Shroff, Behram

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Sent: Wednesday, July 29, 2009 8:59 AM
To: 'Hamm, Tracy'
Subject: GW for Moore
Attachments: Groundwater_rev1_RK.docx

The only text I have on GW is dated 3/24 (attached). If there is anything more recent, pl send ASAP. Pls give me an answer regardless. Thanks

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3.5.3 Groundwater

The uranium-bearing aquifer at the Moore Ranch site is located in the Eocene Wasatch Formation. The Wasatch formation is described as an arkosic fine-to coarse-grained sandstone with siltstone, claystone, and coals. The contact between the underlying Fort Union Formation and the Wasatch is gradational in the vicinity of Moore Ranch and is generally arbitrarily set at the top of the thicker coals or thick sequence of clays and silts. The applicant has identifed the boundary between the two formations to be the top of the Roland Coal. The total thickness of the Wasatch Formation ranges between 800 and 1,100 feet in the License Area. In the southern portion of the of the Powder River Basin, the Wasatch generally dips to the northwest at 1.0 to 2.5 degrees.

There are commonly multiple water-bearing sands within the Wasatch Formation. Groundwater within the Wasatch aquifers is typically under confined (artesian) conditions, although locally unconfined conditions exist. Well yields from the Wasatch in the southern part of the Powder River Basin where the site is located are reported to be as high as 500 gpm. The overall flow of groundwater water in the shallow aquifers in the vicinity of Moore Ranch is toward the Powder River to the north-northwest.

The applicant has adopted the nomenclature used by Conoco for the hydrostatigraphic units of interest within the Moore Ranch Project. Sands above the Roland Coal are numbered, increasing upward. The 40 and 50 sands lie immediately above the Roland Coal and are regionally extensive sands that are considered significant aquifers. The approximate thickness of the 40 and 50 sands in the license area are 80 and 90 feet, respectively. The 58 sand varies in thickness from 5 to 80 feet. The 60 sand is approximately 100 feet thick and is continuous throughout the license area. It is separated from the 58 sand by about 5 to 70 feet of shale and mudstone. The 68 sand is the first sand underlying the 70 sand which contains the economic ore deposits in the area. The 68 sand ranges from 40 to 100 feet across the study area and coalesce with the 60 sand on the west side of the project area. The 70 sand is the proposed ore production zone and coalesces with the 68 sand in one the proposed production areas. The 72 sand overlies the 70 sand and is the shallowest sand across the license area. The 70 sand is separated from the overlying 72 sand by a shale ranging from a few feet thick to 160 feet in some areas.

3.5.3.1 Uranium Bearing Aquifers

The 70 sand is the proposed production aquifer. The 70 sand is laterally extensive and ranges from 40 to 120 feet thick. Groundwater is unconfined in the 70 sand over much of the study area. Groundwater flow is to the northwest in the 70 sand. The 70 sand dips to the northwest and outcrops approximately one mile south of the license area.

Hydrogeologic characteristics:

The hydraulic properties of the production aquifer have been evaluated through a series of pump tests. Aquifer testing was performed between 1978 and 1980 while Conoco was investigating the Moore Ranch site as a possible mine site. Additional pump tests were conducted in 2007 and 2008. Analysis of data from the 2008 test have estimated the transmissivity and hydraulic conductivity of the 70 sand to be 405 ft^2/day and 5.36 ft/d, respectively. Estimates of specific yield ranged from .011 to .039.

Level of confinement:

The 70 sand appears to be hydraulically isolated from the overlying 72 sand. Water levels in the 72 sand are much higher than the 70 sand, indicating a significant downward gradient from the 72 to the 70 sand. The unsaturated zone present throughout much 70 sand indicates that groundwater in the 72 sand is likely perched on the shale separating the two aquifers. Pump testing conducted to date has indicate no hydraulic interconnection between the 72 and 70 sands.

The 70 sand is separated from the 68 sand by a shale over much of the project area. Pump testing conducted to date has identified no hydraulic interconnection in these areas. However, boring data indicates that the shale is missing in a portion of proposed wellfield 2, and the 68 sand coalesces with the 70 sand within this area. An apparent hydraulic connection between the 68 and 70 sands is present in this area. The applicant considers the 60 sand to be the underlying aquifer in the area where the 68 and the 70 sand coalesce. However, the 68 and 60 sand also coalesce in the western portion of the license area. Water levels in the 68 and 70 sands are similar, indicating a potential hydraulic interconnection.

Groundwater quality:

Baseline groundwater quality programs have characterized the quality of groundwater within the shallow Wasatch aquifer within the Moore Ranch License area. Groundwater quality in these aquifers commonly exceed WDEQ Class I standards for TDS and sulfate. Radionuclides radium-226 and uranium are elevated above EPA MCLs in the majority of samples collected from the production zone aquifer and the underlying aquifer. The average radium 226-228 concentration in the production zone is an order of magnitude greater than the USEPA MCL. Elevated concentration of these constituents is consistent with the presence of uranium ore-bodies.

Current Groundwater uses:

According to the Wyoming State Engineers Office, there are 439 wells located within the 2-mile radius of the License Area as of December, 2005. Most of the groundwater pumped from active wells surveyed within a 2-mile radius of the License Area boundary is used either for stock water or CBM production. Within the two mile radius, there are three domestic water wells. While these wells are permitted for domestic use, there are no currently occupied residences with the License Area and 2-mile radius. Therefore, these wells are not being primarily utilized for human consumption.

3.5.3.2 Surrounding Aquifers

In addition to the sands of the Wasatch discussed above, the underlying Fort Union Formation and Fox Hills Sandstones include potentially important aquifers. However, due to the relatively shallow depth of the production zone in the overlying Wasatch, these deeper aquifers are not likely to be impacted by ISL operations in the production zone.

4.5.2 Groundwater Impacts

Potential impacts to groundwater can occur during the construction, operation, restoration and decommissioning phases of the ISL project.

4.5.2.1 Construction Impacts to Groundwater

As indicated in the GEIS (Section 4.3.4.2.1), potential impacts to groundwater during construction is primarily from consumptive use of groundwater, injection of drilling fluids and muds during well drilling, and spills of fuels and lubricants from construction equipment.

As further indicated in the GEIS, groundwater use during the construction phase is limited and is expected to have a small and temporary impact. Groundwater quality of near surface aquifers is expected to be protected by best management practices such as spill prevention and cleanup. The amount of drilling fluids and muds introduced into aquifers would be limited. Thus, the construction impacts to groundwater resources would be small based on the limited nature of construction activities and implementation of management practices to protect shallow groundwater.

While the construction impacts to groundwater resources are expected to be small, the applicant has been requested to provide additional information that is relevant to a final determination of theses impacts. The applicant has been requested to provide additional information regarding groundwater use and quality in the immediate area of the facility, including in the shallow aquifers that might be impacted by construction activities. Additional analysis regarding the potential impacts of releases to shallow soil or shallow groundwater has also been requested. In addition, an analysis of the potential impacts to surficial soils and shallow groundwater during facility construction, including well field installation and testing, has been requested. A discussion of best management practices that will be followed during facility construction has similarly be requested. Thus, the evaluation of construction impacts to groundwater resources remains open.

4.5.2.2 Operation Impacts to Groundwater

Impacts to groundwater may occur during operations to shallow aquifers, production and surrounding aquifers, and to deep aquifers below the production aquifer.

4.5.2.2.1 Operation Impacts to Shallow (Near-Surface) Aquifers

The GEIS (Section 4.3.4.2.2.1) discusses the potential impacts to shallow aquifers during ISL operations. A network of buried pipelines is used during ISL operations for transporting lixiviant between the pump house and the satellite or main processing facility and also to connect injection and extraction wells to manifolds inside the pumping header houses. The failure of pipeline fittings or valves, or failures of well mechanical integrity in shallow aquifers could result in leaks and spills of pregnant and barren lixiviant which could impact water quality in shallow aquifers. The potential environmental impact of such pipeline, valve, or well integrity failure depends on a number of factors, including the depth to shallow groundwater, the use of shallow groundwater, and the degree of hydraulic connection of shallow aquifers to regionally important aquifers.

Hydrogeologic data presented by the applicant indicates that the 72 sand is the first aquifer encountered below the land surface. The depth of the 72 sand ranges between approximately 30 and 200 feet below ground surface (BGS) within the license area. The total thickness of the sand ranges from 5 to 90 feet. Due to its relatively shallow depth, the shallow groundwater in the 72 sand may be subject to impacts from releases at or near the ground surface. However, the thickness of the saturated zone within the 72 sand, and hence the depth to the groundwater and its usability as a water source, has not been clearly established. The applicant has been requested to provide such information. The current use and quality of the 72 sand has also not been clearly established, and the applicant has been requested to provide this information. Due to the potential impact in the shallow groundwater in the 72 sand, the applicant has also been requested to provide an analysis of the potential impacts of releases at the surface that include considerations such as depth to the water table, the permeability of the materials in the unsaturated zone, and the potential adsorption of constituents in the unsaturated zone materials, and the volume of any potential releases.

The water table in the 72 sand has been shown to be perched on the underlying aquitard. Groundwater levels in the 72 sand have been shown to be much higher than water levels in the underlying 70 sand. Consequently, shallow groundwater in the 72 sand appears to be hydraulically isolated from the underlying 70 sand and any regionally important aquifers.

As indicated in the GEIS, the use of evaporation ponds or land application to manage process water generated during operations also could impact shallow aquifer. However, neither evaporation ponds nor land application to manage process water generated during operations are planned at Moore Ranch. Consequently, there is no potential impact to shallow groundwater from these aspects of ISL operations.

As indicated by the GEIS, the potential impact of releases at or near the ground surface on shallow groundwater can be greatly reduced by leak detection programs required by the NRC. The applicant plans an aggressive leak detection and spill cleanup program. In Section 7.5 of the TR, the applicant described the use of high and low flow alarms for individual wells as the primary means for timely identification of a pipe rupture. Headerhouses will be equipped with a "wet building" alarm to detect presence of liquids in building sumps. Additionally, the applicant has proposed a program of wellfield monitoring by roving wellfield operators for periodic visual inspections. Spills exceeding 420 gallons are to be reported to Wyoming Department of Environmental Quality accompanied by reporting to NRC. Following repair of well field leaks, contamination surveys are to be performed and contaminated soils may be remediated at the time if concentrations exceed regulatory requirements or left in place and documented for future clean-up, as needed, during decommissioning. The applicant also indicates that a concrete curb will be built around the entire process building. This pad will be designed to contain the contents of the largest tank within the building in the event of an rupture. Any spill of plant fluids will be contained within the containment allowing for all fluids to drain to the sump system and be pumped to the waste disposal system. Thus, the applicant is planning to include numerous measures to minimize the potential release of wastes and their potential impact on shallow groundwater.

The determination of the impact of operations on shallow groundwater remains open until the requested information regarding the extent of saturation of, groundwater quality in, and groundwater use from the 72 sand is provided. Similarly, the determination of impact of operations on shallow groundwater remains open until the requested analysis of these potential impacts is provided.

4.5.2.2.2 Operation Impacts to Production and Surrounding Aquifers

The potential environmental impacts to groundwater supplies in the production and other surrounding aquifers are related to consumptive use and groundwater quality.

Water Consumptive Use: As discussed in the GEIS (Section 4.3.4.2.2.2), groundwater is withdrawn and reinjected into the production zone during ISL operations. Most of the water withdrawn from the aquifer is returned to the aquifer. The portion that is not returned to the aquifer is referred to as consumptive use. The consumptive use is due primarily to production bleed and also includes other smaller losses. The production bleed is the net withdrawal maintained to ensure groundwater gradients toward the production network. This net withdrawal ensures there is an inflow of groundwater into the well field to minimize the potential movement of lixiviant and its associated contaminants out of the well field.

Consumptive water use during ISL operations could impact local water user who use water from the production aquifer outside the exempted zone. This potential impact would result from lowering the water levels in nearby wells and reducing the yield of these wells. In addition, if the production zone is hydraulically connected to other aquifers above and/or below the water zone, consumptive use may impact the water levels in these overlying and underlying aquifers and reduce the yield in any nearby wells withdrawing water from these aquifers.

As previously discussed in Section 3.5.3, the production zone (the 70 sand) is an unconfined aquifer over much of the license area. The unconfined conditions in the production zone help to reduce the impact of the production bleed anticipated during ISL operations at Moore Ranch. For a given net withdrawal, an unconfined aquifer will exhibit a reduced drawdown relative to that exhibited in a confined aquifer. This is because the water is taken from storage in the saturated zone during withdrawals from an unconfined aquifer.

Appendix B-4 of TR provides an analysis of the drawdowns during various phase of production. This analysis is developed using a numerical groundwater model calibrated to site specific conditions. The analysis assumes production rates of approximately 3,000 gpm and production bleeds ranging between 0.8 and 1.3 percent. The drawdowns predicted by the model simulations vary depending on the phase of production. The model predicts a maximum drawdown of 8 feet at the northern edge of the Well field # 1 at the end of the second stage of production.

While Appendix B-4 provides predictions for drawdowns in the immediate vicinity of the well fields, the drawdowns induced by production bleeds have not been extended into off-site areas in the vicinity of nearby water wells. Predictions of drawdowns induced by production bleeds throughout the model domain has been requested. In addition, a tabulation of all wells potentially impacted by these drawdowns in the 68 and 70 sands and an analysis of the impact on the yield of these wells has been requested.

Due to the hydraulic isolation of the overlying 72 sand from the production zone, there appears to be little potential impact on water levels in the 72 sand resulting from the production bleeds in the production zone. However, there is an apparent hydraulic interconnection between the underlying 68 sand and the production zone (70 sand) in the portion of well field 2 where the 68 and 70 sands have been shown to coalesce (See Section 3.5.3). Thus, there may be an impact on water levels in the 68 sand resulting from withdrawals in the overlying production zone. The potential impact of ISL operations on the 68 sand in the portion of well field 2 where the 68 and 70 sands have been shown to coalesce has been addressed in several Safety RAIs and is the subject of ongoing analysis as part of the Safety review. The identification of all wells screened in the 68 and underlying 60 sands in license and nearby areas has also been requested.

Prediction of drawdowns resulting from production bleeds in the 70 sand throughout the study area and the identification of those wells screened in the 68 and 70 sand potentially impacted by

these drawdowns have been requested. In addition, an analysis of the impact of the predicted drawdowns on the yield of these wells has been requested. The potential impact of consumptive groundwater use resulting from production bleed cannot be fully assessed until this additional information is provided. In addition, the adequacy of the numerical groundwater model provided in Appendix B-4 of the TR is currently being evaluated as part of the safety review, and an assessment of the reliability of the drawdowns predicted by the model is pending this review. The potential impact on consumptive use similarly cannot be determined until the issues relating to the potential impact of ISL operations on the 68 sand have been resolved during the ongoing Safety review.

Excursions and Groundwater Quality :

As discussed in the GEIS, groundwater quality in the production zone is degraded as part of ISL operations. The portion of the production aquifer used for production must be exempted as an underground source of drinking water though the Wyoming UIC program. After production is completed, the licensee is required to initiate aquifer restoration activities to restore the production zone to baseline or pre-operational class-of-use conditions, if possible. If the aquifer cannot be returned to preoperational conditions, NRC requires that the production aquifer be returned to the maximum contaminant levels provided in Table 5C of 10 CFR 40 Appendix A or to Alternate Concentrations Limits (ACL) approved by NRC. For these reasons, potential impacts to the water quality of the uranium-bearing production zone aquifer as a result of ISL operations would be expected to be small and temporary.

The restoration of the production zone, including the potentially impacted portion of the 68 sand in well field 2, was the subject of several safety RAIs and is currently being reviewed as part of the safety analysis. Thus, the issue of production aquifer restoration remains an unresolved issue. It is presumed that the Moore Ranch ISL project will not be licensed with out adequate assurances that the production zone can be restored to appropriate groundwater quality.

As discussed in the GEIS, inward hydraulic gradients are expected to be maintained in the production aquifer during ISL operations. These inward hydraulic gradients are created by the net groundwater withdrawals (production bleeds) maintained during ISL operations. These inward hydraulic gradients ensure that groundwater flow is toward the production zone and prevent horizontal excursions of leaching solutions away from the production zone.

As discussed in the GEIS, NRC requires the licensee to take preventive measures to reduce the likelihood and consequences of potential excursions. A ring of monitoring wells within and encircling the production zone is required for early detection of horizontal excursions. If excursions are detected, corrective actions are required.

The occurrence of an unconfined aquifer in the production zone at Moore Ranch presents special considerations when evaluating the maintenance of the necessary inward hydraulic gradient, the reliability of monitoring around the periphery of the well field, and capability of the pulling back any potential horizontal excursion. To help in addressing these special considerations, the applicant has developed a numerical groundwater model in an effort to represent the unconfined conditions that exist in the production zone at Moore Ranch. The model has been calibrated using site-specific hydraulic data and is presented as Appendix B-4 of the TR. Simulations using this model appear to indicate that it will be possible to maintain the necessary inward gradient during ISL operations and to adequately monitor the well fields to detect any potential horizontal excursions. Further analysis using the numerical groundwater model to demonstrate that it will be possible to recover any horizontal excursions is expected.

The numerical groundwater model was submitted in response to several safety RAIs and is currently being evaluated as part of the safety review. Pending this review, the technical issues

relating to the maintenance of an inward gradient during ISL production, monitoring for detection of horizontal excursions, and recovery of any potential horizontal excursions remain unresolved.

Vertical excursions may also potentially occur into aquifers overlying or underlying the production zone aquifer. As analysis presented in the GEIS indicates, the potential for migration of leaching solution into an overlying or underlying aquifer is small if the thickness of the aquitard separating the production zone from the overlying and underlying is sufficient and the permeability of the aquitard is low. Hydraulic gradient between the production zone and overlying or underlying aquifers also help to determine the potential for vertical excursions. The NRC also requires monitoring in the overlying and underlying aquifers. Corrective action is also required if any vertical excursions are detected.

The aquifer overlying the production aquifer is the 72 sand. The water table within the 72 sand has been shown to be perched on the underlying aquitard separating the 72 sand from the production aquifer (70 sand). The water levels in the 72 sand are generally much higher than in the 70 sand. The perched water table in the 72 sand and the high water levels in the 72 sand relative to the 70 sand demonstrate the lack of hydraulic interconnection between the 72 and 70 sands. The unconfined conditions in the 70 sand further support this conclusion. Pumping test conducted to date have also failed to demonstrate any hydraulic connection between the 70 and 72 sand. Thus, the potential for vertical excursion from the production zone into the overlying 72 sand is very small and the potential impact of such an excursion is insignificant to small.

A relatively thick and impermeable aquitard separates the production aquifer from the underlying 68 sand throughout much of the license area. Pumping tests conducted to date appear to indicate that the 68 sand is hydraulically isolated in these areas. However, the aquitard separating the 68 and 70 sand is missing in a portion of well field 2. The 68 and 70 sand coalesce in this area, and the two aquifers appear hydraulically interconnected. The apparent hydraulic connection between the production aquifer and underlying 68 sand in a portion of the well field 2 is the subject of several safety RAIs and is currently being evaluated as part of the safety review. Pending this review, the technical issues surrounding the potential for a vertical excursion into the underlying 68 sand in well field 2 remains unresolved.

4.5.2.2.3 Operation Impacts to Deep Aquifers Below the Production Aquifers

As indicated in the GEIS, potential environmental impacts to confined deep aquifers below the production aquifer could result from the deep well injection of processing wastes into deep aquifers. Underground injection of fluid requires a permit from EPA or an authorized state-administered program.

The potential environmental impacts of injection of leaching solutions into deep aquifers below ore-bearing aquifers would be expected to be small, if water production from deep aquifers is not economically feasible or the groundwater quality from these aquifers is not suitable for domestic or agricultural uses and they are confined above by sufficiently thick low permeability layers. In the Wyoming East Uranium Milling Region, non-karstic deep Paleozoic aquifers are frequently considered for deep well injection. As indicated in the GEIS, the potential impact of deep well injection into these aquifers could be small if properly confined.

The applicant initially indicated that the planned disposal wells would be permitted as Class I wells under the Wyoming Department of Environmental Quality (WDEQ) Underground Injection Control (UIC) program. Class 1 wells are those wells that inject into a strata below any underground source of drinking water. However, in response to recent safety RAIs, the applicant indicates that an application for a Class V UIC permit has been submitted for the planned injection wells. A Class V UIC permits are for those wells screened above an underground source of drinking water.

In response to this change in class of deep injection well, the applicant has been requested to provide a discussion of the issues that have led to the application for Class V rather than Class I injection wells for use in waste disposal. In addition, the applicant has been requested to provide a brief description of the disposal wells currently planned, including the strata into which injection is being proposed, the water quality and degree of isolation of that strata, and the potential environmental impacts of the proposed injection into that strata. The applicant is also to identify and discuss any issues or potential problems that the WDEQ has identified in its review of the application for the proposed Class V UIC wells. The evaluation of the potential impact of deep well injection at the Moore Ranch facility is pending the receipt and evaluation of this additional information.

4.5.2.3 Aquifer Restoration Impacts to Groundwater

The potential environmental impacts to groundwater resources during aquifer restoration are related to groundwater consumptive use and waste management practices, including deep well injection of wastes. In addition, aquifer restoration directly affects groundwater quality in the vicinity of the well field being restored.

The impacts of consumptive use during ISL operations has already been discussed in Section 4.5.1.5.2.2. As discussed in the GEIS, the impacts of consumptive use during aquifer restoration are generally greater during aquifer restoration than during ISL operations. A greater amount of groundwater is generally withdrawn when groundwater sweeps are employed during the aquifer restoration phase. These larger withdrawals can result in larger drawdowns in the production aquifer which can result in greater impacts on the yields of nearby wells. However, the unconfined condition in the production aquifer at Moore Ranch limits the use of groundwater sweeps. Thus, the drawdowns expected during groundwater restoration are not as large as might otherwise be expected. Nevertheless, the drawdowns anticipated during aquifer restoration are predicted to be larger that those predicted during ISL operations.

The numerical groundwater model presented as Appendix B-4 has be used to provide estimates of drawdowns. The model predicts a maximum drawdown of 16 feet on the periphery of the well fields during aquifer restoration. While Appendix B-4 provides predictions for drawdowns in the immediate vicinity of the well fields, the drawdowns resulting from groundwater withdrawals during aquifer restoration have not been extended into off-site areas in the vicinity of nearby water wells. Predictions of drawdowns induced by pumping during aquifer restoration throughout the model domain have been requested. In addition, a tabulation of all wells potentially impacted by these drawdowns in the 68 and 70 sands and an analysis of the impact on the yield of these wells has been requested. The impact of consumptive use during aquifer restoration cannot be determine until this additional information and analysis is received. In addition, the adequacy of the numerical groundwater model provided in Appendix B-4 of the TR is currently being evaluated as part of the safety review, and an assessment of the reliability of the drawdowns predicted by the model is pending this review.

As indicated in Section 4.5.1.5.2.2, groundwater withdrawals from the production aquifer during ISL may impact water levels in the 68 sand due to the hydraulic interconnection between the 70 and 68 sand in portions of well field 2. A similar impact may occur in the 68 sand during aquifer restoration. The potential impact of consumptive use during aquifer restoration similarly cannot be evaluated until the issues relating to the potential impact of ISL operations on the 68 sand have been resolved during the ongoing Safety review.

The use of deep well injection is planned for disposal of waste fluids during aquifer restoration. The potential impacts from deep well injection have been discussed in Section 4.5.1.5.2.2. As

indicated in this discussion, these impacts cannot be evaluated until the requested additional information and analysis has been received and evaluated.

Aquifer restoration should directly impact the quality of groundwater in the production zone. As discussed in Section 4.5.1.5.2.2, aquifer restoration is intended to restore groundwater quality in the production zone to baseline or pre-operational class-of-use conditions, if possible. If the aquifer cannot be returned to preoperational conditions, NRC requires that the production aquifer be returned to the maximum contaminant levels provided in Table 5C of 10 CFR 40 Appendix A or to Alternate Concentrations Limits (ACL) approved by NRC.

The restoration of the production zones, including the potentially impacted portion of the 68 sand in well field 2, was the subject of several safety RAIs and is currently being reviewed as part of the safety analysis. Thus, the issue of production aquifer restoration remains an unresolved issue. It is presumed that the Moore Ranch ISL project will not be licensed with out adequate assurances that the production zone can be restored to appropriate groundwater quality.

4.5.2.4 Decommissioning Impacts to Groundwater

As indicated in the GEIS (Section 4.3.4.2.4), potential impacts to groundwater during construction are primarily from consumptive use of groundwater, potential spills of fuels and lubricants, and well abandonment. The consumptive use during decommissioning will be much less than during ISL production or aquifer restoration. Spills of fuels and lubricants during decommissioning activities could impact shallow groundwater. Implementation of best management practices during decommissioning will reduce the likelihood of such spills and the impact to groundwater resources in shallow aquifers from decommissioning would be small.

As part of the restoration and reclamation activities, all monitor, injection, and recovery wells will be plugged and abandoned in accordance with the Wyoming UIC program requirements. If this process is properly implemented and the abandoned wells are properly isolated from the flow domain, the potential environmental impacts would be small.