area	Data
Average Number of Pumps Required	23.8	Average value for each area	Data
Average Connected Horsepower	188.1	Pump horsepower plus 10 horsepower	Calculated
Kilowatt-hours per Horsepower	0.746		Conversion Factor
Cost per Kilowatt-hour	$0.060	Estimate based on supplier	Unit Rate
Gallons per Minute	760	Planned flow	Data
Gallons per Hour	45,600		Calculated
Cost per Hour	$8.42		Calculated
Cost per Gallon	$0.0002		Calculated
Cost per Kilogallon	$0.185		Calculated
Repair & Maintenance (Cost per Kilogallon)	$0.115	Estimate	Unit Rate
Total Cost per Kilogallon	$0.300		Calculated
TOTAL WELLFIELD COST	$61,456		Calculated
TOTAL REVERSE OSMOSIS COST	$218,493		Calculated

Table 6.8-1 Surety Estimate (Page 9 of 47) (Revised 3/17/2010)

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
III RECIRCULATION			
A. WELLFIELD			
Cost Assumptions:			
Power			
Average Flow per Pump (Gallons per Minute)	32	Estimate from pumping	Data
Average Horsepower per Pump	7.50	Estimate from pumping	Data
Average Number of Pumps Required	120.0	Estimate from pumping	Data
Average Connected Horsepower	905.0	Pumps plus 5 horsepower for HH	Data
Kilowatt-hours per Horsepower	0.746		Conversion Factor
Cost per Kilowatt-hour	0.060	Estimate based on supplier	Unit Rate
Gallons per Minute	3840	Planned flow	Data
Gallons per Hour	230400		Calculated
Cost per Hour	$40.51		Calculated
Cost per Gallon	$0.0002		Calculated
Cost per Kilogallon	0.176		Calculated
Repair & Maintenance (Cost per Kilogallon)	$0.115	Estimate	Unit Rate
Total Cost per Kilogallon	$0.291		Calculated
TOTAL WELLFIELD RECIRCULATION COST	$9,940		Calculated

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
IV WASTE DISPOSAL WELL			
Operating Assumptions:			
Annual Evaporation Capacity (Gallons)	0		Data
Average Monthly Evaporation Capacity (Gallons)	0		Calculated
Total Disposal Requirement			
Reverse Osmosis Brine (Total Gallons)	51,271,844	=Treatment Gallons * (1- Reverse Osmosis Recovery)	Calculated
Reverse Osmosis Brine (Total Kilogallons)	51,272		Calculated
Brine Concentration Factor	50%	Reverse Osmosis Design	Data
Total Concentrated Brine (Gallons)	25,635,922	= Reverse Osmosis Brine Gallons * Brine Concentration Factor	Calculated
Months of RO Operation	6.2		Calculated
Average Monthly Requirement (Gallons)	4,134,826	=Total Concentrated Brine / Months of Reverse Osmosis Operation	Calculated
Monthly Balance for DDW (Gallons)	4,134,826	=Average Monthly Requirement - Average Monthly Evaporation	Calculated
Total WDW Disposal (Gallons)	25,635,922		Calculated
Total WDW Disposal (Kilogallons)	25,636		Calculated
Cost Assumptions:			
Power			
Average Connected Horsepower	100.0	Estimate	Data
WDW Average Connected Horsepower	300.0	Estimate	Data
Kilowatt-hours per Horsepower	0.746		Conversion Factor
Cost per Kilowatt-hour	$0.060	Estimate based on supplier	Unit Rate
Gallons per Minute	115.0	Planned flow	Data
Gallons per Hour	6900		Calculated
Cost per Hour	$17.90		Calculated
Cost per Gallon	$0.0026		Calculated
Cost per Kilogallon	$2.595		Calculated

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
IV WASTE DISPOSAL WELL (continued)			
Chemicals			
Reverse Osmosis Antiscalent (Cost per Kilogallon)	$0.225	Based on required dosage and cost	Unit Rate
WDW Antiscalent (Cost per Kilogallon)	$0.254	Based on required dosage and cost	Unit Rate
Sulfuric Acid (Cost per Kilogallon)	$0.315	Estimate	Unit Rate
Corrosion Inhibitor	$0.244	Estimate	Unit Rate
Repair & Maintenance (Cost per Kilogallon)	$0.130	Estimate	Unit Rate
Total Cost per Kilogallon	$3.762		Calculated
TOTAL WASTE DISPOSAL WELL COST	$96,450		Calculated

Assumptions/Items	Mine Unit No. 1	Explanation	Source
V STABILIZATION MONITORING			
Operating Assumptions:			
Time of Stabilization (Months)	9	Time frame required	Data
Frequency of Analysis (Months)	3	Required sampling	Data
Total Sets of Analysis	4	Required sampling	Data
Cost Assumptions:			
Power (Cost per Month)	$1,125	Estimate	Unit Rate
Total Power Cost	$10,125		Calculated
Sampling & Analysis (Cost per Set)	$4,050	Estimate	Unit Rate
Total Sampling & Analysis Cost	$16,200		Calculated
Utilities (Cost per Month)	$2,250	Estimate	Unit Rate
Total Utilities Cost	$20,250		Calculated
TOTAL STABILIZATION COST	$46,575		Calculated

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items					Mine Unit No. 1	Explanation	Source
VI LABOR							
Cost Assumptions							
	Crew Numbers	Cost per Hour	Total Hours	Crew	Cost		
	1	$50.00	7280	Project Manager	$364,000	Anticipated operations crew	Data
	1	$40.00	7280	Supervisor/RSO	$291,200	Anticipated operations crew	Data
	1	$30.00	7280	EHS Tech	$218,400	Anticipated operations crew	Data
	1	$30.00	4160	Sampler	$124,800	Anticipated operations crew	Data
	8	$30.00	2600	Plant and Field Operators	$624,000	Anticipated operations crew	Data
	1	$30.00	4160	Chemist	$124,800	Anticipated operations crew	Data
	1	$30.00	7280	Maintenance	$218,400	Anticipated operations crew	Data
	1	$30.00	7280	Office Support	$218,400	Anticipated operations crew	Data
	1	$30.00	7280	Equipment Operator	$218,400	Anticipated operations crew	Data
	4	$30.00	2773	Reclamation Laborer	$332,760	Anticipated operations crew	Data
	1	$35.00	5200	Foreman	$182,000	Anticipated operations crew	Data
	4	$13.50	2080	Vehicles	$112,320	Anticipated operations crew	Data
TOTAL RESTORATION LABOR COST					$3,029,480		

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

LOST CREEK ISR, LLC GROUNDWATER RESTORATION - WORKSHEET 1

Assumptions/Items	Mine Unit No. 1	Explanation	Source
SUMMARY:			
I GROUNDWATER SWEEP	$12,284		
II REVERSE OSMOSIS	$218,493		
III RECIRCULATION	$9,940		
IV WASTE DISPOSAL WELL	$96,450		
V STABILIZATION	$46,575		
VI LABOR	$3,029,480		
VII CAPITAL	$306,270		
TOTAL GROUNDWATER RESTORATION COST	**$3,719,492**		

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

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

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

Assumptions/Items	Plant	Header Houses	Drill Shed	Total	Explanation	Source
I STRUCTURE DEMOLITION & DISPOSAL						
Structural Character	2-Story Steel Frame	1-Story Pre-Fab. (6)	1-Story Pole Barn			
Demolition Volume (Cubic Feet)	1,248,000	19,620	22,400		Estimated volume of structures	Data
Demolition Cost per Cubic Foot	$0.1474	$0.1474	$0.0737			Unit Rate
Demolition Cost	$183,955	$2,892	$1,651	$188,498		Calculation
Factor For Gutting	20.0%	10.0%	10.0%			Data
Gutting Cost	$36,791	$289	$165	$37,245		Calculation
Weight (Pounds)	196,750	99,000	15,000		Estimated weight of building components	Data

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

Assumptions/Items	Plant	Header Houses	Drill Shed	Total	Explanation	Source
Weight per Truck Load	40,000	40,000	40,000		Typical load for shipping	Data
Number of Truck Loads	4.9	2.5	0.4			Calculation
Distance to Landfill	48	48	48		Distance to landfill	Data
Cost per Mile	$2.90	$2.90	$2.90		Current transport rate	Unit Rate
Transportation Cost	$685	$345	$52	$1,081		
Disposal Cost per Ton	$40.20	$40.20	$40.20		Landfill fee	Unit Rate
Disposal Cost	$3,955	$1,990	$302	$6,246		Calculation
TOTAL STRUCTURE DEMOLITION & DISPOSAL COST	$225,386	$5,516	$2,170	$233,071		Calculation

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

Assumptions/Items	Plant	Header Houses	Drill Shed	Total	Explanation	Source
II CONCRETE DECONTAMINATION, DEMOLITION & DISPOSAL						
Area (Square Feet)	30,050	283	565		Building concrete area	Data
Average Thickness (Feet)	1	1.0	0.3			Data
Volume (Cubic Feet)	30,050	283	141			Calculation
Percent Requiring Decontamination	75.0%	50.0%	0.0%			Data
Percent Decontaminated	75.0%	75.0%	0.0%			Data
Decontamination (Cost per Square Foot)	$0.191	$0.191	$0.191			Unit Rate
Decontamination Cost	$4,305	$41	$0	$4,345		Calculation
Demolition (Cost per Square Foot)	$2.124	$2.124	$0.100			Unit Rate
Demolition Cost	$63,826	$601	$57	$64,484		Calculation
Transportation & Disposal						
A. On-Site Disposal						
Percent to be Disposed On-Site	90%	90%	100%			Data
Transportation Cost	$0	$0	$0			Data
Disposal Cost per Cubic Foot	$0.055	$0.055	$0.055			Unit Rate
Disposal Cost	$1,487	$14	$8	$1,509		Calculation
B. Licensed Site						
Percent to be Shipped	10%	10%	0%			Calculation
Distance (Miles)	105	105	105			Data
Cost per Mile	$2.90	$2.90	$2.90		Current transport rate	Unit Rate
Transportation Cost	$1,694	$16	$0	$1,710		Calculation
Disposal Cost per Cubic Foot	$4.16	$4.16	$4.16			Unit Rate
Volume per Truck Load (Cubic Yards)	20	20	20			Data
Volume per Truck Load (Cubic Feet)	540	540	540			Calculation
Disposal Cost	$12,501	$118	$0	$12,619		Calculation
TOTAL CONCRETE DECONTAMINATION, DEMOLITION & DISPOSAL COST	$83,814	$789	$64	$84,667		Calculation

Table 6.8-1 **Surety Estimate (Page 17 of 47)** (Revised 3/17/2010)

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

Assumptions/Items	Plant	Header Houses	Drill Shed	Total	Explanation	Source
III SOIL REMOVAL & DISPOSAL						
Front End Loader Cost per Hour	$50	$50	$50	$50		
Time with Front End Loader (Hours)	16	6	1	23		
Cost of Front End Loader	$800	$300	$50	$1,150	Assume removal of 3" of Contaminated	Data
Volume to be Shipped (Cubic Feet)	2504	71	0		Soil Under Headers, 1" under Plant,	Data
Distance (Miles)	105	105	105		Disposal at a Licensed Facility	Data
Cost per Mile	$2.90	$2.90	$2.90			Unit Rate
Transportation Cost	$1,412	$40	$0	$1,452		Calculation
Disposal Fee per Cubic Foot	$4.16	$4.16	$4.16			Unit Rate
Quantity per Truck Load (Cubic Feet)	540	540	540			Data
Disposal Cost	$10,417	$294	$0	$10,712		Calculation
TOTAL SOIL REMOVAL & DISPOSAL COST	$12,629	$634	$50	$13,314		Calculation
IV RADIATION SURVEY						
Area Required (Acres)	0.69	0.01	0.01			Data
Survey Cost per Acre	$653.00	$653.00	$653.00			Unit Rate
TOTAL RADIATION SURVEY COST	$450	$4	$8	$462		Calculation
TOTAL PLANT BUILDING DEMOLITION AND DISPOSAL COST	**$322,279**	**$6,943**	**$2,292**	**$331,514**		Calculation

Table 6.8-1 Surety Estimate (Page 18 of 47) (Revised 3/17/2010)

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

Assumptions/Items	Pond 1 Storage	Pond 2 Storage	Total	Explanation	Source
I POND SLUDGE					
Average Sludge Depth (Feet)	0.250	0.250			Data
Average Sludge Area (Square Feet)	40,300	40,300			Data
Sludge Volume (Cubic Feet)	10,075	10,075			Calculated
Sludge Volume (Cubic Yards)	373	373			Calculated
Sludge Volume per Truck Load (Cubic Yards)	20.0	20.0			Data
Number of Sludge Truck Loads	18.7	18.7			Calculated
Sludge Handling Cost Per Load	$268.00	$268.00			Unit Rate
Total Sludge Handling Cost	$5,012	$5,012	$10,023		Calculated
Transportation & Disposal					
Percent to be Shipped	100.0%	100.0%			Data
Distance (Miles)	105	105			Data
Cost per Mile	$2.90	$2.90			Unit Rate
Transportation Cost	$5,694	$5,694			Calculated
Disposal Cost per Cubic Foot	$12.38	$12.38			Unit Rate
Volume per Truck Load (Cubic Yards)	20.0	20.0			Data
Volume per Truck Load (Cubic Feet)	540	540			Calculated
Disposal Cost	$125,013	$125,013			Calculated
Total Transportation & Disposal Cost	$130,707	$130,707	$261,414		Calculated
TOTAL POND SLUDGE COST	$135,719	$135,719	$271,438		Calculated

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

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

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

Assumptions/Items	Pond 1 Storage	Pond 2 Storage	Total	Explanation	Source
III POND BACKFILL					
Backfill Required (Cubic Yards)	10,448	10,448			Data
Backfill Cost per Cubic Yard	$1.13	$1.13			Unit Rate
TOTAL POND BACKFILL COST	$11,806	$11,806	$23,612		Calculated
IV RADIATION SURVEY					
Areal required (Acres)	1.02	1.02			Data
Survey Cost per Acre	$653.00	$653.00			Unit Rate
TOTAL RADIATION SURVEY COST	$665	$665	$1,330		Calculated
V LEAK DETECTION SYSTEM REMOVAL					
Gravel and Piping Volume (Cubic Feet)	10075	10075		Assume 3 inches	Data
Volume per Truck Load (Cubic Feet)	540	540			Data
Loads to be Shipped	18.7	18.7			Calculated
Distance (Miles)	105	105			Data
Cost per Mile	$2.90	$2.90			Unit Rate
Transportation Cost	$5,681	$5,681			Calculated
Handling Cost	$5,038	$5,038			Unit Rate (Imbedded)
Disposal Fee per Cubic Foot	$4.16	$4.16			Unit Rate
Disposal Cost	$41,912	$41,912			Calculated
TOTAL LEAK DETECTION SYSTEM REMOVAL COST	$52,631	$52,631	$105,261		Calculated
TOTAL POND RECLAMATION COST	**$202,998**	**$202,998**	**$405,997**		Calculated

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

Assumptions/Items	Mine Unit No. 1	Explanation	Source
Number of Wells	397		Data
Average Depth (Feet)	410		Data
Average Diameter (Inches)	4.328		Data
I MATERIALS			
Class G Neat Cement Required (Cubic Feet per Well)	41.9		Data
Cement Sacks Required per Well	32.7	15 ppg Class G cement requires 6 gallons water per sack cement and 1-1/2% bentonite by weight	Data
Cement Sack Cost	$14.43		Unit Rate
Cement Cost per Well	$472.22		Calculated
Bentonite Sacks Required per Well	0.9		Data
Bentonite Bag Cost	$2.90		Unit Rate
Bentonite Cost per Well	$2.68		Calculated
TOTAL MATERIALS COST PER WELL	$474.89		Calculated
II LABOR (INCLUDED IN WORKSHEET 1)			
Hours Required per Well	0.0		Data
Labor Cost per Hour	$0.00		Unit Rate
TOTAL LABOR COST PER WELL	$0.00		Calculated
III EQUIPMENT RENTAL			
Hours Required per Well	1.0		Data
Backhoe with Operator Cost per Hour	$48.00		Unit Rate
Total Equipment Cost per Well	$48.00		Calculated
TOTAL EQUIPMENT COST PER WELL	$522.89		Calculated
TOTAL WELL ABANDONMENT COST	**$207,589**		Calculated

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

Assumptions/Items	Mine Unit No. 1	Source
I WELLFIELD PIPING		
A. Removal		
Surface Length per Well (Feet)	250	
Downhole Length per Well (Feet)	350	
Total Number of Wells	328	
Total Length (Feet)	196,800	Calculated
Cost of Removal per Foot	$0.109	Unit Rate
Cost of Removal	$21,353	Calculated
Average OD (Inches)	1.6	
Chipped Volume Reduction (Cubic Feet per Foot)	0.008	Unit Rate
Chipped Volume (Cubic Feet)	1,574	Calculated
Volume per Truck Load (Cubic Feet)	540	
Total Number of Truck Loads	2.9	Calculated
B. Survey & Decontamination		
Percent Requiring Decontamination	0%	
Number of Decontamination Loads	0.0	Calculated
Decontamination Cost per Load	$620.00	Unit Rate
Decontamination Cost	$0	Calculated
C. Transport & Disposal		
Landfill		
Transportation		
Percent to be Shipped	0.0%	
Loads to be Shipped	0.0	Calculated
Distance (Miles)	48	
Transportation Cost per Mile	$2.90	Unit Rate
Transportation Cost	$0	Calculated
Disposal		
Disposal Fee per Cubic Yard	$13.50	Unit Rate
Load Volume (Cubic Yards)	20	
Disposal Cost	$0	Calculated
Total Landfill Cost	$0	Calculated

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

Assumptions/Items	Mine Unit No. 1	Source
I WELLFIELD PIPING (continued)		
C. Transport & Disposal (continued)		
Licensed Site		
Transportation		
Percent to be Shipped	100.0%	Calculated
Loads to be Shipped	2.9	Calculated
Distance (Miles)	105	
Transportation Cost per Mile	$2.90	Unit Rate
Transportation Cost	$883	Calculated
Disposal		
Disposal Fee per Cubic Foot	$12.38	Unit Rate
Disposal Fee per Cubic Yard	$334.26	Calculated
Load Volume (Cubic Yards)	20	
Disposal Cost	$19,387	Calculated
Total Licensed Site Cost	$20,270	Calculated
Total Transport & Disposal Cost	$20,270	Calculated
TOTAL WELLFIELD PIPING REMOVAL & DISPOSAL COST	$41,623	Calculated
II PRODUCTION WELL PUMPS		
A. Pump and Tubing Removal		
Number of Production Wells	120	
Removal Cost per Well	$12.07	Unit Rate
Removal Cost	$1,448	Calculated
Number of Pumps per Truck Load	180	
Number of Truck Loads (Pumps)	0.7	Calculated
B. Survey & Decontamination (Pumps)		
Percent Requiring Decontamination	0.0%	
Number of Decontamination Truck Loads	0.0	Calculated
Decontamination Cost per Load	$0.00	Unit Rate
Decontamination Cost	$0	Calculated

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

Assumptions/Items	Mine Unit No. 1	Source
II PRODUCTION WELL PUMPS (continued)		
C. Tubing Volume Reduction & Loading		
Length per Well (Feet)	360	
Total Length (Feet)	43,200	Calculated
Removal Cost per Foot	$0.014	Unit Rate
Removal Cost	$583	Calculated
Average OD (Inches)	2.0	
Chipped Volume Reduction (Cubic Feet per Foot)	0.012	
Chipped Volume (Cubic Feet)	518	Calculated
Volume per Truck Load (Cubic Feet)	540	
Number of Truck Loads	1.0	Calculated
D. Transport & Disposal		
Landfill		
Transportation		
Percent to be Shipped (Pumps)	100.0%	
Loads to be Shipped	0.7	Calculated
Distance (Miles)	48	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$97	Calculated
Disposal		
Disposal Fee per Cubic Yard	$13.50	Unit Rate
Load Volume (Cubic Yards)	20	
Disposal Cost	$189	Calculated
Total Landfill Cost	$286	Calculated
Licensed Site		
Transportation		
Percent to be Shipped (Pumps)	0.0%	
Percent to be Shipped (Tubing)	100.0%	
Loads to be Shipped	1.0	Calculated
Distance (Miles)	105	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$292	Calculated

Table 6.8-1 **Surety Estimate (Page 25 of 47)** (Revised 3/17/2010)

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

Assumptions/Items	Mine Unit No. 1	Source
II PRODUCTION WELL PUMPS (continued)		
D. Transport & Disposal (continued)		
Licensed Site (continued)		
Disposal		
Disposal Cost per Cubic Foot	$12.38	Unit Rate
Disposal Fee per Cubic Yard	$334.26	Calculated
Load Volume (Cubic Yards)	20	
Disposal Cost	$6,418	Calculated
Total Licensed Site Cost	$6,710	Calculated
Total Transport & Disposal Cost	$6,997	Calculated
TOTAL PRODUCTION WELL PUMP REMOVAL & DISPOSAL COST	$9,028	Calculated
III SURFACE TRUNKLINE PIPING		
A. Removal		
Total Length (Feet)	0	
Removal Cost per Foot	$0.081	Unit Rate
Removal Cost	$0	Calculated
Average OD (Inches)	8.750	
Chipped Volume Reduction (Cubic Feet per Foot)	0.088	Unit Rate
Chipped Volume (Cubic Feet)	0	Calculated
Volume per Truck Load (Cubic Feet)	540	
Total Number of Truck Loads	0.0	Calculated
B. Survey & Decontamination		
Percent Requiring Decontamination	0.0%	
Number of Decontamination Truck Loads	0.0	Calculated
Decontamination Cost per Load	$0.00	Unit Rate
Decontamination Cost	$0	Calculated

Table 6.8-1 **Surety Estimate (Page 26 of 47)** (Revised 3/17/2010)

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

Assumptions/Items	Mine Unit No. 1	Source
III SURFACE TRUNKLINE PIPING (continued)		
C. Transport & Disposal		
Landfill		
Transportation		
Percent to be Shipped	0.0%	
Loads to be Shipped	0.0	Calculated
Distance (Miles)	48	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$0	Calculated
Disposal		
Disposal Fee per Cubic Yard	$13.50	Unit Rate
Load Volume (Cubic Yards)	20	
Disposal Cost	$0	Calculated
Total Landfill Cost	$0	Calculated
Licensed Site		
Transportation		
Percent to be Shipped	100.0%	Calculated
Loads to be Shipped	0.0	Calculated
Distance (Miles)	105	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$0	Calculated
Disposal		
Disposal Cost per Cubic Foot	$12.38	Unit Rate
Disposal Fee per Cubic Yard	$334.26	Calculated
Load Volume (Cubic Yards)	20	
Disposal Cost	$0	Calculated
Total Licensed Site Cost	$0	Calculated
Total Transport & Disposal Cost	$0	Calculated
TOTAL SURFACE TRUNKLINE PIPING REMOVAL & DISPOSAL COST	$0	Calculated

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

Assumptions/Items	Mine Unit No. 1	Source
IV BURIED TRUNKLINE		
A. Removal		
Total Length (Feet)	24,304	
Removal Cost per Buried Foot	$1.58	Unit Rate
Removal Cost	$19,139	Calculated
Average OD (Inches)	9.635	
Chipped Volume Reduction (Cubic Feet per Foot)	0.309	Unit Rate
Chipped Volume (Cubic Feet)	7,510	Calculated
Volume per Truck Load (Cubic Feet)	540	
Number of Truck Loads	13.9	Calculated
B. Survey & Decontamination		
Percent Requiring Decontamination	0.0%	
Number of Decontamination Truck Loads	0.0	Calculated
Decontamination Cost per Load	$0.00	Unit Rate
Decontamination Cost	$0	Calculated
C. Transport & Disposal		
Landfill		
Transportation		
Percent to be Shipped	0.0%	
Loads to be Shipped	0.0	Calculated
Distance (Miles)	48	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$0	Calculated
Disposal		
Disposal Fee per Cubic Yard	$13.50	Unit Rate
Load Volume (Cubic Yards)	20	
Disposal Cost	$0	Calculated
Total Landfill Cost	$0	Calculated

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

Assumptions/Items	Mine Unit No. 1	Source
IV BURIED TRUNKLINE (continued)		
C. Transport & Disposal (continued)		
Licensed Site		
Transportation		
Percent to be Shipped	100.0%	Calculated
Loads to be Shipped	13.9	Calculated
Distance (Miles)	105	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$4,233	Calculated
Disposal		
Disposal Cost per Cubic Foot	$12.38	Unit Rate
Disposal Fee per Cubic Yard	$334.26	Calculated
Load Volume (Cubic Yards)	20	
Disposal Cost	$92,924	Calculated
Total Licensed Site Cost	$97,157	Calculated
Total Transport & Disposal Cost	$97,157	Calculated
TOTAL BURIED TRUNKLINE REMOVAL & DISPOSAL COST	$116,296	Calculated
V MANHOLES		
A. Removal		
Total Quantity	9	
Removal Cost per Manhole	$73.16	Unit Rate
Removal Cost	$658	Calculated
Quantity per Truck Load	10	
Number of Truck Loads	0.9	Calculated
B. Survey & Decontamination		
Percent Requiring Decontamination	0.0%	
Number of Decontamination Truck Loads	0.0	Calculated
Decontamination Cost per Load	$0.00	Unit Rate
Decontamination Cost	$0	Calculated

Table 6.8-1 **Surety Estimate (Page 29 of 47)** (Revised 3/17/2010)

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

Assumptions/Items	Mine Unit No. 1	Source
V MANHOLES (continued)		
C. Transport & Disposal		
Landfill		
Transportation		
Percent to be Shipped	0.0%	
Loads to be Shipped	0.0	Calculated
Distance (Miles)	48	Unit Rate
Cost per Mile	$2.90	Calculated
Transportation Cost	$0	
Disposal		
Disposal Fee per Cubic Yard	$13.50	Unit Rate
Load Volume (Cubic Yards)	20	
Disposal Cost	$0	Calculated
Total Landfill Cost	$0	Calculated
Licensed Site		
Transportation		
Percent to be Shipped	100.0%	Calculated
Loads to be Shipped	0.9	Calculated
Distance (Miles)	105	
Cost per Mile	$2.90	Unit Rate
Transportation Cost	$274	Calculated
Disposal		
Disposal Cost per Cubic Foot	$12.38	Unit Rate
Disposal Fee per Cubic Yard	$334.26	Calculated
Load Volume (Cubic Yards)	20	
Disposal Cost	$6,017	Calculated
Total Licensed Site Cost	$6,291	Calculated
Total Transport & Disposal Cost	$6,291	Calculated
TOTAL MANHOLE REMOVAL & DISPOSAL COST	$6,949	Calculated
TOTAL WELLFIELD EQUIPMENT REMOVAL AND DISPOSAL COST	**$173,896**	Calculated

Table 6.8-1 **Surety Estimate (Page 30 of 47)** (Revised 3/17/2010)

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

Assumptions/Items	Mine Unit No. 1	Source
I PLANT		
A. Topsoil Handling & Grading		
Affected Area (Acres)	5.0	
Average Affected Thickness (Inches)	12.0	
Topsoil Volume (Cubic Yards)	8,067	Calculated
Hauling/Placement Cost per Cubic Yard	$1.13	Unit Cost
Topsoil Handling Cost	$9,115	Calculated
Grading Cost per Acre	$56.28	Unit Cost
Grading Cost	$281	Calculated
Total Topsoil Handling & Grading Cost	$9,397	Calculated
B. Radiation Survey & Soil Analysis		
Survey & Analysis Cost per Acre	$653.00	Unit Cost
Total Survey & Analysis Cost	$3,265	Calculated
C. Revegetation		
Fertilizer Cost per Acre	$52.33	Unit Cost
Seeding Preparation & Seeding Cost per Acre	$189.85	Unit Cost
Mulching & Crimping Cost per Acre	$311.25	Unit Cost
Total Revegetation Cost per Acre	$553.43	Calculated
Total Revegetation Cost	$2,767	Calculated
TOTAL PLANT COST	$15,429	Calculated

Table 6.8-1 Surety Estimate (Page 31 of 47) (Revised 3/17/2010)

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

Assumptions/Items	Mine Unit No. 1	Source
II PONDS		
A. Topsoil Handling & Grading		
Affected Area (Acres)	5.0	
Average Affected Thickness (Inches)	12	
Topsoil Volume (Cubic Yards)	8,067	Calculated
Hauling/Placement Cost per Cubic Yard	$1.13	Unit Cost
Topsoil Handling Cost	$9,115	Calculated
Grading Cost per Acre	$56.28	Unit Cost
Grading Cost	$281	Calculated
Total Topsoil Handling & Grading Cost	$9,397	Calculated
B. Radiation Survey & Soil Analysis		
Survey & Analysis Cost per Acre	$653.00	Unit Cost
Total Survey & Analysis Cost	$3,265	Calculated
C. Revegetation		
Fertilizer Cost per Acre	$52.33	Unit Cost
Seeding Preparation & Seeding Cost per Acre	$189.85	Unit Cost
Mulching & Crimping Cost per Acre	$311.25	Unit Cost
Total Revegetation Cost per Acre	$553.43	Calculated
Total Revegetation Cost	$2,767	Calculated
TOTAL POND COST	$15,429	Calculated

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

Assumptions/Items	Mine Unit No. 1	Source
III WELLFIELDS		
A. Topsoil Handling & Grading		
Affected Area (Acres)	0.0	
Average Affected Thickness (Inches)	3.5	
Topsoil Volume (Cubic Yards)	0	Calculated
Hauling/Placement Cost per Cubic Yard	$1.13	Unit Cost
Topsoil Handling Cost	$0	Calculated
Grading Cost per Acre	$56.28	Unit Cost
Grading Cost	$0	Calculated
Total Topsoil Handling & Grading Cost	$0	Calculated
B. Radiation Survey & Soil Analysis		
Survey & Analysis Cost per Acre	$653.00	Unit Cost
Total Survey & Analysis Cost	$0	Calculated
C: Spill Cleanup		
Affected Area (Acres)	-	Calculated
Affected Area (Square Feet)	-	
Average Affected Thickness (Feet)	0.25	
Affected Volume (Cubic Feet)	-	Calculated
Volume per Truck Load (Cubic Feet)	540	
Number of Truck Loads	0.0	Calculated
Distance (Miles)	105	
Cost per Mile	$2.90	Unit Cost
Transportation Cost	$0	Calculated
Handling Cost per Truck Load	$238	Unit Cost
Handling Cost	$0	Calculated
Disposal Fee per Cubic Foot	$4.16	Unit Cost
Disposal Cost	$0	Calculated
Total Spill Cleanup Cost	$0	Calculated

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

Assumptions/Items	Mine Unit No. 1	Source
III WELLFIELDS (continued)		
D. Revegetation		
Fertilizer Cost per Acre	$52.33	Unit Cost
Seeding Preparation & Seeding Cost per Acre	$189.85	Unit Cost
Mulching & Crimping Cost per Acre	$311.25	Unit Cost
Total Revegetation Cost per Acre	$553.43	Calculated
Total Revegetation Cost	$0	Calculated
TOTAL WELLFIELDS COST	$0	Calculated
IV ROADS		
A. Topsoil Handling & Grading		
Affected Area (Acres)	11.1	

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

Table 6.8-1 Surety Estimate (Page 34 of 47) (Revised 3/17/2010)

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

Assumptions/Items	Mine Unit No. 1	Source
IV ROADS (continued)		
A. Topsoil Handling & Grading (continued)		
Average Affected Thickness (Inches)	12	
Topsoil Volume (Cubic Yards)	17,908	Calculated
Hauling/Placement Cost per Cubic Yard	$1.13	Unit Cost
Topsoil Handling Cost	$20,236	Calculated
Grading Cost per Acre	$56.28	Unit Cost
Grading Cost	$625	Calculated
Total Topsoil Handling & Grading Cost	$20,861	Calculated
B. Radiation Survey & Soil Analysis		
Survey & Analysis Cost per Acre	$653.00	Unit Cost
Total Survey & Analysis Cost	$7,248	Calculated
C. Revegetation		
Fertilizer Cost per Acre	$52.33	Unit Cost
Seeding Preparation & Seeding Cost per Acre	$189.85	Unit Cost
Mulching & Crimping Cost per Acre	$311.25	Unit Cost
Total Revegetation Cost per Acre	$553.43	Calculated
Total Revegetation Cost	$6,143	Calculated
TOTAL ROADS COST	$34,252	Calculated

Table 6.8-1 **Surety Estimate (Page 35 of 47)** (Revised 3/17/2010)

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

Assumptions/Items	Mine Unit No. 1	Source
V OTHER		
A. Topsoil Handling & Grading		
Affected Area (Acres)	1.0	
Average Affected Thickness (Inches)	3.0	
Topsoil Volume (Cubic Yards)	403.33	Calculated
Hauling/Placement Cost per Cubic Yard	$1.13	Unit Cost
Topsoil Handling Cost	$456	Calculated
Grading Cost per Acre	$56.28	Unit Cost
Grading Cost	$56	Calculated
Total Topsoil Handling & Grading Cost	$512	Calculated
B. Radiation Survey & Soil Analysis		
Survey & Analysis Cost per Acre	$653.00	Unit Cost
Total Survey & Analysis Cost	$653	Calculated
C. Revegetation		
Fertilizer Cost per Acre	$52.33	Unit Cost
Seeding Preparation & Seeding Cost per Acre	$189.85	Unit Cost
Mulching & Crimping Cost per Acre	$311.25	Unit Cost
Total Revegetation Cost per Acre	$553.43	Calculated
Total Revegetation Cost	$553	Calculated
TOTAL OTHER COST	$1,718	Calculated

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

Assumptions/Items	Mine Unit No. 1	Source
VI REMEDIAL ACTION		
A. Topsoil Handling & Grading		
Affected Area (Acres)	11.1	
Average Affected Thickness (Inches)	0.0	
Topsoil Volume (Cubic Yards)	0	Calculated
Hauling/Placement Cost per Cubic Yard	$1.13	Unit Cost
Topsoil Handling Cost	$0	Calculated
Grading Cost per Acre	$0.00	Unit Cost
Grading Cost	$0	Calculated
Total Topsoil Handling & Grading Cost	$0	Calculated
B. Radiation Survey & Soil Analysis		
Survey & Analysis Cost per Acre	$0.00	Unit Cost
Total Survey & Analysis Cost	$0	Calculated
C. Revegetation		
Fertilizer Cost per Acre	$52.33	Unit Cost
Seeding Preparation & Seeding Cost per Acre	$189.85	Unit Cost
Mulching & Crimping Cost per Acre	$311.25	Unit Cost
Total Revegetation Cost per Acre	$553.43	Calculated
Total Revegetation Cost	$6,115	Calculated
TOTAL REMEDIAL ACTION COST	$6,115	Calculated

TOTAL TOPSOIL REPLACEMENT AND REVEGETATION COST	**$72,944**	

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

Assumptions/Items	Quantity	Source
I FENCE REMOVAL & DISPOSAL		
Length (Feet)	9,500	
Removal & Disposal Cost per Foot	$0.34	Unit Cost
TOTAL FENCE REMOVAL AND DISPOSAL COST	$3,230	Calculated
II POWERLINE REMOVAL & DISPOSAL		
Length (Feet)	15,300	
Removal & Disposal Cost per Foot	$1.00	Unit Cost
TOTAL POWERLINE REMOVAL & DISPOSAL COST	$15,300	Calculated
III POWERPOLE REMOVAL & DISPOSAL		
Number of Powerpoles	51	
Removal & Disposal Cost per Powerpole	$100.00	Unit Cost
TOTAL POWERPOLE REMOVAL & DISPOSAL COST	$5,100	Calculated
IV TRANSFORMER REMOVAL & DISPOSAL		
Number of Transformers	12	
Removal & Disposal Cost per Transformer	$2,428	Unit Cost
TOTAL TRANSFORMER REMOVAL & DISPOSAL COST	$29,131	Calculated
V BOOSTER PUMP ASSEMBLY REMOVAL & DISPOSAL		
Number of Booster Pump Assemblies	0	
Removal & Disposal Cost per Booster Pump Assembly	$149	Unit Cost
TOTAL BOOSTER PUMP ASSEMBLY REMOVAL & DISPOSAL COST	$0	Calculated
VI CULVERT REMOVAL & DISPOSAL		
Length (Feet)	200	
Removal & Disposal Cost per Foot	$1.74	Unit Cost
TOTAL CULVERT REMOVAL & DISPOSAL COST	$348	Calculated
VII UTILITIES		
Number of Months	6	
Cost per Month	$2,380	Unit Cost
TOTAL UTILITIES COST	$14,280	Calculated
VIII DDW PIPELINE REMOVAL AND DISPOSAL		
Length (Feet)	21,730	
Removal & Disposal Cost per Foot	$2.43	Unit Cost
TOTAL DDW PIPELINE REMOVAL & DISPOSAL COST	$52,804	Calculated
TOTAL MISCELLANEOUS RECLAMATION ACTIVITIES COST	**$120,193**	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: Equipment and Tank List

	Quantity	Length (Feet)	Width or Area (Feet or Square Feet)	Thickness (Feet)	Volume (Cubic Feet)	Volume (Cubic Yards)	Contamination	Contaminated Volume (Cubic Yards)	Percent Contamination
SHOP / LAB / OFFICE									
Concrete									
Shop Floor	1	180	40	0.5	3600	133.3	N	0.0	0.0%
Lab Floor	1	40	40.5	0.5	810	30.0	Y	30.0	10.2%
Office Floor	1	40	80	0.5	1600	59.3	N	0.0	0.0%
Perimeter Beam	1	340	1	4	1360	50.4	N	0.0	0.0%
Internal Perimeter	1	300	1	2	600	22.2	N	0.0	0.0%
Total Concrete					7970.0	295.2		30.0	10.2%
Equipment									
Lab Tables	1	1	435	3	1305	48.3	Y	48.3	70.7%
Air Compressor	1	3	3	2	18	0.7	N	0.0	0.0%
Water Heater	2	3	3	6	108	4.0	N	0.0	0.0%
Generator	1	6	4	4	96	3.6	N	0.0	0.0%
MCC	1	20	2	8	320	11.9	N	0.0	0.0%
Total Equipment					1847	68.4		48.3	70.7%
TOTAL SHOP / LAB / OFFICE					**9817**	**363.6**		**78.3**	**21.5%**

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: Equipment and Tank List

	Quantity	Length (Feet)	Width or Area (Feet or Square Feet)	Thickness (Feet)	Volume (Cubic Feet)	Volume (Cubic Yards)	Contamination	Contaminated Volume (Cubic Yards)	Percent Contamination
PRECIPITATION SECTION									
Concrete									
Precip Floor	1	180	40	0.5	3600	133.3	Y	133.3	65.5%
Perimeter Beam	1	40	1	4	160	5.9	Y	5.9	2.9%
Internal Perimeter	1	400	1	2	800	29.6	Y	29.6	14.5%
Tank Base	6	1	140	1	840	31.1	Y	31.1	15.3%
Pump Base	4	5	5	1	100	3.7	Y	3.7	1.8%
Total Concrete					5500	203.7		203.7	100.0%
Equipment									
Filter Press	2	12	3	4	288	10.7	Y	10.7	23.2%
YC Slurry Tank	2	1	89.1	1	178.2	6.6	Y	6.6	14.3%
YC Slurry Trailer	2	1	189	1	378	14.0	Y	14.0	30.4%
Precip. Tank	4	1	91.8	1	367.2	13.6	Y	13.6	29.5%
Pumps	8	2	2	1	32	1.2	Y	1.2	2.6%
Total Equipment					1243	46.1		46.1	100.0%
TOTAL PRECIPITATION SECTION					**6743**	**249.8**		**249.8**	**100.0%**

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: Equipment and Tank List

	Quantity	Length (Feet)	Width or Area (Feet or Square Feet)	Thickness (Feet)	Volume (Cubic Feet)	Volume (Cubic Yards)	Contamination	Contaminated Volume (Cubic Yards)	Percent Contamination
CHEMICAL STORAGE									
Concrete									
Chem. Floor	1	80	40	0.5	1600	59.3	N	0.0	0.0%
Perimeter Beam	1	120	1	4	480	17.8	N	0.0	0.0%
Internal Perimeter	1	120	1	2	240	8.9	N	0.0	0.0%
Acid Floor	2	16	16	1	512	19.0	N	0.0	0.0%
Acid Perimeter	2	64	1	2	256	9.5	N	0.0	0.0%
Tank Base	4	1	140	1	560	20.7	N	0.0	0.0%
Pump Base	4	5	5	1	100	3.7	N	0.0	0.0%
Total Concrete					3748	138.8		0.0	0.0%
Equipment									
Soda Ash Tank	1	1	81	1	81	3.0	N	0.0	0.0%
Bicarb Tank	1	1	56.7	1	56.7	2.1	N	0.0	0.0%
NaOH Tank	1	1	81	1	81	3.0	N	0.0	0.0%
NaCl Saturator	1	1	75.6	1	75.6	2.8	N	0.0	0.0%
Peroxide Tank	1	1	18.9	1	18.9	0.7	N	0.0	0.0%
HCl Tank	1	1	2.7	1	2.7	0.1	N	0.0	0.0%
Acid Tank	2	1	56.7	1	113.4	4.2	N	0.0	0.0%
Pumps	6	2	2	1	24	0.9	N	0.0	0.0%
Total Equipment					453	16.8		0.0	0.0%
TOTAL CHEMICAL STORAGE					**4201**	**155.6**		**0.0**	**0.0%**

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: Equipment and Tank List

	Quantity	Length (Feet)	Width or Area (Feet or Square Feet)	Thickness (Feet)	Volume (Cubic Feet)	Volume (Cubic Yards)	Contamination	Contaminated Volume (Cubic Yards)	Percent Contamination
ION EXCHANGE SECTION									
Concrete									
IX Floor A	1	180	80	0.5	7200	266.7	Y	266.7	64.3%
IX Floor B	1	40	40	0.5	800	29.6	Y	29.6	7.1%
Perimeter Beam	1	300	1	4	1200	44.4	Y	44.4	10.7%
Tank Base	12	1	140	1	1680	62.2	Y	62.2	15.0%
IX Base	56	1	1	2	112	4.1	Y	4.1	1.0%
Pump Base	8	5	5	1	200	7.4	Y	7.4	1.8%
Total Concrete					11192	414.5		414.5	100.0%
Equipment									
IX Column	10	1	86.4	1	864	32.0	Y	32.0	28.8%
Guard Column	2	1	64.8	1	129.6	4.8	Y	4.8	4.3%
Elution Vessel	2	1	86.4	1	172.8	6.4	Y	6.4	5.8%
Fresh Eluate Tank	2	1	91.8	1	183.6	6.8	Y	6.8	6.1%
Eluate Tank	2	1	91.8	1	183.6	6.8	Y	6.8	6.1%
Rich Eluate Tank	2	1	99.9	1	199.8	7.4	Y	7.4	6.7%
Fresh Water Tank	2	1	91.8	1	183.6	6.8	Y	6.8	6.1%
Resin Water Decant	1	1	35.1	1	35.1	1.3	Y	1.3	1.2%
Resin Water Tank	1	1	91.8	1	91.8	3.4	Y	3.4	3.1%
Waste Water Tank	2	1	91.8	1	183.6	6.8	Y	6.8	6.1%
RW Sand Filter	1	1	13.5	1	13.5	0.5	Y	0.5	0.5%
RW Bag Filter	4	1	0.8	1	3.2	0.1	Y	0.1	0.1%
RW Element Filter	4	1	0.8	1	3.2	0.1	Y	0.1	0.1%
Eluate Sump Filter	4	1	0.8	1	3.2	0.1	Y	0.1	0.1%
Eluate Bag Filter	6	1	0.8	1	4.8	0.2	Y	0.2	0.2%
Eluate Element Filter	4	1	0.8	1	3.2	0.1	Y	0.1	0.1%
Resin Screen	4	8	4	1	128	4.7	Y	4.7	4.3%
RO Unit	1	20	4	6	480	17.8	Y	17.8	16.0%
RO Pump	1	1	3.7	1	3.7	0.1	Y	0.1	0.1%
IC/PC Pump	12	1	3.7	1	44.4	1.6	Y	1.6	1.5%
WDW Pump	1	4	6	2	48	1.8	Y	1.8	1.6%
Sump Pump	4	1	1	3	12	0.4	Y	0.4	0.4%
Pumps	6	2	2	1	24	0.9	Y	0.9	0.8%
Total Equipment					2999	111.1		111.1	100.0%
TOTAL ION EXCHANGE SECTION					**14191**	**525.6**		**525.6**	**100.0%**

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: Equipment and Tank List

	Quantity	Length (Feet)	Width or Area (Feet or Square Feet)	Thickness (Feet)	Volume (Cubic Feet)	Volume (Cubic Yards)	Contamination	Contaminated Volume (Cubic Yards)	Percent Contamination
RESTORATION SECTION									
Concrete									
Rest. Floor	1	40	80	0.5	1600	59.3	Y	59.3	97.5%
IX Base	8	1	1	2	16	0.6	Y	0.6	1.0%
Pump Base	1	5	5	1	25	0.9	Y	0.9	1.5%
Total Concrete					1641	60.8		60.8	100.0%
Equipment									
Rest. Column	2	1	75.6	1	151.2	5.6	Y	5.6	5.9%
RO Unit	5	20	4	6	2400	88.9	Y	88.9	93.0%
RO Pump	5	1	3.7	1	18.5	0.7	Y	0.7	0.7%
Sump Pump	1	1	1	3	3	0.1	Y	0.1	0.1%
Pumps	2	2	2	1	8	0.3	Y	0.3	0.3%
Total Equipment					2580.7	95.6		95.6	100.0%
TOTAL RESTORATION SECTION					**4221.7**	**156.4**		**156.4**	**100.0%**

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: Equipment and Tank Calculations

	Quantity	Type	Material	ID (Feet)	Height (Feet)	Unit Volume (Cubic Feet)	Total Volume (Cubic Feet)	Thickness (Inches)	Unit Dry Weight (Pounds)	Total Dry Weight (Pounds)	Unit Crushed Volume (Cubic Yards)	Total Crushed Volume (Cubic Yards)	Vessel Numbers
Pressure Vessels													
Ion Exchange Columns	10	Ellip Hd	CS	11.5	9	3739	37393	0.750	25000	250000	3.2	32.3	IX-1 to 10
Guard Columns	2	Ellip Hd	CS	6.5	9	1195	2389	0.500	9200	18400	2.4	4.8	IX-11, 12
Restoration Columns	2	Ellip Hd	CS	10	8	2513	5027	0.625	13700	27400	2.8	5.6	IX-13, 14
Elution Vessels	2	Ellip Hd	CS	11.5	9	3739	7479	0.750	25000	50000	3.2	6.5	E-1, 2
Tanks													
Fresh Eluate Tanks	2	Flat Btm	FRP	14	18	11084	22167	1.000	10,450	20,900	3.4	6.8	T-210A, B
Eluate Tanks	2	Flat Btm	FRP	14	18	11084	22167	1.000	10,450	20,900	3.4	6.8	T-211A, B
Rich Eluate Tanks	2	Flat Btm	FRP	14	20	12315	24630	1.000	11,286	22,572	3.7	7.3	T-212A, B
Fresh Water Tanks	2	Flat Btm	FRP	14	18	11084	22167	1.000	10,450	20,900	3.4	6.8	T-200A, B
Resin Water Decant	1	Cone Btm	FRP	12	8.5	3845	3845	0.750	3,896	3,896	1.3	1.3	T-201
Resin Water Tank	1	Flat Btm	FRP	14	18	11084	11084	1.000	10,450	10,450	3.4	3.4	T-202
Waste Water Tanks	2	Flat Btm	FRP	14	18	11084	22167	1.000	10,450	20,900	3.4	6.8	T-203A, B
Precipitation Tanks	4	Flat Btm	FRP	14	18	11084	44334	1.000	10,450	41,801	3.4	13.6	T-213A - D
Y/C Slurry Storage	2	Cone Btm	CS - RL	12.5	15	7363	14726	0.500	8,242	16,484	3.3	6.6	T-220A, B
Soda Ash Tank	1	Flat Btm	FRP	12	20	9048	9048	1.000	9,316	9,316	3.0	3.0	T-214
Bicarb Mix Tank	1	Flat Btm	FRP	12	12	5429	5429	1.000	6,449	6,449	2.1	2.1	T-215
NaCl Saturator	1	Flat Btm	FRP	12	18	8143	8143	1.000	8,599	8,599	2.8	2.8	T-216
NaOH Tank	1	Flat Btm	FRP	12	20	9048	9048	1.000	9,316	9,316	3.0	3.0	T-219
H2O2 Tank	1	Hor Tank	Alum	9	16.5	4199	4199	0.375	2,396	2,396	0.7	0.7	T-220
Acid Day Tank	1	Flat Btm	CS	5.5	6	570	570	0.250	773	773	0.1	0.1	T-217
Acid Tanks	2	Flat Btm	FRP	12	12	5429	10857	1.000	6,449	12,899	2.1	4.2	T-218A, B
Filtration													
RW Sand Filter	1	Ellip Hd	CS	6	12.5	1414	1414	0.500	7,450	7,450	0.5	0.5	
RW Bag Filter	2		316ss	2	3	38	75	0.375	175	351	0.03	0.1	
RW Element Filter	2		304ss	2	3	38	75	0.375	175	351	0.03	0.1	
Eluate Sump Filter	2		316ss	2	3	38	75	0.375	175	351	0.03	0.1	
Eluate Bag Filter	6		316ss	2	3	38	226	0.375	175	1,052	0.03	0.2	
Eluate Element Filter	2		304ss	2	3	38	75	0.375	175	351	0.03	0.1	
Slurry Filter Press	2						0			0	0.00	0.0	

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: Equipment and Tank Calculations

	Quantity	Type	Material	ID (Feet)	Height (Feet)	Unit Volume (Cubic Feet)	Total Volume (Cubic Feet)	Thickness (Inches)	Unit Dry Weight (Pounds)	Total Dry Weight (Pounds)	Unit Crushed Volume (Cubic Yards)	Total Crushed Volume (Cubic Yards)	Vessel Numbers
Pumps													
IC Pumps (75 hp submersible)	6		SS			3.7	22		560	3,360			P-206A - F
PC Pumps (75 hp submersible)	6		SS			3.7	22		560	3,360			P-207A - F
RO Pumps (75 hp horizontal)	6		CS/SS			3.7	22		560	3,360			
Waste Water Pumps (25 hp centrifugal)	2		SS				0		100	200			P-203A/B
Resin Water Pumps (20 hp centrifugal)	4		SS				0		265	1,060			P-201A/B, 202A/B
Waste Disposal Pump (Plunger)	2		CS/SS			23	46		2,400	4,800			
Sump Pumps (5 hp)	4		SS				0		295	1,180			
Reverse Osmosis													
200 GPM Unit	6						0			0			
Other													
Resin Screens	4		CS/SS				0			0			S-1A, B, S-2A, B
Water Heater							0			0			
Air Compressor							0			0			
Slurry Trailer	2		CS				0	0.375	15,000	30,000	7	14.0	TR-1, 2
Generator	2						0			0			
MCC							0			0			

FRP =	0.06
CS =	0.28
SS =	0.29
Al =	0.097
Accy Fact	1.1

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: Deep Disposal Pipeline Calculations

Assumptions/Items	Deep Disposal Well No. 1	Deep Disposal Well No. 2	Deep Disposal Well No. 3	Total	Source
PIPELINE					
A. Removal					
Total Length (Feet)	11,850	1,230	8,650	21,730	
Removal Cost per Foot	$1.58	$1.58	$1.58		Unit Rate
Removal Cost	$9,362	$972	$6,834		Calculated
Average OD (Inches)	4.500	4.500	4.500		
Chipped Volume Reduction (Cubic Feet per Foot)	0.309	0.309	0.309		Unit Rate
Chipped Volume (Cubic Feet)	3,662	380	2,673	6,715	Calculated
Volume per Truck Load (Cubic Feet)	540	540	540		
Number of Truck Loads	6.8	0.7	4.9	12.4	Calculated
B. Survey & Decontamination					
Percent Requiring Decontamination	0.0%	0.0%	0.0%		
Number of Decontamination Truck Loads	0.0	0.0	0.0	0.0	Calculated
Decontamination Cost per Load	$0.00	$0.00	$0.00		Unit Rate
Decontamination Cost	$0	$0	$0	$0	Calculated
C. Transport & Disposal					
Landfill					
Transportation					
Percent to be Shipped	0.0%	0.0%	0.0%		
Loads to be Shipped	0.0	0.0	0.0	0.0	Calculated
Distance (Miles)	48	48	48		
Cost per Mile	$2.90	$2.90	$2.90		Unit Rate
Transportation Cost	$0	$0	$0	$0	Calculated
Disposal					
Disposal Fee per Cubic Yard	$13.50	$13.50	$13.50		Unit Rate
Load Volume (Cubic Yards)	20	20	20		
Disposal Cost	$0	$0	$0	$0	Calculated
Total Landfill Cost	$0	$0	$0	$0	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: Deep Disposal Pipeline Calculations

Assumptions/Items	Deep Disposal Well No. 1	Deep Disposal Well No. 2	Deep Disposal Well No. 3	Total	Source
PIPELINE (continued)					
C. Transport & Disposal (continued)					
Licensed Site					
Transportation					
Percent to be Shipped	100.0%	100.0%	100.0%		Calculated
Loads to be Shipped	6.8	0.7	4.9	12.4	Calculated
Distance (Miles)	105	105	105		
Cost per Mile	$2.90	$2.90	$2.90		Unit Rate
Transportation Cost	$2,071	$213	$1,492	$3,776	Calculated
Disposal					
Disposal Cost per Cubic Foot	$12.38	$12.38	$12.38		Unit Rate
Disposal Fee per Cubic Yard	$334.26	$334.26	$334.26		Calculated
Load Volume (Cubic Yards)	20	20	20		
Disposal Cost	$45,459	$4,680	$32,757	$82,896	Calculated
Total Licensed Site Cost	$47,530	$4,893	$34,250	$86,672	Calculated
Total Transport & Disposal Cost	$47,530	$4,893	$34,250	$86,672	Calculated
TOTAL PIPELINE REMOVAL & DISPOSAL COST	$56,891	$5,864	$41,083	$103,839	Calculated
MANHOLES					
A. Removal					
Total Quantity	1	0	1	2	
Removal Cost per Manhole	$146.32	$146.32	$146.32		Unit Rate
Removal Cost	$146	$0	$146	$293	Calculated
Quantity per Truck Load	10	10	10		
Number of Truck Loads	0.1	0.0	0.1	0.2	Calculated
B. Survey & Decontamination					
Percent Requiring Decontamination	0.0%	0.0%	0.0%		
Number of Decontamination Truck Loads	0.0	0.0	0.0	0.0	Calculated
Decontamination Cost per Load	$0.00	$0.00	$0.00		Unit Rate
Decontamination Cost	$0	$0	$0	$0	Calculated

LOST CREEK ISR, LLC DECOMMISSIONING AND SURFACE RECLAMATION: Deep Disposal Pipeline Calculations

Assumptions/Items	Deep Disposal Well No. 1	Deep Disposal Well No. 2	Deep Disposal Well No. 3	Total	Source
MANHOLES (continued)					
C. Transport & Disposal					
Landfill					
Transportation					
Percent to be Shipped	0.0%	0.0%	0.0%		
Loads to be Shipped	0.0	0.0	0.0	0.0	Calculated
Distance (Miles)	48	48	48		Unit Rate
Cost per Mile	$2.90	$2.90	$2.90		Calculated
Transportation Cost	$0	$0	$0	$0	
Disposal					
Disposal Fee per Cubic Yard	$13.50	$13.50	$13.50		Unit Rate
Load Volume (Cubic Yards)	20	20	20		
Disposal Cost	$0	$0	$0	$0	Calculated
Total Landfill Cost	$0	$0	$0	$0	Calculated
Licensed Site					
Transportation					
Percent to be Shipped	100.0%	100.0%	100.0%		Calculated
Loads to be Shipped	0.1	0.0	0.1	0.2	Calculated
Distance (Miles)	105	105	105		
Cost per Mile	$2.90	$2.90	$2.90		Unit Rate
Transportation Cost	$30	$0	$30	$61	Calculated
Disposal					
Disposal Cost per Cubic Foot	$12.38	$12.38	$12.38		Unit Rate
Disposal Fee per Cubic Yard	$334.26	$334.26	$334.26		Calculated
Load Volume (Cubic Yards)	20	20	20		
Disposal Cost	$669	$0	$669	$1,337	Calculated
Total Licensed Site Cost	$699	$0	$699	$1,398	Calculated
Total Transport & Disposal Cost	$699	$0	$699	$1,398	Calculated
TOTAL MANHOLE REMOVAL & DISPOSAL COST	$845	$0	$845	$1,691	Calculated
TOTAL DEEP DISPOSAL WELL PIPELINE REMOVAL AND DISPOSAL COS	**$57,737**	**$5,864**	**$41,928**	**$105,530**	Calculated
DEEP DISPOSAL WELL PIPELINE REMOVAL AND DISPOSAL COST PER FOOT				**$4.86**	Calculated

Attachment 6.2-1

Comparison of
Lost Creek, Christensen Ranch, and Irigaray ISR Projects
with respect to
Aquifer Restoration

TECHNICAL MEMORANDUM

TO: UR Energy

FROM: Petrotek Engineering Corporation

DATE: 12/09/08

SUBJECT: Comparison of Lost Creek, Christensen Ranch and Irigaray ISR Projects, with Respect to Aquifer Restoration

UR Energy has applied for a permit to mine the Lost Creek ISR uranium project in Sweetwater County, Wyoming. A key component of the permit application is the requirement to restore aquifer water quality following mining. A comparison is made between the Lost Creek project, currently being permitted, and the COGEMA Irigaray and Christensen Ranch ISR uranium projects that have completed production and restoration operations. Similarities between Lost Creek and the COGEMA sites indicate that aquifer restoration at Lost Creek is achievable following ISR of uranium. Extenuating factors suggest that aquifer restoration can be accomplished at the Lost Creek project with less pore volumes (PVs) of treatment/reinjection/disposal than was required at the COGEMA sites.

The Irigaray site has received approval of aquifer restoration from the Wyoming Department of Environmental Quality (WDEQ) and the Nuclear Regulatory Commission (NRC). COGEMA has submitted a Wellfield Restoration Report for the Christensen Ranch project that is currently under review by WDEQ. These two ISR projects are located within a similar geologic trend as the Lost Creek Project. Hydrogeologic characteristics of Irigaray and Christensen Ranch are also similar to Lost Creek.

The geologic, hydrogeologic and water chemistry properties of the Irigaray, Christensen Ranch and Lost Creek ISR projects are summarized in Table 1. All three of the projects target uranium ore within fluvially deposited sands of Eocene age. Uranium ore within the COGEMA projects was produced from the Wasatch Formation in the Powder River Basin. The Lost Creek uranium deposits are located within the Great Divide Basin, within the Battle Springs Formation, which is laterally equivalent to the Wasatch Formation. Depths to the ore bearing units are similar in each site (100 to 500 feet below ground surface). Hydrologic properties of the sites are also similar, with transmissivity on the order of 50 to 150 ft^2/d and hydraulic conductivity generally between 0.5 and 1 ft/d. Porosity and hydraulic gradient are also in the same range, resulting in calculated groundwater velocity of similar magnitude.

Baseline water quality of the three projects are generally similar, although the Lost Creek site is more of a calcium-sulfate to calcium-bicarbonate water type whereas Irigaray and Christensen Ranch are predominately sodium-sulfate type water. TDS, sulfate and sodium levels tend to be lower at the Lost Creek project. Trace minerals arsenic and manganese, and radionuclides uranium and radium–226 are in the same range at all three sites. Selenium tends to be lower at Lost Creek than at Irigaray and Christensen Ranch. Based on these similarities and the projected use of similar lixiviant, it is anticipated that mining impacts to Lost Creek water quality prior to restoration, will be similar to post-mining water quality at Christensen Ranch and Irigaray.

Based on the comparison of geologic, hydrologic and water chemistry properties of Irigaray, Christensen Ranch and Lost Creek, it is reasonable to expect that aquifer restoration can be achieved at Lost Creek. Furthermore, there are several reasons to expect that restoration can be achieved with fewer PV) of treatment and reinjection or disposal as described below.

Additional evaluation is provided with respect to the number of PVs of treatment that will be required to achieve restoration of the production zone aquifer. Table 2 presents a summary of the restoration schedule and volumes for Irigaray and Christensen Ranch. As shown on the table, the average number of PVs extracted and treated/reinjected/or disposed was 13.6 for Irigaray and 12.6 for Christensen Ranch. However, several points can be made that suggest that the number of PVs required to restore the aquifer at Lost Creek will be less than at Christensen Ranch and Irigaray. Circumstances at both those ISR projects resulted in increased PVs to achieve restoration goals including the following:

- Production and restoration were not conducted sequentially, and were hindered with extended periods of shut-in and standby, with delays of up to several years in some cases;
- During early production at Christensen Ranch, the lixiviant was an ammonium bicarbonate with hydrogen peroxide, which resulted in extensive additional restoration efforts;
- Groundwater sweep, the initial phase of restoration, was often largely ineffective and in some cases may have exacerbated the mining impacts to water quality; and
- RO was continued in some wellfields after it was apparent that little improvement in water quality was occurring.

Restoration was not performed immediately following the completion of production, and in some cases, there were long periods of inactivity during the production and restoration phases. At Irigaray, production was interrupted for a period of almost six years in MU1 through MU5 (Figure 1). Similarly, there was a three-year break in production in MU6 through MU9, when the operation was in standby status. Restoration did not commence at MU1 through MU3 until a year after production had ended. At MU4 and MU5, restoration operations did not begin until two years following production. Restoration commenced shortly after the end of production at MU6 through MU9. However the project was on standby status between the completion of groundwater sweep and the beginning of the RO phase of production, resulting in a break of one to two years, depending on the MU. Restoration was initiated sooner after the end of production at Christensen Ranch, with the exception of MU3 and MU4. However, there were periods of standby between groundwater sweep and RO treatment/injection of up to a year. These delays between and during production and restoration operations most likely increased the number of PVs required to complete aquifer restoration. UR Energy will commence restoration activities immediately upon completion of production within a wellfield, thus eliminating this factor in prolonging aquifer restoration.

Results of the effectiveness of groundwater sweep (or lack of it) were clearly demonstrated in the Christensen Ranch Wellfield Restoration report (CRWR) (COGEMA 2008). Examples of plots from that report of mean wellfield water quality at the end of mining, groundwater sweep, RO and stabilization monitoring are attached. Plots of TDS for MU3, MU5 and MU6 (Figures 5-7, 5-8 and 5-7, from the respective Mine Unit Data Packages of the CRWR), indicate minimal improvement following groundwater sweep at MU3 and MU5 and an actual increase at MU6. Following application of RO, the TDS values at MU5 and MU6 decreased to levels below the target Restoration Goal. Uranium increased in MU5 and MU6 following groundwater sweep (Figures 5-12 and 5-13 from the respective Mine Unit Data Packages of the CRWR), and then was significantly lowered during RO. Approximately 1,8. 4.8 and 1.5 PVs of groundwater were removed from MU3, MU5 and MU6, respectively, during groundwater sweep. This water removal was totally consumptive by design, in that none of it was returned to the aquifer. Based on the results, minimal benefit, if any, was derived from this phase of restoration. Groundwater sweep is an unnecessary, ineffective and consumptive step in the restoration process. Eliminating, or at least reducing the groundwater sweep phase, will reduce the number of PVs required to reach aquifer restoration goals.

In some cases, RO was continued longer than necessary or at least longer than any improvements to water quality were occurring. A review of the uranium and conductivity trend plots from the Irigaray recovery wells during restoration (included in the Irigaray Mine Wellfield Restoration Report (COGEMA 2004) show this to be the case. Figures 4-4 through 4-7 from the Irigaray report show that RO was often continued for several PVs beyond the point that water quality had stabilized. The additional PVs of RO resulted in no direct benefit to aquifer water quality and only resulted in consumptive use of the groundwater resources. RO typically results in disposal of approximately 20 percent of the recovered groundwater with reinjection of the remaining 80 percent following treatment. Terminating RO once water quality has stabilized will minimize the consumptive use of groundwater and reduce the number of PVs of treatment.

In addition to the improvements to restoration methods described above, UR Energy intends to conduct RO concurrent with production operations. Rates of up to 200 gpm will be treated using RO within portions of the wellfield while production is ongoing. This action will result in better water quality at the termination of wellfield production. This means that the starting point for restoration will be closer to the target restoration goals for the project.

The net result of each of these strategies (implementation of RO during production operations, immediate restoration following production, elimination of groundwater sweep, terminating RO once restoration is achieved or water quality has stabilized) should reduce the number of PVs required to achieve aquifer restoration. It is difficult to quantify how effective each of these strategies will be until actual field measured data become available. Substantial justification of the number of PVs estimated for restoration of Lost Creek following ISR mining using analytical methods or numerical modeling, given the degree of uncertainty that exists in many of the parameters that would be used in such a demonstration, does not seem appropriate at this time. The preferred approach is the one presented in this response; to use existing analogs to the site, and to adjust the PV approximation based on "lessons learned" from those sites.

Table 1. Geologic, Hydrologic, and Water Quality Properties- Lost Creek, Irigaray, and Christensen Ranch ISR Projects

	Lost Creek	Irigaray	Christensen Ranch
Permit Area	4,400 Acres	700 Acres	14,000 Acres
Wellfield Area	6 Mine Units - 235 Acres	9 Mine Units - 30 Acres	5 Mine Units - 200 Acres
Geology			
Basin	Greate Divide Basin	Powder River Basin	Powder River Basin
Location within basin	Northeast edge of basin	West central-east of basin axis	West central-east of basin axis
Deposi ional Set ing	Fluvial/alluvial fan deposits	Fluvial/channel sands	Fluvial/channel sands
Formation	Eocene-Battle Springs(Wasatch Equivalent)	Eocene-Wasatch	Eocene-Wasatch
Regional Dip		NW at 1 to 2 1/2 degrees	NW at 1 to 2 1/2 degrees
Formation Lithology	Interbedded sandstone, siltstone and shales	Interbedded sandstone, siltstone and mudstone with thin coal beds	Interbedded sandstone, siltstone and mudstone with hin coal beds
Primary Ore Bearing Unit	HJ Horizon	Upper Irigaray Sandstone	K Sandstone
Lithology of ore bearing unit	fine to crse gr, poorly srtd, arkosic sd	fine to crse gr, poorly srtd, arkosic sd	fine to crse gr, mod srtd, arkosic sd
Ore bearing unit thickness	100 - 160 ft	75-130 ft	50 to 210 ft
Ore type	Roll Front/Tabular Deposits	Roll Front	Roll Front
Ore thickness	5 to 28 ft	15-25 ft	15-25 ft
Depth to ore zone	300 to 450 feet	100 to 300 ft	250 to 500 ft
Porosity	25 - 30%	23-29%	26 - 29 %
Overlying confining unit thickness	5 to 45 ft	18-25 ft	5-150 ft
Underlying confining unit thickness	5 to 75 ft	10-30 ft	20-70 ft
Hydrology (Ore bearing unit)			
Groundwater Flow Direction	West-Sou hwest	Northwest	Northwest
Hydraulic Gradient	0.0035 - 0.0056 ft/ft	0.005 ft/ft	0.004 to 0 010 ft/ft
Transmissivity (ore bearing unit)	60 to 100 ft^2/d	40 to 136 ft^2/d	33 to 138 ft^2/d
Hydraulic Conductivity	0.2 to 3.0	0.37 to 1.4 ft/d	0.32 to 1.6 ft d
Storativity	3.3 E-05 to 9.1 E-04	2.70E-04	4.5E-05 to 1.3E-03
Groundwater Velocity	0.0025 to 0.054	0.019 to 0.03 ft/d	0 0088 to 0.043 ft/d
'Baseline Water Chemistry (Ore Bearing Unit)			
Water type	Calcium Sulfate to Calcium Bicarbonate	Sodium Sulfate	Sodium Sulfate
TDS (mg/l)	100 - 600	270-1050	400-1200
Sulfate (mg/l)	25 - 300	130-630	230-680
Calcium	5 - 150	1-34	10-50
Sodium (mg/l)	20 - 40	95-280	150-280
Bicarbonate (mg/l)	30 - 170	5-144	130-210
Manganese (mg/l)	0.01 - 0.03	0.05-0.19	0.01-0 05
Selenium (mg/l)	0 001 - 0.002	0.001-0.416	0.003-0.03
Arsenic (mg/l)	0.001 - 0.014	0.001-0.105	0.002-0.01
Uranium (mg/l)	0.001 - 0.844	0.0003-18.6	0 034-0 376
Radium (pCi/l)	0 - 550	0-250	83-430

Table 2. Production and Restoration Schedule and Volumes, Christensen Ranch and Irigaray ISL Uranium Projects

Christensen Ranch Production/Restoration

	Production[1]	GWS	RO	Recirculation	Stability Monitoring	Total Volume Restoration (million gallons)	Total PVs Restored	PV of GWS	PV of RO	PV of Recirc
MU2	Jul-93,May-97	May-97, Jul-98	Oct-00, Mar-02	Apr-03, Mar-04*	Apr-04, Jan-05	394	14.4	2.2	10 8	1.4
MU3	Mar-89-Jun-95	Mar-97, Sep 98	Feb-99, Aug-02	Feb-04, Sep-04*	Oct-04, Jul-05	443	19 8	1.8	16.4	1.6
MU4	Jun-94 Aug-97	Aug-97 Jul-98	Apr-01 Mar-03*	Mar-03 Apr-04	Apr-04 Jan-05	250	12 8	1.9	9.8	1.0
MU5	Jun-95, Mar-00	Aug-00, Jun-01	Feb-01, Nov-03	-	Nov-03, Aug-04	757	10.1	4.8	5.3	0.0
MU6	Jan-97, Jun-00	Sep-00, Feb-03	Oct-03,May-05	-	Jun-05, Mar-06	757	6	1.5	4.5	0.0
					Average	520 2	12 6	2.4	9.4	0.8

1 - 'Lixiviant was Sodium Bicarbonate with gaseous O2
* included H2S injection

Irigaray Production/Restoration

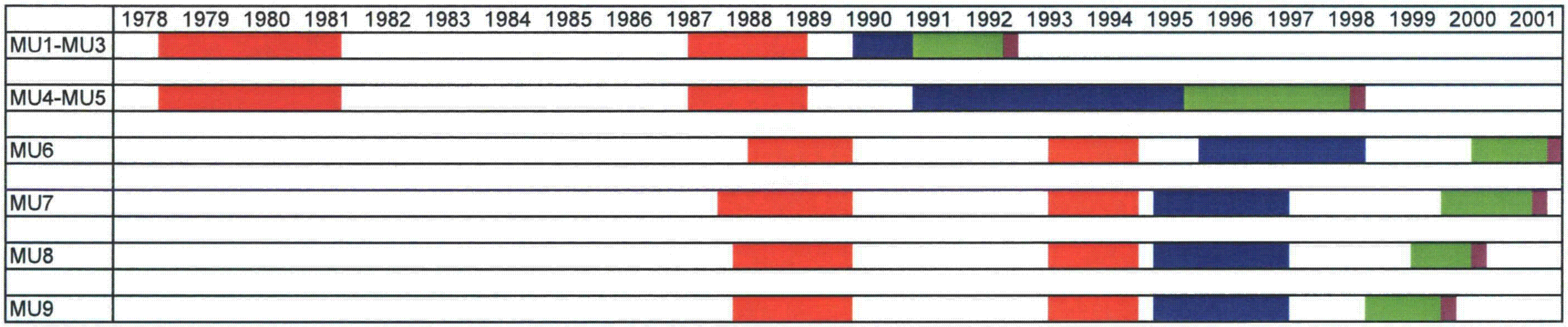
	Production[2]	GWS	RO	Recirculation	Stability Monitoring	Total Volume Restoration (million gallons)	Total PVs Restored	PV of GWS	PV of RO	PV of Recirc
MU1 - MU3	Oct-78, Oct-81 Aug-87, Jun-89	May-90, Apr-91	Apr-91, Oct-92	Oct-92, Nov-92	Dec-92, Sep-93	216	18.4		13 2	
MU4 - MU5	Oct-78, Oct-81 Aug-87, Jun-89	Jun-91, Oct-95	Oct-95, Aug-98	Aug-98, Sep-98	Oct-98, Jul-99	142	13 9		9.5	
MU6	Jun-88, Feb-90 Aug-93, Nov-94	Jan-96, Aug-98	Jul-00, Oct-01	Oct-01, Nov-01	Dec-01, Aug-02	127	9.5		7.1	
MU-7	Jan-88, Feb-90 Aug-93, Nov-94	Apr-95, Sep-97	Feb-00, Jul-01	Jul-01, Aug-01	Aug-01, Jun-02	189	14 3		11.7	
MU-8	Feb-88, Feb-90 Aug-93, Nov-94	Apr-95, Sep-97	Mar-99, Jun-00	Jul-00, Aug-00	Sep-00, Jun-01	55	12 5		10 2	
MU-9	Mar-88, Feb-90 Aug-93, Nov-94	Aor-95, Sep-97	Nov-98, Apr-00	May-00, May-00	Jun-00, Jan-01	110	13		10.7	
					Average	140	13 6		10.4	

2 - Liviant was Ammonium Bicarbonate with Hydrogen Perioxide in MU1 -MU5 from 1977 to May 1980. Thereafter Sodium Bicarbonate with gaseous O2 was utilized.

PV - Pore Volume
GWS - Groundwater Sweep
RO -Reverse Osmosis and Reinjection
Recirc - Recirculation

Figure 1. Production and Restoration Sequence, Irigaray And Christensen Ranch ISR Uranium projects

Irigaray Mine Units 1 through 9



Christensen Ranch Mine Units 2 through 6

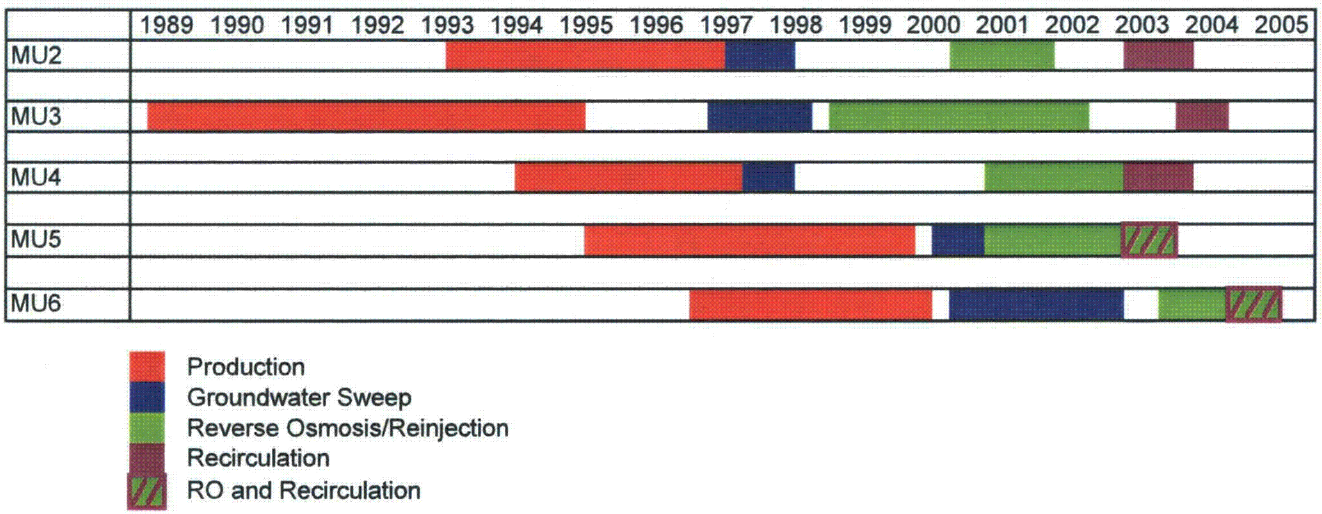


Figure 5-7. Mean TDS Concentration-Post Mining Through 4th Stability Round
Mine Unit 3, Christensen Ranch, Wyoming, Cogema Mining, Inc.

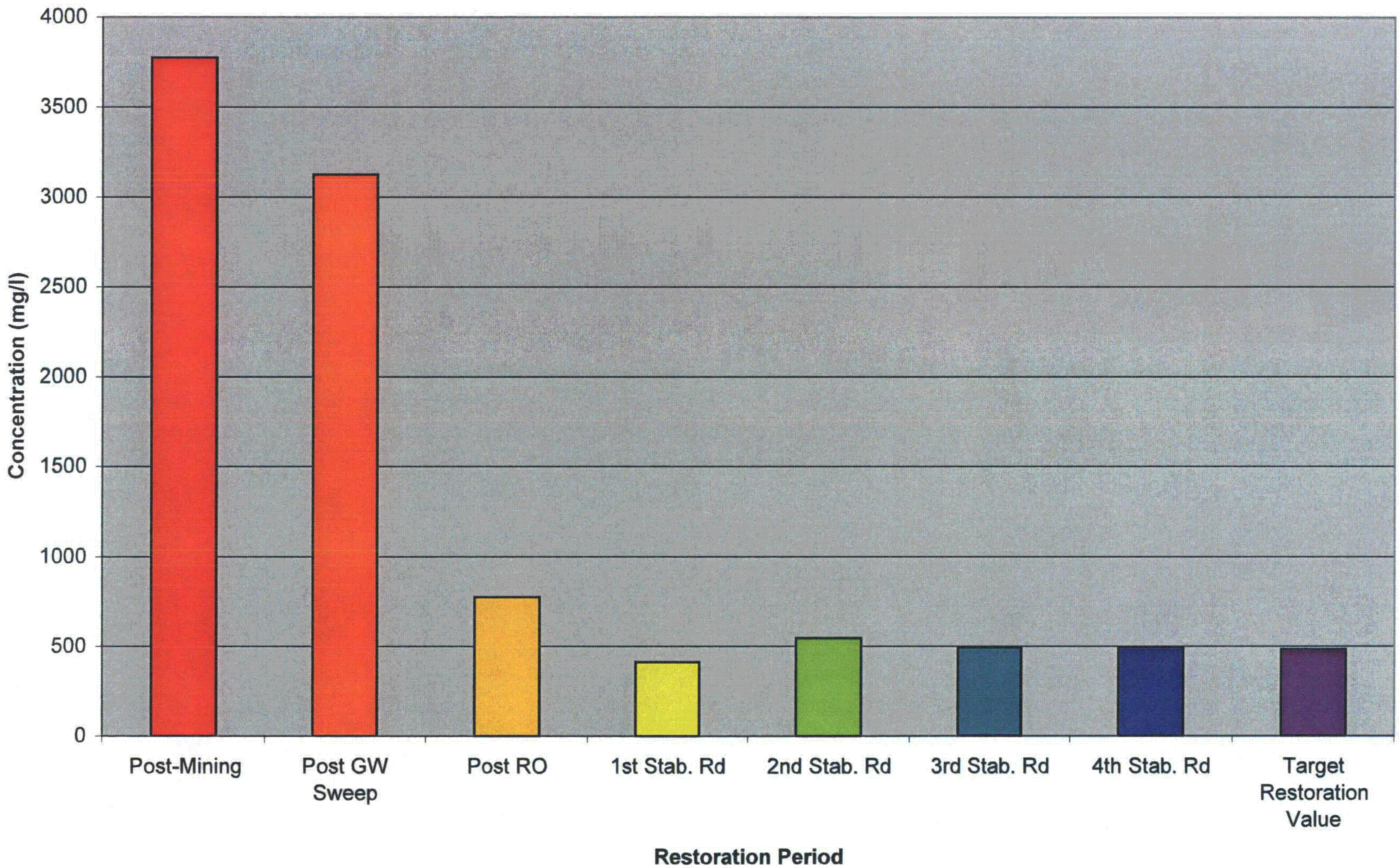


Figure 5-8. Mean TDS Concentration-Post Mining Through 4th Stability Round
Mine Unit 5, Christensen Ranch, Wyoming, Cogema Mining, Inc.

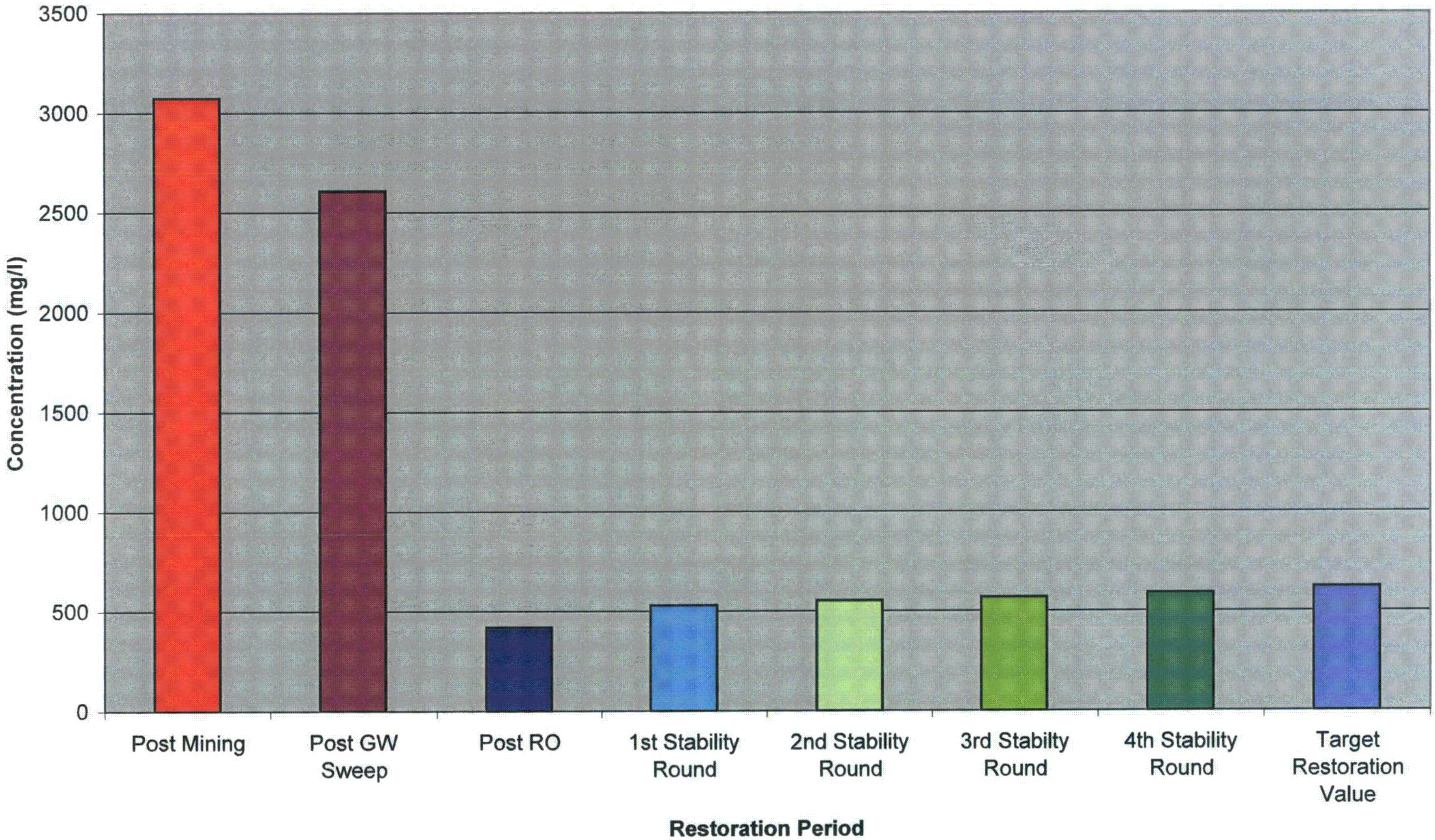
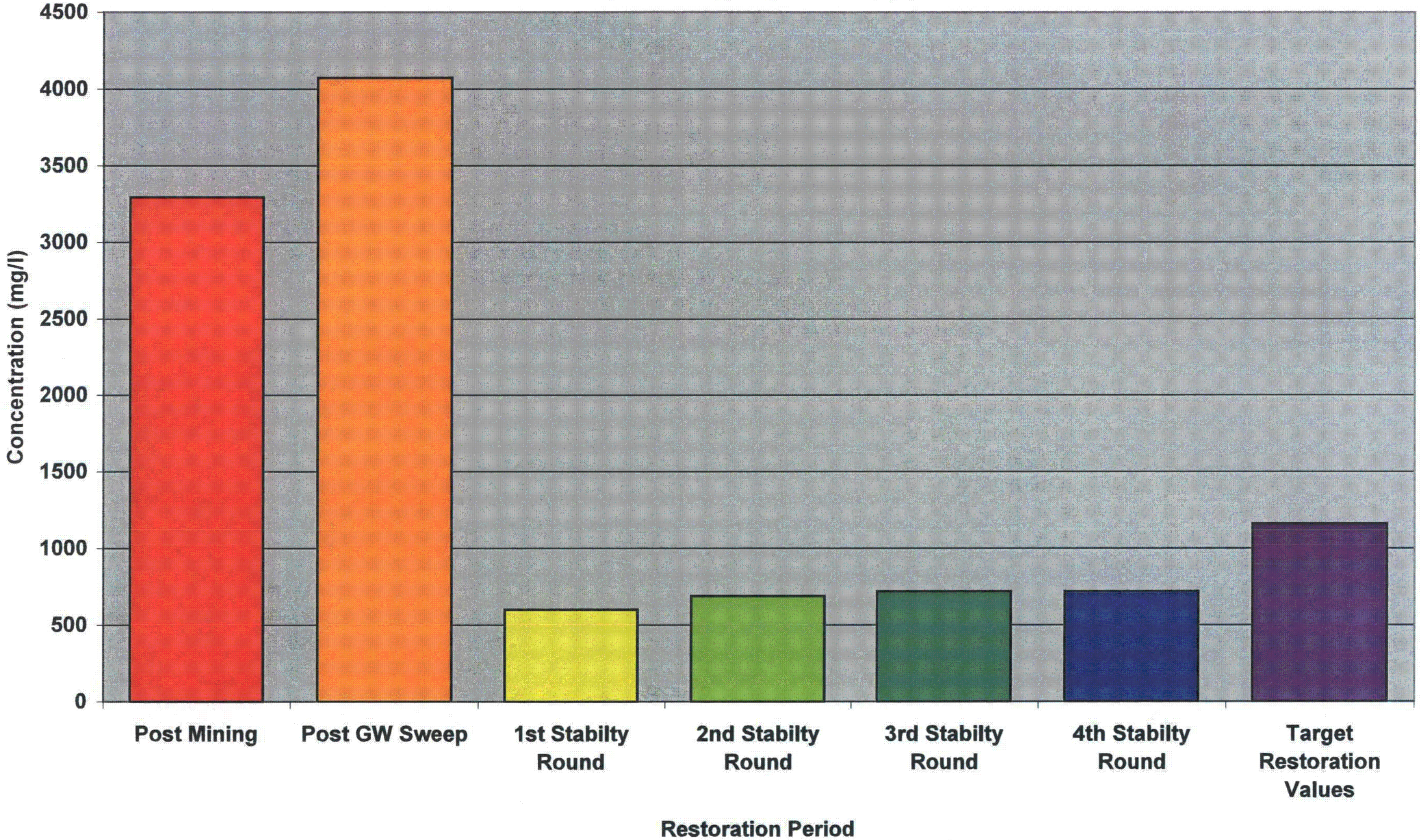


Figure 5-7 Mean Total Dissolved Solids Concentration-Post Mining Through 4th Stability Round
Mine Unit 6, Christensen Ranch, Wyoming, Cogema Mining, Inc.



Figuire 5-12. Mean Uranium Concentration-Post Mining Through 4th Stability Round
Mine Unit 5, Christensen Ranch, Wyoming, Cogema Mining, Inc..

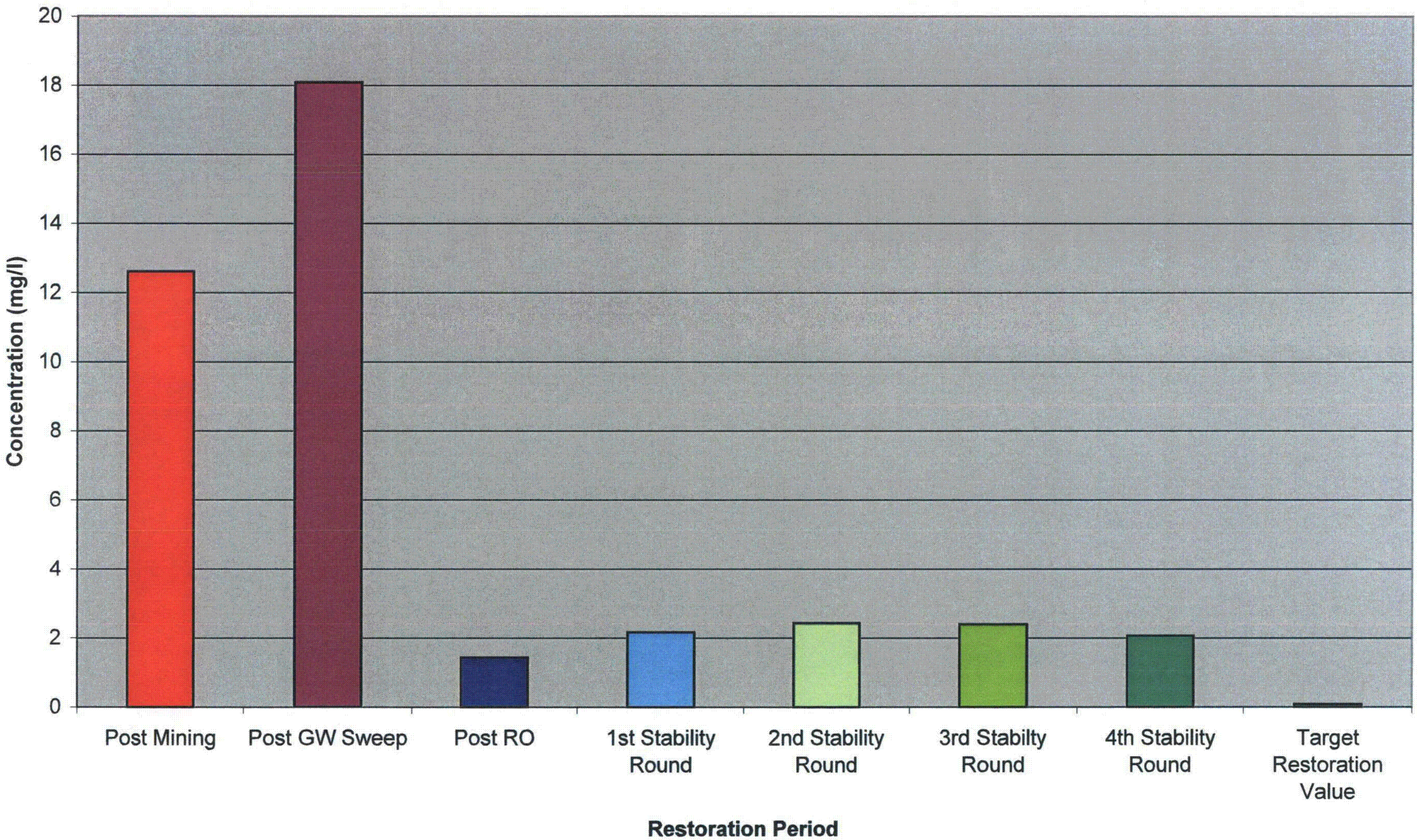


Figure 5-13 Mean Uranium Concentration-Post Mining Through 4th Stability Round
Mine Unit 6, Christensen Ranch, Wyoming, Cogema Mining, Inc.

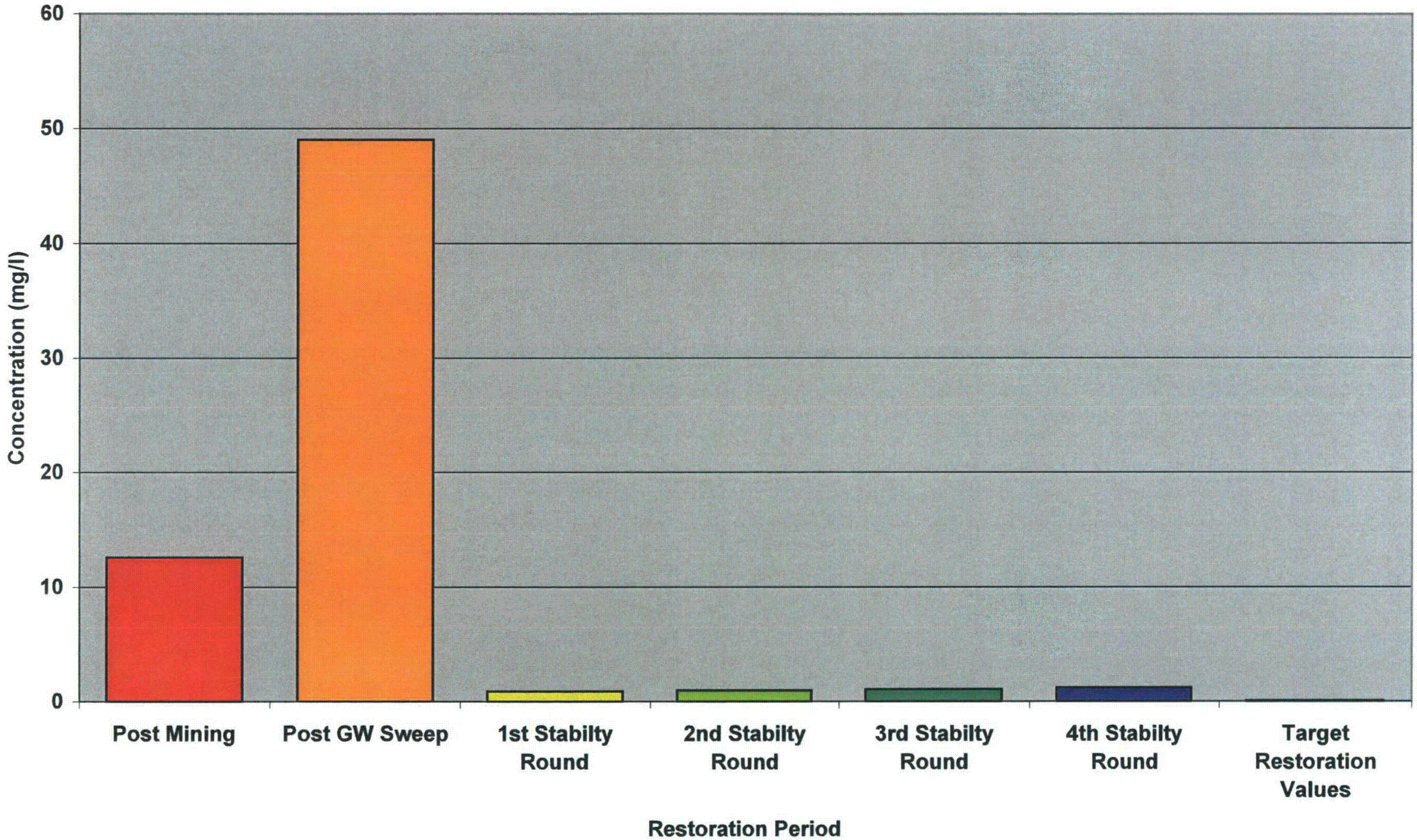


FIGURE 4-4
CONDUCTIVITY AND URANIUM TRENDS
PRODUCTION UNIT 6, RO PHASE
(MONTHLY RECOVERY WELL AVERAGES)

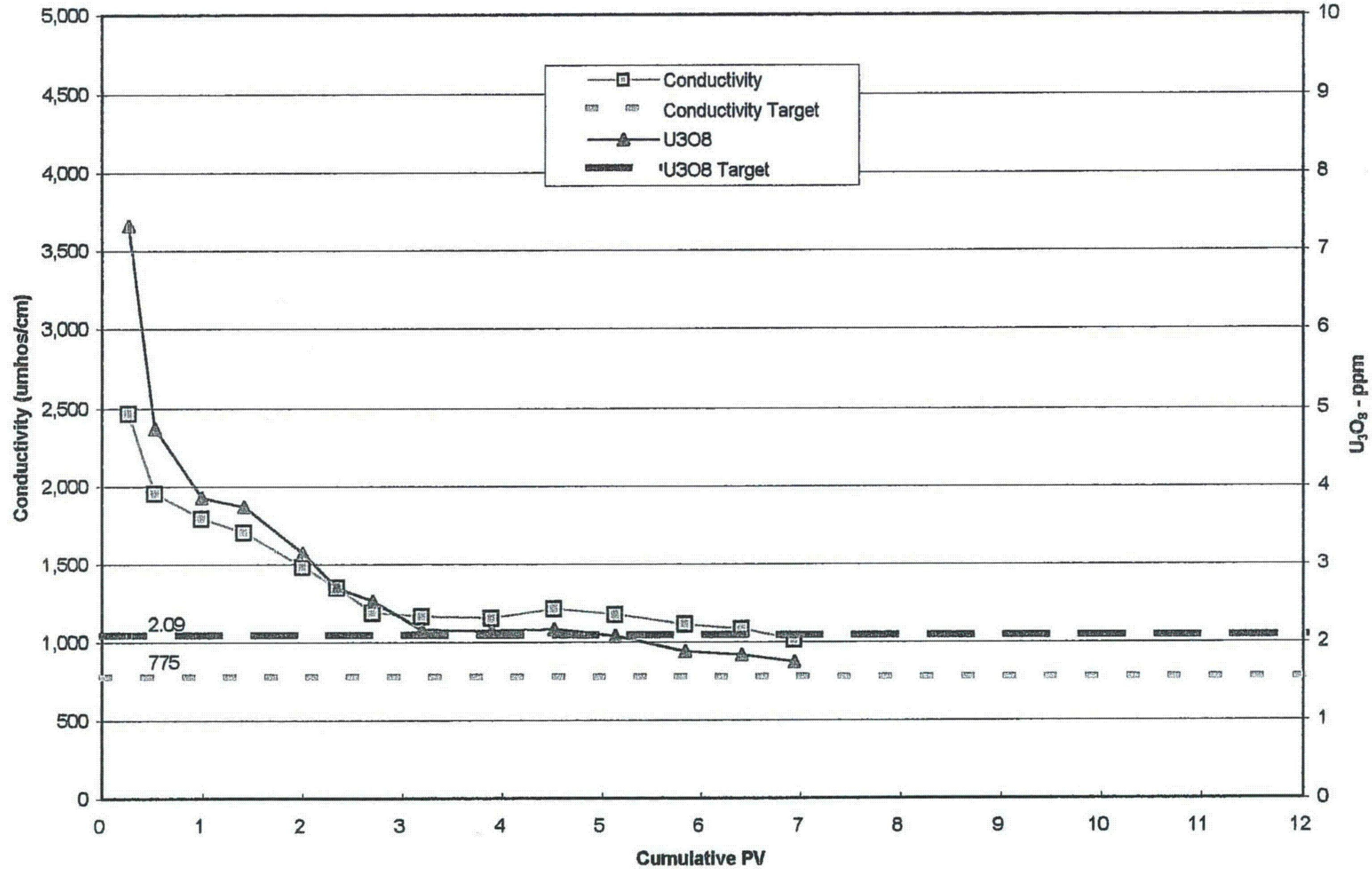


FIGURE 4-5
CONDUCTIVITY AND URANIUM TRENDS
PRODUCTION UNIT 7, RO PHASE
(MONTHLY RECOVERY WELL AVERAGES)

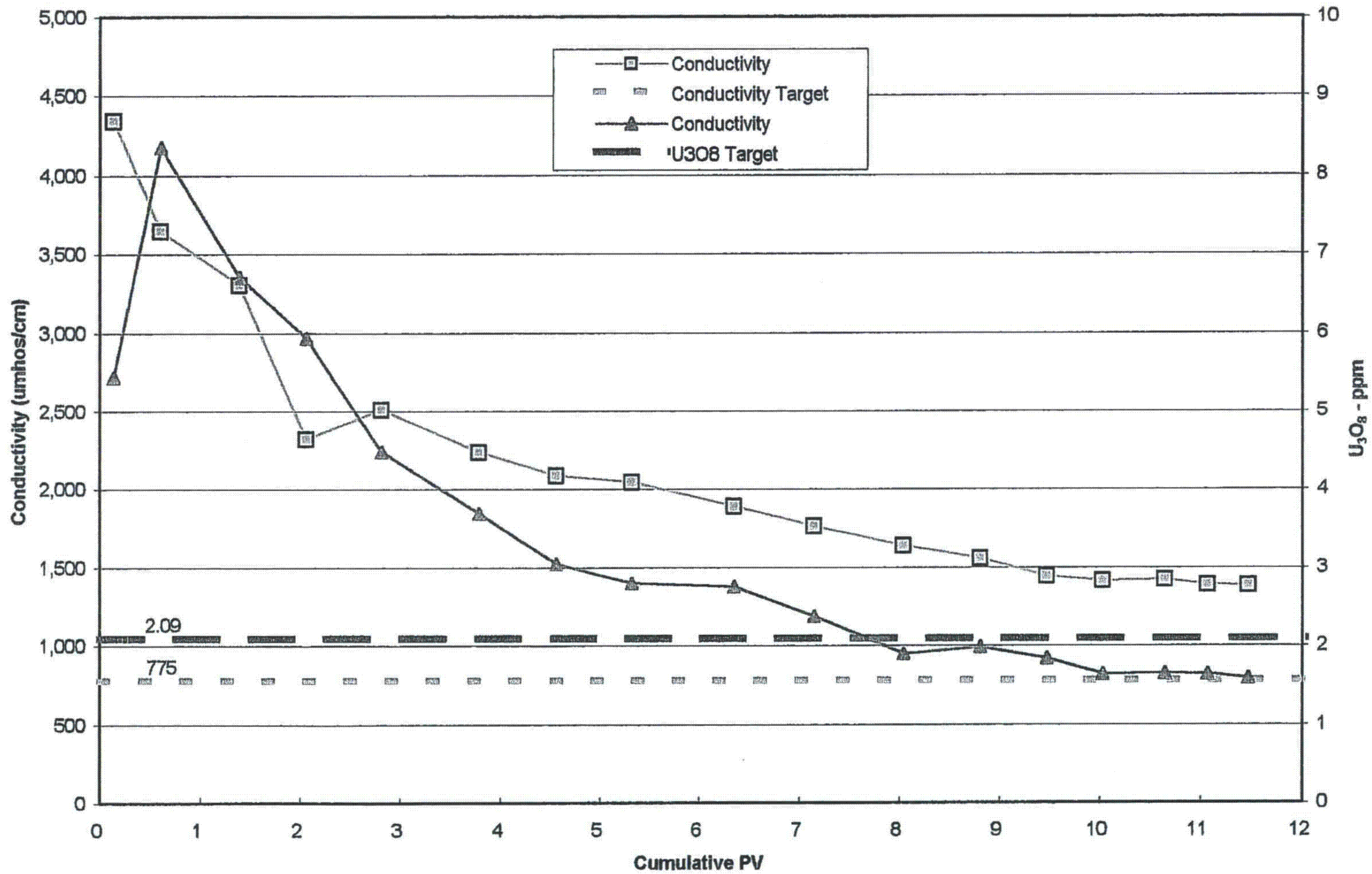


FIGURE 4-6
CONDUCTIVITY AND URANIUM TRENDS
PRODUCTION UNIT 8, RO PHASE
(MONTHLY RECOVERY WELL AVERAGES)

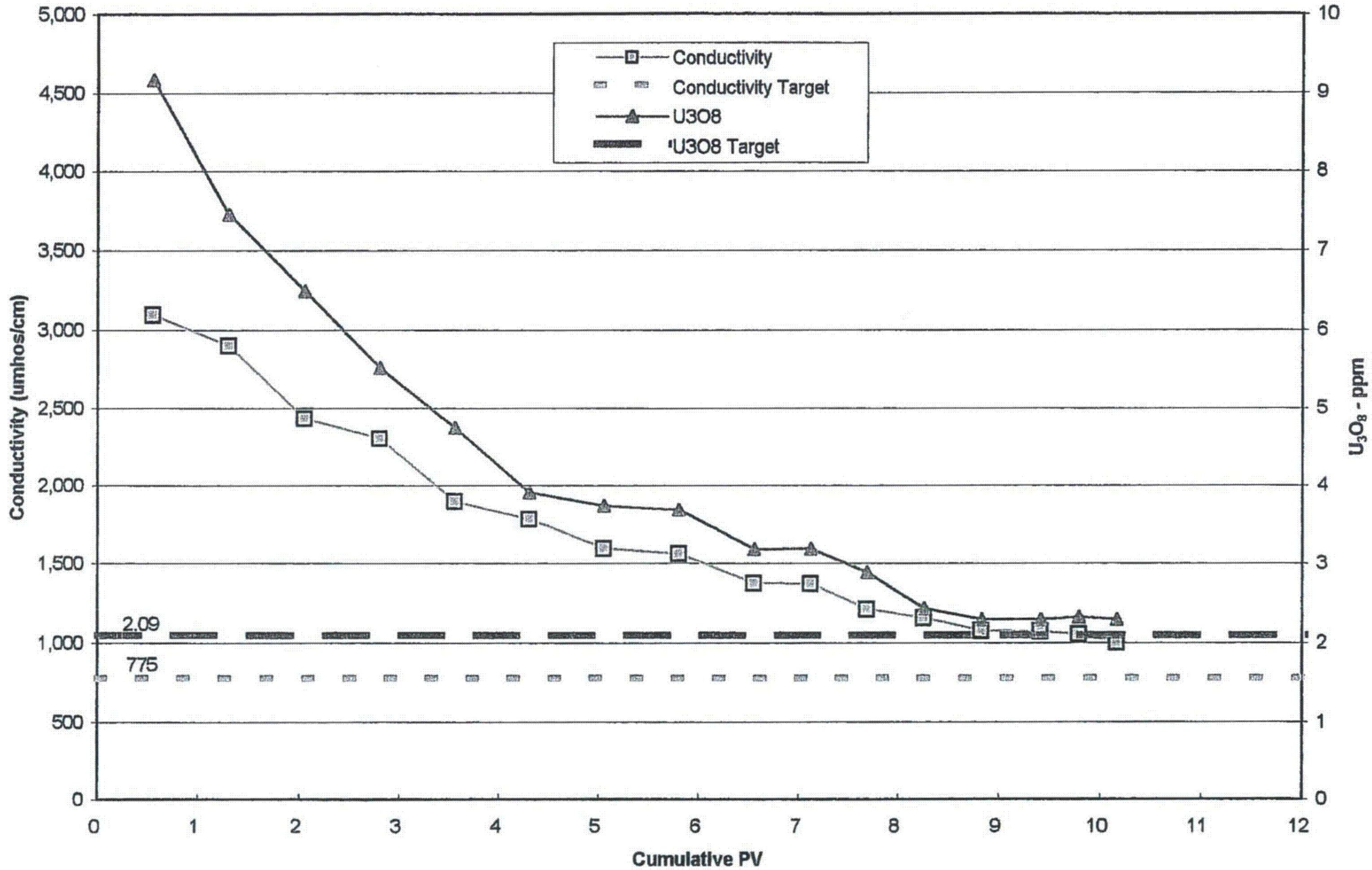


FIGURE 4-7
CONDUCTIVITY AND URANIUM TRENDS
PRODUCTION UNIT 9, RO PHASE
(MONTHLY RECOVERY WELL AVERAGES)