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ABBREVIATIONS AND ACRONYMS

µmhos/cm	micromhos per centimeter
BLM	Bureau of Land Management
BPT	Best Practicable Technology
Eh	oxidation-reduction potential
EPA	Environmental Protection Agency
ft bgs	feet below ground surface
H_2S	hydrogen sulfide
ISR	In Situ Recovery
LC ISR, LLC	Lost Creek ISR, LLC
LQD	Land Quality Division
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
Na_2S	sodium sulfide
NH_3	ammonia
NRC	Nuclear Regulatory Commission
pCi/L	picoCuries per liter
Permit Area	Lost Creek Permit Area
Project	Lost Creek Project
PV	pore volume
RO	reverse osmosis
SOP	standard operating procedure
su	standard units
SWPPP	Storm Water Pollution Prevention Plan
TDS	total dissolved solids
UIC	Underground Injection Control
US	United States
WDEQ	Wyoming Department of Environmental Quality
WQD	Water Quality Division
WSEO	Wyoming State Engineer's Office

GROUNDWATER QUALITY RESTORATION AND SURFACE RECLAMATION

A variety of restoration and reclamation activities will be phased in throughout the Lost Creek Project (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 RP-1** includes a schedule of activities for the Project, including the restoration and reclamation activities. Lost Creek ISR, LLC (LC ISR, LLC) will include in the Annual Report to the Wyoming Department of Environmental Quality (WDEQ) and the United States (US) Nuclear Regulatory Commission (NRC) a map of the Lost Creek Permit Area (Permit Area) showing: the mine units that are being developed, in production, and in restoration; and areas where restoration has been completed. The schedule will be compared with that in **Figure RP-1**, and if it becomes evident that LC ISR, LLC cannot comply with the approved schedule, a request for revision of the schedule will be made, including explanation of the reason(s) for the changes from the approved schedule.

Reclamation of each mine unit and associated header houses involves:

- groundwater restoration,
- radiological decontamination,
- equipment removal/decommissioning (e.g., well abandonment), and
- 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 the 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 or overlying header houses and/or mine units will be carefully evaluated and implemented. Once groundwater restoration is complete, decontamination and other reclamation activities will start. Because some ore-bearing sands may overlie others in a mine unit, decontamination of equipment and other surface reclamation activities will start when all of the “stacked” sands are restored.

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

- radiological decontamination,
- equipment removal/decommissioning (e.g., building demolition), and
- 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. The restoration and reclamation success criteria are summarized in **Table RP-1a**.

RP 1.0 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 resources, 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 ion exchange and processing capacity of the Plant 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.

RP 2.0 PLANS AND SCHEDULE 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. The methods to achieve this objective for groundwater are described in this section.

The schedule for the Project activities, including groundwater restoration, is shown in **Figure RP-1** and is discussed in detail in **Section OP 2.1**. **Figure RP-2** shows the location of the mine units and includes a schedule of mining and restoration for each mine unit. **Figures OP-5a through OP-5f** illustrate the water balance for the Project, and include several variations of production and restoration scenarios. **Section OP 3.6.3** discusses the water balance during different phases of the Project. During the groundwater sweep restoration phase of the first mine unit, the waste water will be sent to disposal since there will be no need for make-up water in other mine units. However, during groundwater sweep of subsequent mine units, at least a portion of the waste water may be used as make-up water for reverse osmosis (RO) treatment or other purposes. **Figure OP-5b** represents the water balance during groundwater sweep in the first mine unit.

LC ISR, LLC has designed its processing plant to perform restoration concurrent with commercial production. Restoration shall be carried to completion with all reasonable diligence and shall be conducted concurrently with production operations to the extent practicable.

RP 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 United States (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 lixiviant 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, salts, residual uranium and other metals mobilized under the oxidized conditions are removed, and the treated water is re-injected. As necessary to accomplish restoration, specific reductants such as sodium sulfide may be added. Bioremediation may also be applied, if site conditions are suitable for this restoration technology.

RP 2.2 Restoration Requirements

LC ISR, LLC commits to return the groundwater to the pre-operational class-of-use in accordance with WDEQ statutes and regulations. Restoration will demonstrate that Best Practicable Technology (BPT), as defined in the Wyoming Statutes, has been applied. Current technologies which are considered BPT are discussed in the following section. If possible, restoration will be conducted to achieve water quality that approximates baseline levels.

Prior to operation of each mine unit, groundwater class-of-use will be determined by the WDEQ-Water Quality Division (WQD) on the basis of baseline water quality data collected in accordance with WDEQ requirements and submitted to WDEQ by LC ISR, LLC. The WDEQ Class-of-Use Standards are listed in **Table RP-1b**. For the wells in the perimeter monitor ring and for wells in overlying and underlying aquifers, the class-of-use 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 class-of-use for that mine unit (WDEQ, 1977).

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 initiating ISR operations in each mine unit, in accordance with the Testing Proposal which will be submitted to WDEQ-Land Quality Division (LQD) for review and approval. A minimum of four samples will be collected from each well, with each sampling event separated by at least 14 days. At least one of the four samples will be analyzed for the parameters required per WDEQ-LQD Guidelines 4 and 8, as listed in **Table RP-1b**. The other samples may be analyzed for a reduced parameter list with agency approval.

RP 2.3 Groundwater Restoration Methods

The following sections discuss the treatment phases and methodology that will be employed during the groundwater restoration program at the Lost Creek Project. LC ISR, LLC believes that the groundwater restoration methodology set out in this section represents Best Practicable Technology (BPT) as evidenced and demonstrated by accepted and approved industrial practices over the last decade in the State of Wyoming and at other locations where ISR operations are licensed and authorized. Further evidence that the methodology described herein is accepted as BPT is the inclusion of the same methodology in NRC NUREG-1910, 'Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities', published in May 2009. As stated in the abstract of the document:

> *"NRC developed this GEIS using (1) knowledge gained during the past 30 years licensing and regulating ISL facilities, (2) the active participation of the State of Wyoming Department of Environmental Quality Land Quality Division as a cooperating agency and (3) public comments received during the preparation of the GEIS."*

In order to demonstrate that BPT has been correctly applied, LC ISR, LLC will be required to review: (1) the type of technology used; (2) the application of the technology; and (3) the economics and benefits of further processing, upon completion of the restoration activities within each mine unit. While the restoration activities described herein 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 consider new technologies as they develop and apply them to groundwater restoration as appropriate and as approved by WDEQ-LQD. A conclusion that the proper technology was economically applied can only be drawn at the completion of the activity.

The aquifer restoration program will use a combination of the following phases including:

- groundwater transfer
- groundwater sweep
- reverse osmosis treatment with permeate injection; and
- recirculation.

LC ISR, LLC may evaluate the use of reductants on a case by case basis. If it is determined that use of a reductant would be beneficial and consistent with BPT, LC ISR, LLC will seek WDEQ-LQD approval via a minor permit revision application that details the proposed chemical or biological reductant addition techniques, anticipated chemical or biological responses and compliance with the applicable terms and conditions of the UIC permit requirements. With permit approval, reductants could be added during any of the restoration phases to lower the oxidation potential of the groundwater within the production zone. Reductants have been used successfully in some mine units in Wyoming, but have been relatively ineffective in others. Further, the additives and addition techniques have not been standardized within the industry. Some operators have added sulfide or sulfite compounds to the injection stream in concentrations theoretically sufficient to reduce the oxidized species. Biological reductant methods have also been proposed and applied as experimental technology. Because of the lack of consensus on the techniques and results, reductant addition is not presently considered in the discussion of BPT.

The progress of groundwater restoration is often measured on the basis of the number of "pore volumes" treated in each phase. Pore volume is a term used by the industry to define an indirect measurement of a unit volume of aquifer water affected by ISR operations. It represents the volume of water that fills the void space in a certain volume of rock or sediment. Pore volume provides a unit reference that an operator can use to describe the amount of treated water circulations needed to flow through a depleted ore body to achieve restoration standards.

One pore volume (PV) is equivalent to:

- the volume of water within the pattern area (thickness of the completion interval times the surficial pattern area times the effective porosity of the sand); plus
- the volume of water outside of the pattern area affected by the "horizontal flare" of the lixiviant along the outer edge of the pattern area; plus
- the volume of water above and below the completion interval affected by the "vertical flare" of lixiviant.

The thickness (T) of the average well completion interval and the size of the pattern area (A_p) are readily measurable, and the effective porosity is determined from hydrogeologic data. The extent of the horizontal and vertical flare can also 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 twenty percent of the volume in the pattern area. The calculation of the pore volume will take the form of the following equation:

$$PV = Area \times Thickness \times Horizontal\ Flare \times Vertical\ Flare \times Porosity \times Conversion$$

$$PV = A_p\ (ft^2) \times T\ (ft) \times 1.2 \times 1.2 \times 0.25 \times 7.48\ (gallons/ft^3) = PV\ (gallons)$$

The number of pore volumes planned for each stage of groundwater restoration to meet the restoration objective and to demonstrate the application of BPT is as follows:

- Groundwater transfer - zero to two pore volumes (optional);
- Groundwater sweep – three tenths of a pore volume;
- RO permeate injection - six pore volumes; and
- Groundwater recirculation – one pore volume.

LC ISR, LLC will conduct an in-house water quality monitoring program throughout the progression of the groundwater restoration activities. Upon the expectation that the restoration requirements have been met, LC ISR, LLC will collect appropriate groundwater samples (as outlined in this application) to determine the results. If confirmed, LC ISR, LLC will initiate the stabilization monitoring phase and 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 primary standards, LC ISR will either re-initiate certain of the restoration phases or submit documentation to the agencies that BPT has been used in restoration and the aquifer has been restored to its original class of use. The documentation will include an evaluation of the water quality data and a narrative of the application of BPT as applied.

Additional details, descriptions and discussion of the pore volume requirement determination of the various phases of groundwater restoration are presented in the following sub-sections.

RP 2.3.1 Groundwater Transfer

Groundwater transfer (or exchange) involves moving groundwater between a mine unit in restoration and another mine unit where uranium production is beginning. (Alternately, it may be desirable to transfer water between different portions of the same mine unit, depending on the water quality and operational state of the different portions.) Both mine units will first have received approval for UIC Class III injection. The transferred groundwater may undergo treatment using one or more of the permit-approved processes (such as ion exchange, chemical pH adjustment, and/or reverse osmosis) prior to injection within the destination mine unit. This technique is generally used to replace operationally-affected waters in the restoration mine unit with baseline quality water from the production mine unit. The operationally-affected waters from the restoration mine unit are then used as the basis for the lixiviant in the production mine unit.

Because water is transferred (or exchanged) between mine units at equal rates, the transfer typically does not generate liquid effluents.

The operations plan and project schedule for the Lost Creek Project do not represent the use of groundwater transfer techniques. However, should the opportunity arise and BPT dictates the use of the method, LC ISR, LLC will beneficially utilize groundwater transfer to enhance the project restoration effort. In such an event, it is projected that the transfer will involve between zero and two pore volumes. As two discreet mine units of differing volume are involved, the actual pore volume transferred will vary depending on the mine units involved. For the restoration mine unit, groundwater transfer has much of the benefit of groundwater sweep without the large consumptive use of water. This technique has been used successfully at ISR operations in Nebraska.

RP 2.3.2 Groundwater Sweep

During groundwater sweep, water is pumped from the mine unit without offsetting with water injection. This pumping creates an influx of baseline quality native groundwater into the unit, thereby flushing contaminants from areas affected by the horizontal and vertical spreading (flare) of the lixiviant during mining. The affected water in the edge patterns of the mine unit is also drawn back into more central portions of the pattern area, making the later restoration phases more efficient.

Groundwater produced during the sweep phase will contain uranium and other constituents mobilized during production. The initial concentrations of the constituents would be similar to those during the later stages of production. With enough pumping, the constituent concentrations would decline gradually, reflecting the influx of baseline quality water. The water produced during groundwater sweep is treated through the restoration plant ion exchange circuit to capture uranium and then either treated with reverse osmosis or pumped directly to disposal.

Groundwater sweep alone is typically insufficient and uneconomical for complete groundwater restoration. Because of the heterogeneities commonly observed in the production aquifers, the native groundwater that is brought into the ore zone does not completely displace the residual lixiviant. With increasing volumes produced, a greater proportion of the produced water will be native groundwater. Many pore volumes of groundwater would need to be produced in order to reach original baseline conditions, if baseline conditions could be achieved by this method alone. Application of groundwater sweep alone to Wyoming ISR projects has not been demonstrated to be successful and therefore is not proposed for the Lost Creek Project.

Native groundwater quality and regional climate may impact the extent to which groundwater sweep is considered for use under BPT. The native groundwater quality is relatively poor at many of the South Texas ISL facilities that could be considered as analogs to a modern ISR facility in Wyoming. In addition, because the regional climate in South Texas is characterized by considerable precipitation, pumping out the groundwater by sweep does not significantly impact the area and is therefore considered an acceptable method. In the arid basins of Wyoming, the use of substantial volumes of native groundwater to replace the affected groundwater may not be considered beneficial. Experience at other Wyoming ISR facilities also demonstrates that long-term groundwater sweep operations do not lead to water quality that approaches baseline conditions within the impacted production zones.

As part of its commitment to environmental stewardship and BPT, LC ISR, LLC will minimize the volume of groundwater removed during sweep operations. The operational requirement of this phase will be condensed to the basic need to draw water into the pattern area of unit from the edges. The benefits from groundwater sweep will be realized in a fraction of one pore volume since the groundwater within the production pattern area will not require displacement by this operation. Groundwater within the production pattern area can be more effectively remediated by reverse osmosis permeate injection operations.

LC ISR, LLC has determined that groundwater sweep removal of 0.3 PV, in conjunction with the groundwater removal associated with the bleed requirements of normal production and RO, will result in an adequate flushing and removal of water from the affected areas at the edges of the mine unit. This determination is supported by the underlying calculation of a pore volume. A pore volume (PV) includes the volume of water within the pattern area (V_{PA}) plus the volume of water outside of the pattern area affected by the horizontal flare (V_{HF}) of the lixiviant along the outer edge of the pattern area plus the volume of water above and below the completion interval affected by the "vertical flare" (V_{VF}) of lixiviant. Using the preliminary estimate of vertical and horizontal flare factors of 0.2, the portion of a pore volume attributable to the vertical and horizontal flare combined approximately equals 30% (0.30). The following calculations apply:

$$V_{HF} = V_{VF} = 0.2\ V_{PA}$$

$$PV = V_{PA} + V_{HF} + V_{VF} = V_{PA} + 0.2\ V_{PA} + 0.2V_{PA} = 1.4V_{PA}$$

$$\text{therefore;}\quad (V_{HF} + V_{VF}) / PV = (V_{HF} + V_{VF}) / 1.4\ V_{PA} = (0.2\ V_{PA} + 0.2V_{PA}) / 1.4V_{PA}$$

$$\text{and;}\quad (V_{HF} + V_{VF}) / PV = 0.4V_{PA} / 1.4V_{PA} = 0.29PV$$

The Lost Creek project schedule (**Figure RP-1**), water balances (**Figures OP-5b, OP-5c,** and **OP-5e**) and bond calculations incorporate a groundwater sweep phase operation of 0.30 PV in each mine unit.

RP 2.3.3 Reverse Osmosis Treatment with Permeate Injection

Reverse osmosis with permeate injection (RO) is used following the groundwater sweep phase. This treatment is most beneficial in returning the concentrations of total dissolved solids and trace metals and the aquifer pH to baseline values. The water balances in this restoration phase are shown in **Figures OP-5c through OP-5f.**

During this restoration phase, uranium in the groundwater is removed by passing the water through an ion exchange circuit. The ion exchange resins remove the majority of the soluble uranium in recovered solutions and yield chloride, sulfate or bicarbonate ions in the place of the uranium compounds. The chemistry of the ion exchange circuit used in the restoration is identical to the chemistry of the ion exchange circuit used in the production circuit. Ion exchange resins preferentially remove the uranyl dicarbonate and/or uranyl tricarbonate compounds from the solution. Chloride, sulfate and/or bicarbonate compounds are displaced from the resin and set into the solution.

After ion exchange, other chemical constituents in the groundwater are removed by passing the water through an RO system. The RO process yields two fluids: clean water (permeate) that can be reinjected into the aquifer; and concentrated water (brine) that cannot be reinjected directly. Water sent to the RO system usually requires some form of pre-treatment to prevent fouling of the membranes. Commonly, the pH is lowered with the addition of sulfuric or hydrochloric acid and antiscalant additives may be used. These additives (along with the sulfate and/or chloride ions of the acid) are rejected in the RO unit and become part of the brine. Therefore, the additives do not become part of the permeate which will be injected into the restoration aquifer. After reverse osmosis, the permeate may be depressurized to release entrained gasses. This process commonly results in a pH increase since carbon dioxide is typically present in the permeate and is readily released at atmospheric pressure. Sodium hydroxide may also be added to increase the pH of the permeate stream prior to injection.

If reductant is added to the injection stream during the 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 theoretically lowered, thereby decreasing the solubility of these elements. As warranted, hydrogen sulfide, sodium sulfide, 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 prepared for WDEQ-LQD review prior to implementation.

Table RP-2 shows typical RO manufacturers' specification data for removal of ion constituents. The clean permeate water will be re-injected or sent to storage for use in the ISR process. The 25% of water that is rejected, called "brine," contains the majority of dissolved salts and other ions recovered from the mine unit water and will be sent for disposal in the waste system. The amount of brine can be reduced by making additional passes through an RO system. Permeate produced from secondary RO units may be added to the injection stream to reduce the amount of "bleed" in the restoration areas.

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 typically shown that the groundwater class-of-use can be attained in approximately six pore volumes of RO treatment.

The prescribed restoration process and number of pore volumes of RO treatment has been proven successful at analogous mine units restored at the Christensen Ranch ISR Project in the Powder River Basin of Wyoming. The process is justifiable in terms of performance and achievability in relation to health, safety and the minimization of adverse impacts to the environment. The restoration efforts and results from the restored Christensen Ranch Mine Units 5 and 6 (Wellfield Restoration Report, Christensen Ranch Project, March 2008) are reviewed and compared to the process proposed for the Lost Creek Project. Although located in a distinctly separate geographic basin, the two mine units were selected as analogs for the following reasons;

1) Restoration began soon after production operations ended;
2) RO treatment of lixiviant was employed throughout the production life;
3) Average flow rates on a per well basis for these fields most nearly approach the average flow rate per well predicted for Lost Creek (low flow rate per well is not analogous);
4) The pore volume calculation method was comparable;
5) There were mixed pattern types addressing multiple ore horizons within the sand unit; and
6) Hydro-geologic properties are similar (see table below).

Project & Mine Unit	Confined?	Sand Unit Thickness (ft)	Transmissivity (ft^2/d)	Hydraulic Conductivity (ft/d)
Christensen MU5	Yes	190	87	0.46
Christensen MU6	Yes	50 - 60	84	1.58
Lost Creek	Yes	120 - 140	60 – 80	0.50 - 1.50

The groundwater restoration process employed at the Christensen Ranch Project was similar in that it employed the staged approach of groundwater sweep followed by RO and then recirculation. The following table presents the actual number of pore volumes processed in each restoration stage at the Christensen Ranch Project as compared to the Lost Creek restoration plan.

Project & Mine Unit	Pore Volumes			
	Groundwater Sweep	Reverse Osmosis	Recirculation	Total
Christensen MU5	1.1	8.0	1.0	10.1
Christensen MU6	1.5	3.5	1.0	6.0
Lost Creek (projection)	0.3	6.0	1.0	7.3

Ground water within the Christensen Mine Unit 5 production zone was restored to the pre-mining class of use, using BPT, as required by the WDEQ-LQD. In Mine Unit 5, 25 of the 35 constituents were restored to at or below their target restoration values. Concentrations of most constituents were reduced by more than seventy five percent of the post mining values.

There are reasons to expect that restoration of Mine Unit 5 could have been achieved with fewer pore volumes of treatment. Plots of uranium concentration and total dissolved solids for each module (header house) during RO clearly indicate that the effort extended well beyond the point where beneficial gains were being obtained. The Mine Unit 5 restoration report data (COGEMA, March 2008) supports a conclusion that the completion of the restoration operations in Mine Unit 5 could have been achieved with six or less pore volumes of RO operations instead of the 8 PV that were completed.

Ground water within the Christensen Mine Unit 6 production zone was also restored to the pre-mining class of use, using BPT, as required by the WDEQ-LQD. In Mine Unit 6, 27 of the 35 constituents were restored to at or below their target restoration values. Concentrations of most constituents were reduced by more than seventy five percent of the post mining values.

The Mine Unit 6 Restoration Report (COGEMA, March 2008) demonstrates that six PV of active restoration is sufficient to successfully complete restoration operations in mine units using the BPT practices proposed for the Lost Creek Project. LC ISR, LLC has included seven and one-third PV of active restoration in its restoration plan. The proposed process is justifiable in terms of performance and achievability in relation to health, safety and the minimization of adverse impacts to the environment.

RP 2.3.4 Recirculation

At the completion of the reverse osmosis treatment phase in a mine unit, recirculation will be initiated. Recirculation consists of pumping from the mine unit and re-injecting the commingled solution (untreated) into the aquifer it came from. Recirculating solution is intended to homogenize the overall groundwater conditions. It is anticipated that one pore volume of groundwater will be recirculated.

RP 2.4 Stabilization Phase

Upon completion of restoration and notification of WDEQ, a groundwater stabilization monitoring program will begin in which the pattern monitor wells used to evaluate restoration success will be sampled. Each pattern monitor well will be sampled at the beginning of stabilization and once every three months for a period of twelve months, for a total of five samples, and analyzed for the parameters in Table RP-1b.

The stability period will be a minimum of 12 months. (Pursuant to discussions with WDEQ-LQD, the bond and timeline show a stability period of 9 months. The additional three months of time is accounted for in the regulatory approval period.) Following the end of the 12-month 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 analyses 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 its 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 used will be determined by the constituent and the process required to decrease its concentration.

During stability monitoring, all overlying, underlying and perimeter monitor wells will be analyzed for all UCL parameters once every two months. If groundwater restoration has not been successful and an excursion occurs during stabilization, then the sampling will revert to weekly for affected monitor wells until the excursion is resolved.

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.

RP 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 Annual Report submitted to WDEQ-LQD. This information will also be included in the final report on restoration.

Upon completion of restoration activities and before stabilization, the monitor wells in the pattern area, plus any perimeter, overlying, or underlying monitor wells affected by excursions, will be sampled for the parameters required per WDEQ-LQD Guidelines 4 and 8, as listed in **Table RP-1b**. 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. These comparisons will help ensure that the water quality criteria have been met and that the oxidation/reduction conditions in the pattern area are such that any residual uranium or other metals are not readily mobile. In addition, the water quality data for monitor wells completed outside the uranium recovery zone that have experienced an excursion will be compared with the US Environmental Protection Agency (EPA) maximum contaminant levels (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.

RP 3.0 MINE UNIT RECLAMATION

Mine unit reclamation will be followed by any radiation surveys and/or soil or equipment remediation required by NRC within the mine unit.

RP 3.1 Well Abandonment

Once 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 11, Section 8;
- WDEQ-WQD Rules and Regulations Chapter XI, Section G; and
- Wyoming State Engineer's Office (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 or tremie 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 (ft bgs) 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 ft bgs, additional grout will be introduced on top of the settled grout through a tremie pipe. Step 8 will not commence unless the last application of abandonment material remains less than three feet below ground surface after at least a 24-hour period.
8) Once the grout is set, the soil around the well collar will be excavated so the final plug depth is at least three ft bgs. 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 RP-3**.
12) A written well abandonment report will be completed and sent to WSEO and WDEQ-LQD.

RP 3.2 Facility and Road Reclamation

With the exception of any facilities, access roads, or utility corridors required for continued operation all of the facilities associated with a specific header house or mine unit will be removed once stabilization in that header house or mine unit has been deemed complete. The header houses and pump stations will be moved to new locations in other mine units of 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 performed in accordance with the methods described below in **Section RP 4.5**.

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 RP-3**.

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 RP 4.5**.

Erosion control will be an important factor in protecting the topsoil resource. When soil is disturbed in such a manner that wind or water erosion may result, one or more of the following practices will be followed to mitigate the potential risk:

- mulching;
- terracing;
- wind breaks;
- dust suppression with water; and/or
- sediment trapping structures

RP 4.0 RECLAMATION AND DECOMMISSIONING OF PROCESSING AND SUPPORT FACILITIES

The facilities that require reclamation and decommissioning include:

- processing and water treatment equipment, which includes tanks, filters, ion-exchange columns, pipes, pumps, and related equipment;
- buildings and structures, parking areas, processing facilities, shipping areas, laydown areas, and offices;
- waste storage, treatment, and disposal facilities, including the Underground Injection Control (UIC) Class I wells and the Storage Ponds;
- buried pipes;
- topsoil and subsoil stockpile locations;
- engineering control structures, such as dams and culverts; and
- roads.

Final reclamation and decommissioning will begin following any radiation surveys and or soil or equipment remediation required by NRC.

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 and groundwater restoration have been completed. Approval for post-operational use must be supported by the landowners and/or lessees request, and approval from the US Bureau of Land Management (BLM), which is the surface management agency of the Permit Area, and WDEQ-LQD. 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.

RP 4.1 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 and release limits. Particular attention will be given to equipment and structures in which radiological materials could accumulate, including piping, traps, junctions, and access points. 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 or disposed of at an appropriately licensed solid waste facility.

Structures will be decontaminated, if necessary, and moved to a new location, salvaged, or dismantled and disposed at an appropriately licensed solid waste facility. Concrete flooring, foundations, and foundation materials will be decontaminated, if necessary, broken up, and disposed of at an appropriately licensed facility. The contours of the disposal area shall blend with those of the surrounding area.

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 OP 2.5**. Storm water control, soil replacement, and reseeding will be done in accordance with the methods described below in **Section RP 4.5**.

RP 4.2 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 and decommissioned in accordance with the separate license requirements.

Any contaminated sludge accumulation in the Storage Ponds, the pond liner, and, if necessary, the leak detection equipment will be removed, in accordance with the standard operating procedure (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 below in **Section RP 4.5**.

All other waste facilities will be reclaimed in accordance with the procedures outlined above in **Section RP 4.1**.

RP 4.3 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 RP 4.1**.

RP 4.4 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 RP 4.5**.

RP 4.5 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.

During site reclamation, the storm water discharge permits applicable per the Wyoming Pollution Discharge Elimination System (WYPDES) will be maintained (**Table ADJ-1**).

The associated Storm Water Pollution Prevention Plan (SWPPP) will be designed and implemented as part of LC ISR, LLC's compliance with applicable WDEQ-Water Quality Division (WQD) rules and will be kept in an accessible area of the Project. The SWPPP will focus on protecting waters of the state through prevention and mitigation of chemical spills and topsoil erosion and will contain provisions for routine inspections and audits to ensure the plan is being properly implemented and all employees, and contractors as necessary, are familiar with applicable portions of the plan.

RP 4.5.1 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 is obtained from the landowner and WDEQ to leave the facilities in place to improve post-operational access or land use.

RP 4.5.2 Surface Preparation

Due to the nature of ISR, topography or drainage patterns will not be significantly altered during operations. Therefore, post-reclamation contours are not shown on a separate map (see Plate OP-2 for pre-operational contours). The small areas of disturbance that may be necessary (e.g., due to culvert removal) will be graded to approximate pre-operational contours and drainage patterns.

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

To avoid creating ruts or other surface damage, loss of soil resources, and/or equipment damage, seed bed preparation will be performed under appropriate soil (e.g., not when the ground is wet, frozen, or exceptionally dry) and climatic conditions (e.g., not during significant precipitation events or if the wind is excessive).

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 a depth of 12 inches to ensure soil stability after replacement. Areas with viable sage brush will not be ripped and seed will be broadcast and worked in by appropriate means such as a harrow, drag, or rake.

RP 4.5.3 Soil Replacement

Excavated soils will be replaced at the location from which they were excavated; unless, the area from which the soils were excavated is approved for a different post-mine land use (e.g., the landowner requests that a road or building remain in place and that request is approved by WDEQ-LQD). In such a case, the excavated soil from the road or building area will be used in another area where the original topsoil depth was thin or non-existent (e.g., it was disturbed by historic exploration activities), if such replacement is approved by WDEQ-LQD.

The replaced soil thickness will be in accordance with the depths and acreages salvaged during construction (**Section OP 2.5**). 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.

RP 4.5.4 Seed Mix, Reseeding Methods, and Fencing

The permanent seed mix and seeding rates for revegetation of the Permit Area are provided in **Table RP-3**. 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 January 14, 2010 and by Melissa Bautz of the WDEQ-LQD Lander Field Office (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. On occasion it may be beneficial to stabilize soil by planting a vigorous annual cover crop of rhizomatous species as directed in WDEQ-LQD Guideline 2. LC ISR, LLC will seek and receive approval from BLM and WDEQ-LQD before planting such species.

Three methods of seeding, drill, 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.

Drill seeding will be the primary method. Areas with little gradient will be seeded with the rows perpendicular to the direction of the prevailing wind. Where necessary to prevent erosion, seeding will be done along the contour. 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 broadcast seeding, the areas will be raked or dragged along the contour. This will cover the seeds with approximately one-quarter inch of soil. Pit seeding will be used in areas in which vegetation re-establishment is particularly difficult because the method allows for sheltering seeds from eolian erosion and capturing moisture in the area of the seed.

When reseeding areas outside fenced mine units or the Plant, vehicular access to reseeded areas will be restricted until vegetation is successfully re-established. Because of the potential for excessive grazing pressure on these areas, revegetation success will be evaluated in each growing season to determine if additional weed control, a cover crop, or other protective measures are necessary. If such measures are considered necessary, LC ISR, LLC will submit a plan to WDEQ-LQD.

RP 4.5.5 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) of the undisturbed portions of the Permit Area;
- 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.

RP 4.6 Recovery of Groundwater Levels

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

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

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

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

RP 5.0 FINANCIAL ASSURANCE

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

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

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

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

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

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

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

Category 1) Groundwater Restoration

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

Category 2) Decommissioning and Surface Reclamation

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

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

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

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

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

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

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

Category 3) Miscellaneous Associated with Third Party Contractors and Contingency

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

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

Environmental Protection Agency. 2009b. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Unified Guidance. EPA 530-F-09-020 Available from http://www.epa.gov/osw/hazard/correctiveaction/resources/guidance/sitechar/gwstats/unified-guid-3.pdf. Access on 9th December 2009.

The Cogema Report, Wellfield Restoration Report Christensen Ranch Project, March 5, 2008.

Wyoming Department of Environmental Quality. 1977. Letter from G. Beach (WQD) and R. Chancellor (LQD) to M.Loomis (WMA). Use of average wellfield concentrations and individual monitor well concentrations for groundwater classification at in situ operations.