

**U.S. Nuclear Regulatory Commission
Requests for Additional Information
Power Resources Inc. dba Cameco Resources (Cameco) Smith Ranch Project
Environmental Review of the License Renewal Application
for Source Material License SUA-1548**

The purpose of the following Requests for Additional Information (RAIs) is to provide the additional information and data that are necessary for the U.S. Nuclear Regulatory Commission (NRC) to fulfill the requirements of NRC's National Environmental Policy Act of 1969 (NEPA)-implementing regulations at Title 10 *Code of Federal Regulations* (CFR) Part 51 (10 CFR 51), and the Domestic Licensing of Source Material requirements in 10 CFR Part 40. These RAIs were developed during the NRC staff's review of Power Resources, Inc. dba Cameco Resources (Cameco) (the "Licensee") *Environmental Report* (ER) and *Technical Report* (TR), which were submitted to the NRC as part of its license renewal application.

Note: For the purpose of these RAIs, the Smith Ranch site and its two contiguous satellite sites, Highland and Reynolds Ranch, are collectively referred to as the "Smith Ranch site." Additionally, the three remote satellite sites presented in the Licensee's ER and TR are referred to as specific, individual sites when the discussion is specifically referring to one or more these remote satellite sites. These are denoted as the "Gas Hills site," the "North Butte site"; and/or the "Ruth site," as appropriate. When taken together, all six of these sites are denoted as the "Smith Ranch Project" or "the Project."

Additionally, the "phases" of the in situ uranium recovery (ISR) process are construction, operation, aquifer restoration, and decommissioning.

General

RAI GEN-1

Please confirm plans for the Ruth site during the proposed license renewal period.

If Cameco plans to develop the Ruth site during the proposed license renewal period, please provide detailed information regarding the scope and timing of these activities. Also, provide additional information to support an evaluation of the impacts to each resource area (as recommended in NUREG-1748). This information should include current data on the Ruth site and its vicinity, and also address, as appropriate, the information requested below as for the other sites in the Smith Ranch Project. This information should address each of the phases of the ISR process.

In Sections 1.5 of the ER and TR, Cameco writes that "[s]ince Cameco is not actively developing the Ruth Remote Satellite at this time [January 2012] and available data for Ruth are limited, Cameco will defer submittal of an operating plan and updated environmental evaluation for Ruth until closer to the time of commencing operations." On the other hand, Cameco also included environmental information regarding the Ruth area and, in Section 3.3.4 of the TR, stated that "Cameco has plans to extract uranium at Ruth within the next ten years, but an updated operations plan that details the extraction and production plans, including mine units, satellite layout and other details have yet to be developed." Thus, the NRC requests clarification of Cameco's intentions regarding the Ruth site.

RAI GEN-2

Please clarify the following apparent discrepancies in the license renewal application related to the size of the various sites and some of the respective flow rates.

- A. The areal extent (i.e., size) of the Smith Ranch site is stated differently on page 1-7 of the TR than on page 2-1 of the TR.
- B. The areal extent of the North Butte site is stated differently on pages 1-7 and 2-8 of the TR as compared to page 3-3 of the TR.
- C. The areal extent of the Gas Hills site is given differently on page 1-8 of the TR than on page 2-5 of the TR.
- D. The respective flow rates at the different sites also seem to contain some discrepancies, including:
 - i. Smith Ranch Site:
 - The current, maximum, and nominal flow rates for Satellite 2, 3, SR-1, and SR-2 are stated differently on page 1-15 of the TR as compared to the rates provided on page 3-47 of the TR.
 - ii. Reynolds Ranch Site:
 - The currently licensed flow rate is given differently on page 1-6 of the TR than on page 3-3 of the TR.
 - Proposed increased flow rate is stated differently on pages 1-6 and 1-15 of the TR than as given on page 3-3 of the TR.
 - iii. North Butte Site:
 - The currently licensed flow rate is specified differently on page 1-5 of the TR than on page 3-3 of the TR.
 - The proposed increased flow rate is stated differently on pages 1-5 and 1-15 of the TR than on page 3-3 of the TR.
 - iv. Gas Hills Site:
 - The flow rate is given differently on TR page 1-15 and ER page 2-1, than is stated on TR pages 3-4, 3-54, and 3-64.

RAI GEN-3

Please resolve apparent discrepancies concerning information for some of the facility-design data related to the Smith Ranch Project.

- A. The approximate footprint for the proposed North Butte satellite building is stated differently on page 3-3 of the TR, as compared to page 3-51 of the TR.
- B. The flow rate for the Carol Shop Satellite Building at the Gas Hills site is given differently on page 3-54 of the TR, than is stated on page 3-64 of the TR.

- C. On page 2-1 of the ER, it states that the total flow rate for the Gas Hills site would increase from the currently licensed 45,000 lpm to 51,000 lpm, while on page 1-15 of the TR, the currently licensed flow rate for the Gas Hills site is given as 51,000 lpm.
- D. The reported dimensions of the surface impoundment at Smith Ranch's Central Processing Plant (CPP) is stated differently on page 3-45 of the TR, than is stated on page 4-6 of the TR.

RAI GEN-4

Please update the status of all federal, state, and local permits submitted or required for the Smith Ranch Project. Identify each individual permit and provide additional information as needed.

- A. Please update the status of all federal, state, and local permits and identify each individual permit.
- B. Please provide an update regarding the status of Cameco's permit applications indicated as under technical review by the WDEQ.
- C. Please provide any additional information that may have been developed by Cameco during the preparation of the permit applications shown in Tables 1-2 through 1-4 as "to be prepared." Please include in revised Tables 1-2 through 1-4 any new permit applications that may have been submitted by Cameco (or accepted by the WDEQ) since the submittal of its license renewal application to NRC.

The permitting status of the Smith Ranch Project presented in the ER as Tables 1-1 through 1-4 indicates that some of the identified permits have been approved, while other permit applications are either under review or are yet to be prepared. In nearly all cases, however, the individual permits themselves (e.g., their tracking numbers) are not specified. Additionally, in Section 1.4.2 of the TR, Cameco indicates that a Combined Permit Application for the Smith Ranch, Highland, and Reynolds Ranch sites (i.e., to combine WDEQ Permits 633 and 603) has been submitted to the WDEQ and that it was under technical review by the WDEQ at the time of the license-renewal application's submittal to the NRC.

Please provide any additional information from these permits and permit applications provided to the federal, state, or county agencies since the ER was submitted, or provide the permits and permit applications themselves, for NRC's consideration in the NRC's EA.

RAI GEN-5

Please provide the current progress on construction and ISR operations at each of the Smith Ranch Project sites.

Cameco submitted its revised license renewal application in February 2012. Please provide an update to the current status of construction and operations at each of the Project sites.

Facility Design

RAI FD-1

Please provide additional information regarding header-house and wellhead structures.

- A. Please provide additional design details on the typical header house(s) that would be constructed to support wellfield operations at all Smith Ranch Project sites.
- B. Please provide the number of header houses and wells that would be constructed at each wellfield at each Smith Ranch Project site. For the Smith Ranch site itself, please compare the number of new header houses anticipated with the number currently located in the existing wellfields.

Sections 3.6.1.6 and 4.2.4 of the TR describe the current design of the basements in header houses and also the equipment (i.e., leak detection system, sump) that would be contained within these basements. Sections 3.5.2.2 of the TR and 4.9.1 of the ER provide wellhead cover design details. Please provide additional detail information on the header houses and wellhead structures to address (1) the extent of surface disturbance during construction, (2) the depth of excavation for header house basements, (3) the dimensions, colors, and construction materials of the header houses and wellhead structures, and (4) the number of structures anticipated at the Smith Ranch site and at each of the three remote satellite sites. This information is requested to aid NRC's assessment of the related environmental impacts to affected resource areas.

Cumulative Impacts

RAI CI-1

Please provide additional information on the cumulative-impact analyses contained in the ER.

- A. Please describe the geographic and temporal parameters used to develop the scope of the cumulative impact assessments in Section 4 of the ER for each resource area.
- B. Please provide additional quantitative information regarding the features of all past and present actions and reasonable foreseeable future actions (RFFAs) that were used in the assessment of cumulative impacts in each resource area. To the extent available, description of RFFAs should include the location, schedule and cumulative-impact analysis for each RFFA that could occur in the vicinity of each of the Smith Ranch Project sites, with respect to all resource areas.
- C. Please provide a cumulative impact assessment for the following resource areas: geology and soils, ecology, historical and cultural resources, and public and occupational health and safety.

Analysis of cumulative impacts should be based upon, to the extent possible, quantitative comparisons between impacts as a result of the proposed relicensing of the Smith Ranch Project and the cumulative impacts of actions within a defined geographic and temporal scope.

Section 2.2 of the ER states that cumulative impact assessments were performed for impacts that were considered to be meaningful. It is not clear how Cameco determined which impacts were meaningful; therefore, the NRC requests the geographic and temporal parameters used in developing the resource area-specific scope for the cumulative impact assessment.

Additionally, the cumulative impact assessment should make use of the most recent, available quantitative data. For example, with respect to transportation impacts, the traffic flow to and from other actions within each designated cumulative-impact area (i.e., for each resource area) and from RFFAs should be quantified to allow comparison with current baseline conditions and all increases as a result of the proposed relicensing of the Smith Ranch Project. Data on RFFAs made available since Cameco's submittal of its license renewal application should be reflected in the cumulative impact assessment.

Also, in Section 4 of the ER, cumulative impact evaluations of the Smith Ranch Project are not provided for the following resource areas: geology and soils, ecology, historical and cultural resources, and public and occupational health and safety. Evaluations that are provided in the ER for other resource areas generally are not specific to each site. Section 6.4 of NUREG-1748 indicates that cumulative impacts should be included among the impacts analyzed and described for each resource area. Such an analysis of the cumulative impacts for all resource areas and specific to each Smith Ranch Project site is requested by the NRC.

RAI CI-2

Please provide an assessment of the impacts of the proposed Ludeman Project by Uranium One in the cumulative impacts analysis for the Smith Ranch site.

In Table 2-1 of the ER, the Ludeman Project, an RFFA, is proposed to be developed within the same geographic area modeled for Smith Ranch site cumulative impacts; however, it is not clear how or if the Ludeman Project was addressed in Cameco's cumulative impact analysis. For example, the model of cumulative hydrologic impacts for the Smith Ranch site is presented in Appendix E of the ER, but the impacts of the Ludeman Project's operations are not evaluated in the ER's Appendix E's model. Additionally, the anticipated volumes of liquid process wastes at the Ludeman Project to be disposed via deep well injection should be included in Cameco's assessment of cumulative impacts to deep aquifers from deep well injection.

Cameco's cumulative impact assessment should include impacts from the proposed Ludeman Project.

RAI CI-3

Please provide the status of other ISR projects that Cameco has under consideration.

During the August 2012 NRC visit to the Smith Ranch Project sites, one stop was made at the site of a potential future Cameco ISR property, Ruby Ranch. Additionally, during the NRC's February 7, 2013 public meeting with Cameco, Cameco has stated that the Brown Ranch property (located near North Butte) is also under consideration as a future ISR site. The NRC requests the current status of Cameco's development of the Ruby Ranch and Brown Ranch sites and Cameco's intentions for these properties over the next 10 years. Please also provide this information for any other sites that Cameco has under consideration for ISR-related activity.

in the next 10 years and that are located in the proximity of the current Smith Ranch Project sites.

Land Use

RAI LU-1

Please clarify the extent and timing of all surface area disturbances resulting from activities at each Smith Ranch Project site for each ISR process phase.

- A. Please identify the anticipated locations for the various individual surface disturbances during the proposed license renewal period. Each disturbance area should be described thoroughly and consistently. Please identify the reason for these disturbances (e.g., well or wellfield construction, access road development); the respective maximum area (lateral extent) of each individual or related disturbance; the ISR phase during which these disturbances would occur; and the anticipated length of time that each area of disturbance would occur.
- B. For each area of disturbance, include description of the specific structures and other components of the Smith Ranch Project whose construction and operation would cause surface disturbance. Include short-term and long-term areas of disturbance for each component of the proposed Smith Ranch Project.

The ER describes the area disturbed at each site in different terms. At the North Butte and Gas Hills sites, the area of disturbance is described (1) over the total lifecycle of the Proposed Action and (2) as the maximum disturbance at any single point in time. For the Smith Ranch and Highland sites, the area of disturbance is identified only over the total lifecycle of the Project. For the Reynolds Ranch site, the WDEQ permit identifies land disturbance as short term (less than one year) or long term (greater than one year). However, the ER does not identify short-term and long-term areas of disturbance for each component of the proposed Smith Ranch Project.

For the EA to assess impacts to land use, soils, cultural resources, and to other resource areas, please identify surface disturbances by area removed from other land uses, and please include any land with soil disturbance in the assessment of both land-use and soils impacts.

In contrast, any land that would be fenced off and would have no surface disturbance, and thus not be impacted by Project activities, should be identified for the land-use impacts assessment.

Further, the areas of disturbance should be further divided into areas associated with (1) processing facilities, (2) wellfields, and (3) access roads and pipelines outside the processing-facility and wellfield areas. The ER and the TR do not consistently identify the associated area of disturbance or the extent of fenced areas during the construction and operation of the proposed Smith Ranch Project, including all wellfields, buildings and other structures, surface impoundments, parking and storage areas, roads, and utility corridors. This information will be used by NRC in its evaluation of impacts related to surface disturbance associated with the Smith Ranch Project.

RAI LU-2

Please provide a map showing inhabited residences located within each Smith Ranch Project site's boundary or within 8 km (5 mi) of that boundary, and clarify the status and locations of identified properties beyond the 8-km (5-mi) radius.

The ER identifies the Vollman Ranch (located within the Smith Ranch site boundary), the Pfister Ranch (located about 0.5 mi south of the North Butte site boundary), and the JE Ranch (located about 12 miles northeast of the Gas Hills site boundary) as occupied residences. The ER and TR also identify the Fowler Ranch, the Duck Creek Ranch, and the Boner Ranch as being in the vicinity of the Smith Ranch site. It is not clear if these ranches are inhabited. Figure 5.7 in the TR shows the locations of air monitoring stations for the Smith Ranch site, with stations at the Vollman Ranch and Fowler Ranch indicated by stars. The Duck Creek Ranch and the Boner Ranch are not shown. There are no figures to show the locations of the Pfister Ranch or the JE Ranch. Therefore, please provide a map showing the locations of inhabited residences within 8 kilometers (km) [5 miles (mi)] of each project site's boundary, and clarify the status and distances of the ranches identified in the ER/TR if located outside the 8-km (5-mi) radius.

Transportation**RAI TR-1**

Please provide additional information on the estimated vehicular traffic volumes at each Smith Ranch Project site during all ISR process phases.

- A. Please provide the current frequency of all deliveries and shipments (e.g., of process chemicals, fuels, byproduct materials, wastes, and yellowcake) during the operation of the Smith Ranch site.
- B. Please identify the anticipated increase in these Smith Ranch site deliveries and shipments resulting from all proposed Project activities, including the proposed increase in uranium production at the Gas Hills and North Butte sites.
- C. For the Gas Hills and North Butte sites, please confirm that the employee-vehicle volumes during operation at these sites is sufficient to base an impacts analysis on for the construction, aquifer restoration, and decommissioning phases, or please provide specific data for these process phases.
- D. For the Smith Ranch site, please confirm that the employee-vehicle volume during operation is sufficient to base an impacts analysis on for the aquifer restoration, and decommissioning phases, or please provide specific data for these process phases.

In Sections 3.2.1, 3.2.3, and 4.2.1 of the ER, information is provided regarding employee-vehicle and passenger-car traffic volumes during the Proposed Action at all Project sites; however, information is not provided regarding the expected traffic volumes during other Project phases (i.e., construction, aquifer restoration, and decommissioning) at the Gas Hills and North Butte sites. These could be different than during the sites' operation.

Additionally, although information is provided about the number of shipments of uranium-laden and barren-eluted resins as noted in Section 4.2.1 of the ER, the numbers of any other deliveries and the shipments of yellowcake are not detailed. Please provide information concerning these deliveries and shipments, as these shipments would use several State and local roads. NRC requests this additional information in order to evaluate potential impacts to these roads by Project-related transportation.

RAI TR-2

Please provide additional information related to current traffic-volume data on local roads for all Smith Ranch Project sites.

- A. For the Smith Ranch site, please provide the best-available, current traffic-count data for Converse County Road 31, 762 Ross Road, Highway 93, and Highway 95.
- B. For the Gas Hills site, please provide best-available, current traffic-count data for Gas Hills Road.
- C. For the North Butte site, please provide best-available, current traffic-count data for Highway 50, Van Buggenum Road, and Christensen Road.

Vehicles related to the construction, operation, aquifer restoration, and decommissioning at the Smith Ranch Project would use nearby highways and local roads. However, although information is provided for current traffic counts on some roads in Section 3.2 of the ER, the current traffic on all of the roads listed above is not discussed. In order for the NRC to evaluate the potential impacts to these roads and the surrounding environment, additional information is needed regarding current traffic volumes.

RAI TR-3

Please discuss the location(s) at which all toll-milling shipments of uranium-loaded ion-exchange (IX) resin or slurried yellowcake would be accepted, and provide additional information regarding the number of shipments and respective quantities.

- D. Please confirm that both the Smith Ranch CPP and the Highland Central Processing Facility (CPF) would accept and process toll-milling shipments.
- E. Please indicate whether all toll-milling shipments were included in the projected traffic counts on Section 4.2.1.1 of the ER. If not, please provide additional data on the anticipated number of trucks per month for all toll shipments to each respective receiving facility. For example, please specify the total number of such toll-milling shipments and their respective expected volumes by material (e.g., uranium-loaded IX resin and/or slurried yellowcake), to each facility (i.e., the CPP and the CPF). Please specify this information for the Proposed Action (i.e., the proposed conditions) and for continued operation under the existing license (i.e., the current conditions).

Section 1.5 of the TR states that "SUA-1548 currently allows Cameco to receive and process up to 365 third party shipments of loaded IX resin at the CPP per calendar year." This TR section also indicates that Cameco plans to receive third party shipments of loaded IX resin from other

licensees at the refurbished Highland Central Processing Facility (CPF). Additionally, Cameco is requesting that the NRC reauthorize the refurbished Highland CPF to receive slurried source material from third party licensees (toll processing) for the purpose of drying, packaging, and transporting the material to a uranium conversion facility on their behalf. As a part of the NRC's environmental-impact analysis, including transportation impacts, the information requested above is needed.

Geology

RAI GEO-1

Please provide information on the thickness of the confining layer below the 30-Sand unit that separates the 30-Sand unit from the Cloverly Formation in the southern portion of the Gas Hills site (i.e., Mine Unit 3).

Section 3.3.3.3 of the ER describes the geology of the southern portion of the Gas Hills site (i.e., Mine Unit 3). The ER section also notes that the Cloverly Formation is considered an aquifer and that it is separated from the 30-Sand by confining units within the Wind River Formation. This arrangement is illustrated in the cross-section shown on Plate D5-3 in Appendix 5-D of the WDEQ Permit No. 687 Update. However, the estimated thickness of the confining layer is not provided. This information is requested for the NRC's impact analysis of the Gas Hills site.

Water Resources

RAI WR-1

Please provide additional information on project-related, non-production water uses (e.g., domestic, equipment washing, dust control, irrigation) during all ISR process phases. This information should address the facilities and wellfields currently in operation (i.e., Smith Ranch site) and those not yet in operation (i.e., Gas Hills and North Butte sites).

- A. Please describe the current volumes of project-related, non-production water use for each Smith Ranch Project site and the estimated volumes for each site under Cameco's proposed license renewal changes.
- B. Please identify the source(s) of the volumes of water estimated in response to item A above, including the location(s) of the source(s) and the aquifer zone(s) targeted if ground water would be used.

Sections 3.4 and 4.4 of the ER identifies surface water use at the Smith Ranch Project sites for livestock and wildlife watering, but does not address project-related, non-production water usage. This information is requested so that the NRC can accurately assess all water-resource impacts of the Smith Ranch Project.

RAI WR-2

Please provide additional information on the storm-water management approaches and proposed storm-water management infrastructure for each Satellite area.

- A. Please provide a general description of the storm-water management approaches (e.g., infiltration, evaporation, detention, or dispersion) that have been and would be implemented at each of the Smith Ranch Project sites.
- B. Please provide a figure illustrating the current and anticipated layout of each Smith Ranch Project site, including proposed waste-management surface impoundments, other storm-water-management infrastructure, and any surface-water drainages to which storm water(s) would be discharged.
- C. Please discuss the best management practices (BMPs) that are used currently or would be implemented at each Smith Ranch Project site for storm water management.

As noted in Section 4.12.1.1 of the ER, storm-water management approaches would be implemented as required by the WDEQ, where “facility drainage is designed to route storm water away or around buildings, ancillary buildings and parking areas, chemical and fuel storage areas.” In addition, both the TR and ER discuss that BMPs would be implemented through a storm water pollution prevention plan (SWPPP) approved by the WDEQ. However, the specific BMPs in the current SWPPP for operation of the Smith Ranch site or those proposed for the respective satellites are not discussed. The NRC requests this information in order to discuss the potential for and mitigation of environmental impacts related to storm water at the Smith Ranch Project.

RAI WR-3

Please provide additional information on the Cameco’s approach to plugging historical, improperly abandoned drillholes and wells.

- A. Please estimate the number of drillholes and wells that have not been abandoned properly that may exist within proposed wellfields of the Smith Ranch Project.
- B. Please describe how the drillhole- and well-abandonment approach described in Section 3.4.3 of the TR would ensure that all improperly abandoned drillholes and wells within each wellfield would be identified and abandoned properly.

Section 2.4.1.3 of the GEIS notes “improperly abandoned exploration drill holes” can cause an excursion of lixiviant from the ore zone. Excursions could impact water quality in adjacent aquifers and outside the exempted ore-zone aquifer. Section 3.5.2.10 of the TR describes the computer database that lists information on all known exploration and mine development drill holes (more than 40,000) completed by previous mineral owners and Cameco within the SUA-1548 License areas. Information on the abandoned drill holes for Smith Ranch, North Butte, and Gas Hills are provided in Appendix D of their respective Permit-to-Mine application submitted to WDEQ. Yet, Section 3.0 of the TR notes that a Section 3.5.2.10 should include a discussion on how Cameco would handle potentially leaking historical exploration drillholes, but

the discussion is missing. Further, Section 3.4.3 presents Cameco's approach to identifying and properly abandoning old holes as part of interpreting aquifer-pumping test results, but it is not clear if this activity would ensure that *all* improperly abandoned holes within each wellfield would be identified and abandoned properly. An estimate of the number of improperly abandoned drillholes and wells will support NRC's evaluation of the potential for excursions.

RAI WR-4

Please provide an evaluation of the potential interaction between the Underground Injection Control (UIC) deep-injection waste-disposal wells at each Smith Ranch Project site and the development of oil and gas reserves in the Smith Ranch Project region, as well as the potential for the deeply injected fluids to reach the surface through other mineral-extraction wells.

- A. Please identify whether there are any developed or undeveloped oil and gas reserves at similar depths and/or geologic formations as the UIC deep-injection wells' completion intervals near each of the current and proposed injection-well locations. This information should be provided for each Project site.
- B. Please evaluate the potential for deep well injection fluids to be captured by nearby oil and gas wells at each Project site, and provide an assessment of the minimum safe distance between UIC deep-injection wells and those related to current or future oil- and gas-production efforts.
- C. Please address the potential for Cameco's development and use of deep-injection wells to restrict the development of oil and gas fields in the vicinity and/or the potential that oil and gas development to restrict the installation or use of Project-related deep-injection wells.

As discussed in Section 2.1.4.2 of the ER, existing and proposed UIC deep-injection wells are, or would be, completed at a depth of 9,000 – 10,000 feet (ft) below the ground surface. The ER also notes that currently authorized deep disposal wells for the Smith Ranch site target the Parkman, Teapot, and Teckla Formations.

The requested information, regarding potential interactions between the wastes disposed of through Cameco's deep-injection wells at all Smith Ranch Project sites and any oil- and gas-production wells, is requested for the NRC to evaluate the potential for environmental impacts to local ground-water resources as well as to assess the cumulative impacts to water resources of the Smith Ranch Project.

RAI WR-5

Please provide an assessment of the impacts of Cameco's installation and use of UIC deep-injection wells to address the potential for the creation of preferential flow pathways and for induced seismicity.

- A. Please describe Cameco's previous experience with respect to hydraulic fracturing related to UIC deep-injection wells in the region of the Smith Ranch Project and describe where hydraulic fracturing could be employed during the Smith Ranch Project.

- B. Please provide an estimate of the vertical and horizontal extent of fracture propagation based on Cameco's experience in similar geologic conditions.
- C. Please discuss the potential for induced seismicity in areas where Cameco employs deep injection of waste-waters. Indicate whether induced seismicity is or is not probable due to the nature of the specific geologic setting or the proposed operating methods.

Cameco explained during the NRC's site visit to the Smith Ranch Project sites that hydraulic fracturing would be used to improve the performance of UIC deep-injection wells. Accordingly, additional information regarding the use of hydraulic fracturing during UIC well installation and use is requested to evaluate the potential impacts to ground water in shallow aquifers outside of the exempted aquifer. Hydraulic fracturing during well installation and use may increase the potential for the creation of preferential flow pathways from the receiving formation that would allow injected fluids (i.e., wastes) to escape into shallower aquifers.

Additionally, in some areas of deep waste-water or other fluids injection, seismicity appears to have been induced due to fractures in weak rock and/or lubrication of existing faults. Please provide a discussion of the potential for induced seismicity and the occurrence of induced seismicity in the Powder River and Wind River Basins, as appropriate to each Smith Ranch Project area. This information will support NRC's analysis of the potential environmental impacts from deep-well injection.

RAI WR-6

Please provide additional information regarding the laboratory analysis of chemical constituents in filtered-water samples or unfiltered samples.

- A. Please identify the chemical constituents reported as total concentrations in unfiltered samples and the chemical constituents reported as dissolved concentrations in filtered samples.
- B. Please provide the basis(es) underlying Cameco's decision to request analyses of some water-quality constituents on filtered-water samples and other constituents on unfiltered-water samples for all water-quality data reported and referenced in the ER and in the proposed monitoring plans and protocols.

The reporting of water-quality constituents as dissolved (i.e., filtered) or total concentrations (i.e., unfiltered) is a key feature of the NRC's evaluation of water-quality results. The decision to report these dissolved and/or total concentrations could be based upon regulations, rules, and/or other guidance from the U.S. Environmental Protection Agency (EPA) and the WDEQ as well as the NRC (for radiological parameters). A description of Cameco's rationale for filtering or not filtering samples during collection or before chemical analysis is requested for the NRC to evaluate the water-quality data presented in the ER.

RAI WR-7

Please provide additional information on the underlying aquifer referred to as the "1-Sand" at the North Butte site.

- A. Please confirm that there are no available water-quality data from the 1-Sand that can be used to describe the pre-licensing baseline water quality.
- B. Please explain how the 1-Sand would be used to monitor for vertical excursions.

Section 3.4.3.2.7 of the ER notes that “Uranerz drilled and completed a well in the Lower aquitard, the 1 sand, as a part of Hydro Test NB2. In addition to serving as an observation well for the aquifer pump test, Uranerz planned to sample the well for water-quality analysis. Uranerz was unable to obtain sufficient water from the 1 Sand aquifer to provide a representative sample.” The document referred to, North Butte Update Appendix D-6, submitted for WDEQ Permit 632, also indicated that Cameco drilled and completed a well in the Lower Aquifer 1-Sand as a part of Hydro Test NB2. In addition to serving as an observation well for the aquifer-pumping test, Cameco planned to sample the well for water-quality analysis. Due to the fact that the 1-Sand is so poorly developed and discontinuous, however, Cameco indicated that it was not possible to pump the well long enough to retrieve a representative ground-water sample.

In addition to these accounts of unsuccessful attempts at retrieving ground-water samples, there is no report of water-quality data from the 1-Sand or from any other aquifer underlying the production sand units. Section 3.4.3.2.5 of the ER summarizes the aquifer properties of the aquitard between the lowest production sand (i.e., “A”) and the 1-Sand, but no characterization of the hydraulic properties of the 1-Sand is provided.

Given the unsuccessful sampling from the 1-Sand and the lack of hydraulic characterization of the 1-Sand, a discussion of how the 1-Sand can serve to monitor for vertical excursions is needed to evaluate the potential for water-quality impacts at the North Butte site. Also, please confirm that the accounts of unsuccessful sampling of the 1-Sand contained in the two documents (those quoted above) are descriptions of a single event.

RAI WR-8

Please provide water-quality data tables itemized below.

- A. Please provide clearly readable data tables from the ER:
 - Table 3.4-6, North Butte Surface Water Quality Data within 2 Kilometers
 - Table 3.4-9, North Butte Groundwater Quality Results
 - Table 3.4-11, Gas Hills Surface Water Quality
 - Table 3.4-14, Gas Hills Historic Water Quality Data.
- B. Please provide a clearly readable data table from the WDEQ Permit 632 Update:
 - Table D6-1.2, North Butte Production Well Water Quality Summary.

The quality of the data tables provided in support of the license-renewal application is poor, and they are extremely difficult to read and sort, either on a computer screen or printed form.

Please provide the following tables in electronic form or in a legible tabular format. These data are requested for permit the NRC to assess the impacts of the Smith Ranch Project on water quality.

RAI WR-9

Please provide additional information regarding formal wetland delineations at the Gas Hills satellite.

Section 3.5.5 of the ER indicates that wetlands have not been delineated at the Gas Hills site, but such delineation would occur, should direct wetland disturbance be proposed as activities at that site become more clearly defined. The U.S. Bureau of Land Management's (BLM's) *Draft Environmental Impact Statement* (DEIS) for the Gas Hills site also does not discuss any wetland delineations that have been completed. Please specify how Cameco would determine that wetland disturbance would occur, without having completed a delineation of existent wetlands. This information is requested to allow the NRC to assess potential impacts to water and wetland resources as a result of the Smith Ranch Project.

Ecological Resources

RAI ECO-1

Please provide the methodologies for and concise, detailed summaries of the results of previous ecological surveys (i.e., surveys that inventory the specific vegetation, wildlife, and aquatic species that appear in a specific area) for all Smith Ranch Project sites.

The ER references appendices to various WDEQ permits in its discussion of ecological impacts of the Smith Ranch Project. For example, the ER references appendices to the WDEQ's Permit-to-Mine (e.g., Appendix D-8), but it does not provide concise, detailed summaries of previous ecological surveys, including methodology, for each site under the Smith Ranch Project. In addition, the historical and current information provided is not sufficiently tabulated to allow for efficient analytical review. Detailed summaries of ecological-resource inventories and surveys should be provided that include all results of past, current, and proposed vegetation, wildlife, and aquatic surveys at all Smith Ranch Project sites. The NRC requests this information to evaluate the ecological impacts of the Smith Ranch Project.

RAI ECO-2

Please provide additional information related to local vegetation types.

- A. Please provide the results of the updated vegetation survey for the Smith Ranch site, which was reported to have commenced in the spring of 2011. Information identified in Appendix D-8 of the WDEQ's Permit-to-Mine does not contain the correspondence and the methodology information as referenced in Section 3.5.1 of the ER.
- B. Please clarify whether any Federally-protected species were identified anywhere within each of the Smith Ranch Project sites and, if present, how the uranium-recovery activities during each Project phase proposed for the respective area(s) would impact these species.

Section 3.5.1 of the ER indicates that an updated vegetation survey, which commenced in the spring of 2011, has been completed. Correspondence with the Wyoming Game and Fish Department (WGFD) and U.S. Fish and Wildlife Service (USFWS) regarding the updated vegetation survey is referenced in ER Section 3.5.1. Appendix D-8 of WDEQ's Permit-to-Mine does not contain this updated survey. Section 2.2.8 of the TR indicates that the 2011 vegetation survey included a survey for Federally-listed species, including the Ute ladies'-tresses orchid (*Spiranthes diluvialis*) and blowout penstemon (*Penstemon haydenii*). The NRC requests this information for its evaluation of the impacts of the Smith Ranch Project on ecological resources.

RAI ECO-3

Please provide additional information related local wildlife, including the updated wildlife survey for the Smith Ranch site, which was reported to have commenced in the spring of 2011.

Section 3.5.2 of the ER states that Cameco is currently updating its wildlife surveys, commencing in the spring of 2011. Appendix D-9 of the WDEQ permit also indicates that Cameco is updating its wildlife surveys. This updated information is necessary for the NRC to evaluate the impacts from past and present uranium-recovery activities, as this information can be a useful predictor of potential future impacts to wildlife resources.

RAI ECO-4

Please provide additional information regarding the relative performance of Cameco's site-reclamation efforts and its related monitoring of areas where vegetation restoration has been completed (i.e., at the Smith Ranch site).

Section 3.5.1.4 of the ER indicates that vegetation reclamation is an ongoing process wherever land disturbance has occurred. Section 4.5.1.1.1 of the ER further states that "ongoing re-vegetation efforts are successful and typically restore a robust vegetative cover within the first and second growing season." Please provide additional information that supports this evaluation of the performance of re-vegetation activities, as defined by the monitoring methods (which should be included), and that supports that past reclamation activities would be a sound predictor of future re-vegetation efforts. The respective areas of disturbance should be defined; the reclamation (i.e., re-vegetation) techniques should be described; and the success of these mitigation measures should be discussed. The NRC requests this information because historical reclamation efforts could provide a sound predictor of long-term impacts and mitigation-measure success, and this information could assist the Commission in its evaluation of the ecological impacts and mitigation of those impacts at the Smith Ranch Project.

Air Quality

RAI AQ-1

Please provide best-available recent meteorological data for the onsite and offsite monitoring stations described in the ER and the TR, especially those data acquired since the license-renewal application was submitted.

- A. Please update the meteorological data from the Smith Ranch Project sites with the latest twelve months of best-available data. These data should include temperature, precipitation, wind, evaporation, and severe weather.
- B. Please compare these data to recently collected regional meteorological data and discuss the representativeness of regional meteorological conditions to those of the Smith Ranch Project sites.

The data presented in Section 3.6 of the ER and Sections 2.2.5, 2.3.5, 2.4.5, and 2.5.5 of the TR may need to be updated. Cameco committed in its ER (Section 3.6) and the TR (Section 2.3.5) to provide these data as a supplement to its license-renewal application. The use of complete and best-available data is requested for the NRC to characterize existing conditions at all Project sites and to estimate the respective climate-change and air-quality impacts of the Smith Ranch Project.

RAI AQ-2

Please provide best-available air-quality data, including data for air-quality-related values in ambient air as well as those related to climate change (e.g., deposition, visibility, and greenhouse gases) for all Smith Ranch Project sites.

- A. Please provide additional air-quality information as described below:
 - i. Please provide best-available and/or most recent (i.e., the last twelve months, the current conditions) ambient air-quality data collected from the monitoring stations used for the Smith Ranch Project, including nitrogen oxides (NO_x), sulfur dioxide (SO₂), carbon monoxide (CO), volatile organic compounds (VOCs), ozone (O₃), particulates less than 10 microns in diameter (PM₁₀), and particulates less than 2.5 microns in diameter (PM_{2.5}).
 - ii. Please provide data for parameters that pertain to climate change, including atmospheric deposition, visibility, and greenhouse-gas production.
 - iii. Please provide concentration data for all other pollutants of concern (e.g., criteria gaseous pollutants) at the Smith Ranch Project sites, as available.
- B. Please compare the current data to recently collected regional meteorological data from offsite air-quality stations to determine the representativeness of regional conditions to Smith Ranch Project site conditions.

The data requested above should include the respective data from each Project monitoring station. The NRC will use this information to assess the air-quality impacts of the Smith Ranch Project.

RAI AQ-3

Please provide estimates of the concentrations of the air-quality and climate-change parameters specified above in RAI AQ-2 for all phases of the Smith Ranch Project and at all of the Project sites, including during Project transportation.

Baseline air emissions should be established or calculated for all current and proposed activities and for all significant sources of air emissions during all phases at the Smith Ranch Project. In addition, because all phases of the Smith Ranch Project could produce greenhouse gases at each of the Project's sites as well as discharge other air-quality-related emissions, the NRC requests this information in order to compare existing air-quality conditions at each Project area with those that could potentially impact site and regional air quality. This information will assist the NRC in its assessment of air-quality impacts of the Smith Ranch Project.

RAI AQ-4

Please provide further explanation of the mathematical approach taken by Cameco's fugitive-dust calculations.

- A. Please discuss and consolidate the fugitive-dust emissions information provided in Section 3.6.6.1 of the ER and the tables in Section 7.2.1 of the TR.
- B. Please clarify the gaseous and airborne-particulate emissions that are referred to in the ER Section 4.6 statement: "The current release of gaseous and airborne particulates from the in-situ recovery (ISR) operations at Smith Ranch are below the allowable limits for the State of Wyoming." Also, please identify the "allowable limits" to which Cameco refers.
- C. The Table on ER page 3-76 presents certain mathematical results, but it does not provide supporting information as to how the results were calculated. Also, please clarify why the Smith Ranch site is listed as having 0.0 with respect to employee vehicles and service trucks.

The narrative on pages 3-74 to 3-75 of the ER discusses the fugitive dust-equation that was used for Cameco's analysis in the ER; however, the narrative is not clear as to how the equation was used in practice. In order for the NRC to evaluate the air-quality impacts of the Smith Ranch Project, it needs to understand the underlying bases of Cameco's calculations.

RAI AQ-5

Please provide additional information regarding the specific mitigation measures in use and to be used by Cameco to control fugitive dust during each phase of the Smith Ranch Project at all Project sites.

- A. Please describe the events and/or measurements that would trigger the implementation of fugitive-dust-control measures and/or discuss the measures' standardized frequencies, if any.
- B. Please describe the specific dust-suppression methodologies that are currently used or would be used by Cameco at each of the Smith Ranch Project sites, especially during well installation and facility construction (i.e., water application or chemical treatment), and identify the types of chemicals that would be applied to unpaved roads to minimize fugitive-dust emissions.

- C. Please discuss the expected relative performance of each dust-control technique, how such performance would be measured, and any impacts each technique would have on underlying soils.

Section 4.6.1.1 in the ER states that mitigation measures would be implemented, as needed, to moderate fugitive dust and its generation. Section 7.4.1 of the TR states that dust suppressants would only be used if warranted by conditions. Please discuss how Cameco would determine that implementation of mitigation measures is “warranted.” In order for the NRC to evaluate the air-quality impacts of the Smith Ranch Project, additional information is requested regarding the implementation and the associated performance of dust-control measures.

Visual Resources

RAI VIS-1

Please provide additional information regarding visual resources at all Smith Ranch Project sites during all Project phases.

- A. Please provide a map that displays the respective VRM classes present at all Smith Ranch Project sites, to include a two-mile visual-resource study area beyond the project boundaries and an area of appropriate size within which Smith Ranch Project facilities or wellfield structures can be seen by an observer (i.e., the maximum distance from which an object can be observed).
- B. Please provide data or a table describing the number of acres of each VRM class within each of the areas identified above for each Project site.

Section 3.9.2 of the ER states that the BLM has inventoried the visual resources of all lands within the boundaries of the Buffalo, Casper, and Lander Field Offices using the Visual Resource Management (VRM) system. However, specific information regarding all Smith Ranch Project sites is not provided. This information will be used in NRC’s visual-resource impacts of the Proposed Action.

RAI VIS-2

Please provide additional information related to the nighttime lighting of all Smith Ranch Project sites.

- A. Please describe lighting-fixture design and fixture arrangements that currently are and that would be present at each Smith Ranch Project site.
- B. Please discuss the impacts of nighttime lighting during all Project phases for each of the Project sites, and include current or proposed nighttime-lighting mitigation measures, if any.

Additional lighting information will be used by the NRC to assess the impacts of nighttime lighting at the Smith Ranch Project sites, including the potential for light pollution. Specific information regarding the current and proposed lighting fixture(s), bulb type, shielding, post locations, and hours of operation would be used to evaluate potential visual impacts from the Smith Ranch Project.

RAI VIS-3

Please provide the estimated current number of feet/miles (or meters/kilometers) of fencing at each Smith Ranch Project site and describe the fencing's design(s). Please also provide the estimated increase in the extent of fencing (in feet/miles or meters/kilometers) that would result from the changes proposed in the license renewal application.

Section 4.1.1 of the ER states that Cameco installs fencing around mine units at the Smith Ranch Project sites to restrict livestock access during ISR production and restoration phases. The ER indicates also that these fences would allow continuing wildlife forage. Sections 3.6.1.1, 3.10.3.1 and 5.7 of the TR state that fencing surrounds the Smith Ranch CPP, the evaporation ponds at the Smith Ranch site, and areas containing source or 11e.(2) byproduct materials.

The design and the magnitude (i.e., lengths) of this fencing could have visual impacts. The NRC requests this information to evaluate potential visual-resource impacts of the Smith Ranch Project.

RAI VIS-4

Please provide additional discussion on Photos 4.9-1 and 4.9-2, which are included in ER Section 4.9.4.

Please indicate the geographic direction the viewer of these photographs is looking toward (i.e., provide the direction in which the reader is facing). In addition, discuss how these photographs correspond to the photographs included in Section 3.9, Photos 3.9-1 A-D. This information would better clarify the impacts to the viewshed before and after the Project construction and would serve to support the statement on ER page 4-32 that "Photo 4.9-2, Central Processing Plant at Smith Ranch, demonstrates a potential worst-case visual impact (largest building complex) within SUA-1548."

Socioeconomics**RAI SOC-1**

Please provide the number of workers, both current and proposed, at each Project site associated with all phases of Smith Ranch Project.

Please provide employment estimates for each Smith Ranch Project site specific for each ISR process phase. Section 4.10.1.1 of the ER provides employment estimates associated with construction activities, but this estimate appears only related to the Smith Ranch site (i.e., approximately 300 workers), and not to the Gas Hills or North Butte sites. Section 4.10.1.2 provides operation-phase employment estimates for three Smith Ranch Project sites; however, it appears employment estimates for aquifer restoration and decommissioning activities at each site are missing. The information is requested for the NRC to analyze the socioeconomic impacts of Smith Ranch Project.

RAI SOC-2

Please clarify whether Smith Ranch Project activities would result in additional land being lost to livestock grazing and agricultural production at Project sites and, if so, how much would be lost during all Project phases and at each Project site.

Section 4.10 of the ER provides information regarding the total acreage comprised by the areas taken for the Smith Ranch (16,187 ha), North Butte (409 ha), and Gas Hill (3,440 ha) sites. Please provide the estimated number of additional hectares at the Smith Ranch site specifically where access would be restricted under the proposed conditions, but it is not during the current operation of the site (i.e., areas that would consequently not be available for livestock grazing or agricultural activities). In particular, please provide this information for all areas that would be cut off or otherwise would be inaccessible (but would not necessarily directly impacted as a result of Project activities). Also, at the North Butte and Gas Hills sites please provide the respective acres that would be restricted during any of the Smith Ranch Project phases. This information will support calculations of the potential for reduced economic activity as a result of the Smith Ranch Project, where grazing and other agricultural uses due to Project activities are foregone.

RAI SOC-3

Please confirm the values in Table A-10-4 of the ER.

Table A-10-4 of the ER presents estimated 2009 payrolls (\$9,141,000); 2008 ad valorem, property taxes, sales and use taxes, and severance taxes (\$1,644,000); and local purchases (\$26,065,000). These values total \$36,850,000. Please discuss why this total is different than the total presented in Table A-10-4 of \$40,327,000. This information is requested so that the NRC can assess the socioeconomic impacts of the Smith Ranch Project.

RAI SOC-4

Please clarify the differences between the total taxes as presented in Table A-10-4 and the values in Tables 7-1 and 7-3 of the ER.

Table A-10-4 of the ER suggests that the 2008 tax revenues currently generated by the Smith Ranch Project total \$1,644,000. In contrast, Table 7-1 and Table 7-3 suggest direct tax revenues \$3,737,000. Please explain this inconsistency. This information is requested to support the NRC's socioeconomic-impact analysis of the Smith Ranch Project.

RAI SOC-5

Please provide the basis for the State and local tax-revenue estimates presented in Section 7 of the ER.

- A. Please provide the input data values and rates used in Cameco's calculations to determine tax-revenue estimates.

- B. Please discuss in more detail to whom these revenues would accrue. In doing so, please specifically distinguish what quantity would accrue to the State of Wyoming and what quantity would accrue to individual, local jurisdictions from the Smith Ranch Project.

Section 7 of the ER discusses the estimated tax revenues associated with the Smith Ranch Project. However, insufficient detail is provided in the ER for a determination to be made as to which jurisdictions would accrue these revenues. The NRC requests this information in order to verify the tax-revenue estimates during its socioeconomic-impact analysis.

Environmental Justice

RAI EJ-1

Please confirm that there are no minority census-block groups and no low-income census tract groups greater than 20 percent within a 4-mile radius of the Smith Ranch Project.

Section 4.11 in the ER examines the 2010 census tracts within a 50-mile (80-kilometer) radius around the proposed Project for the characteristics that are relevant to environmental justice. Tables 4.11-1, 4.11-3, and 4.11.7 show race characteristics at the 2010 census-tract level for the respective 80-kilometer-radii areas centered on the Smith Ranch, North Butte, and Gas Hills sites. Although census tracts are shown in the tables, the *NRC Final Policy Statement on Environmental Justice* (2004) notes that the NRC uses *census-block groups* as the geographic unit of analysis for an evaluation of race census data. This is because there may be concentrated pockets of minority populations that live at this smaller geographic unit of analysis that would not be obvious at the census tract level.

The *NRC Policy Statement on the Treatment of Environmental Justice* and NUREG-1748 suggest the guideline of a 4-mile-radius area around rural facilities regulated by the NRC's Office of Nuclear Materials Safety and Safeguards for environmental-justice analysis. However, the GEIS notes that the 4-mile radius is intended as a guideline rather than a requirement, and the NRC's GEIS evaluated a 50-mile-radius area around potential ISR facilities. Nonetheless, the NRC recognizes that many of the potential impacts of the Smith Ranch Project would not extend 50 miles; consequently, NRC would like to confirm that the best-available data indicate there are no minority or low-income populations at the census-block-group level for minorities and census-tract level for income exceeding 20 percent within the 4-mile-radius area around each Smith Ranch Project site.

RAI EJ-2

Please confirm that the best-available income data were used in the environmental-justice analysis presented in the ER (i.e., by comparing the data used to 2010 data).

The current income data from Tables 4.11-2, 4.11-5, and 4.11-8 are derived from the 2000 U.S. Census. The economic downturn that began in 2008 and the changes in the energy industries of Wyoming may have affected the data on minority and low-income populations in Wyoming. This review of the census data is necessary to ensure that NRC has employed the best-available data in its environmental-justice evaluation for the ER. The tables of census data will be used by the NRC to substantiate its conclusions in its environmental-justice analysis. If the

recent economic downturn could have affected the environmental-justice data, please revise the environmental-justice analysis to incorporate 2010 data.

RAI EJ-3

Please provide information regarding hunting or gathering of natural resources by Tribal members (or other minority populations) as well as by any low-income populations, on each of the Smith Ranch Project sites and in their immediate vicinity.

This information regarding activities of Native American Tribes, other minority populations, and/or low-income populations is requested for the NRC to support the NRC's environmental-justice analysis.

Public and Occupational Health and Safety

RAI H&S-1

Please summarize the emergency-management protocols, procedures, plans, programs, and/or best management practices (BMPs) that would mitigate the risk of an accidental release of hazardous or radioactive materials and reduce consequent impacts if a release were to occur at the Smith Ranch Project, and please confirm that these would remain in effect for the duration of the Smith Ranch Project.

An emergency-management plan is described in Section 4.12.1.1 of the ER, one which reduces the risk of an accidental release of hazardous and/or radioactive materials. In addition, the current standard operating procedures (SOPs) for the handling, processing, storage, and transport of hazardous and radioactive materials are described in Section 4.12 of the ER. These SOPs are also designed to ensure that the risks associated with these materials remain low, thereby mitigating potential public and occupational health and safety impacts. The NRC would like to include discussion of these health-and-safety-related protocols, SOPs, plans, programs, and BMPs as mitigation measures in its public and occupational health and safety analysis for the Smith Ranch Project EA.

RAI H&S-2

Please summarize the site-specific health and safety programs in place at existing and proposed Smith Ranch Project sites, and please confirm that these would remain in effect for the duration of the Smith Ranch Project.

Site-specific health and safety programs, including those related to occupational health and safety—both nonradiological and radiological—which are currently in place at the Smith Ranch site and that would be instituted at the proposed Project sites, could be considered as a mitigation measure(s). Please provide a summary of the current site-specific health and safety program at the Smith Ranch site as well as those that would be implemented at the Gas Hills and North Butte sites. This information will support the NRC's analysis of the public and occupational health and safety impacts of the Smith Ranch Project.

Waste Management

RAI Waste-1

Please provide Section 4.13 of the ER.

Section 4.13 is referenced in ER Sections 4.3.1.2, 4.12.1.1, and 4.12.1.2; however, it does not seem to be included in the copy of the ER included in Cameco's license-renewal application. If the contents of Section 4.13 are located elsewhere in the ER, please identify the location(s). Complete information (e.g., quantities, types, and characterizations) regarding all waste streams, both byproduct and non-byproduct, and both liquid and solid, that would be generated at all of the Project sites and during all ISR process phases will be part of the NRC's assessment of proposed waste-management impacts for the Smith Ranch Project.

RAI Waste-2

Please provide additional detail on the liquid-waste disposal methods that are in use or proposed at each of the Smith Ranch Project sites during all Project phases.

Although TR Section 4.2.2 and ER Section 3.12.1 discuss liquid-waste management, additional detail regarding the current and proposed methods of liquid-waste disposal (e.g., evaporative surface impoundments, land application, deep-well injection) for each site is requested. Please identify the conditions under which methods other than those currently in use at the Smith Ranch site, or proposed for use at the North Butte and Gas Hills sites, would be implemented, if appropriate. Please ensure that this information addresses liquid-waste disposal during each of the ISR process phases. This information will be used by the NRC to evaluate the full range of environmental and waste-management impacts associated with liquid-waste disposal.

RAI Waste-3

Please provide additional information on the decommissioning and reclamation of Satellite 1's radium-settling basins.

- A. Please provide the anticipated schedule for the complete decommissioning of the radium-settling basins at Satellite 1 of the Smith Ranch site.
- B. Please indicate the estimated volume and characterization of waste(s) expected to be generated during final decommissioning of these basins.

In Section 3.12.1.2.2, the ER discusses the "radium-settling basins" that are present to the east of Satellite 1, where radium-barium sulfate precipitation occurred after filtration of the Satellite 1 waste water and prior to discharge via land application. Although the decommissioning has been largely completed, additional work is indicated as having to be conducted. The timing, estimated volume, and anticipated characteristics of the waste generated during the basins' decommissioning will be assessed in the NRC's analysis of waste-management impacts at the Smith Ranch Project.

RAI Waste-4

Please provide additional information regarding the nature and characteristics of the solid-phase waste streams contaminated by byproduct materials that would be generated at all of the Smith Ranch Project sites during all appropriate ISR process phases.

- A. Please specify each solid-phase, byproduct-material-contaminated waste stream that would be generated at each Smith Ranch Project site during all ISR process phases.
- B. Please estimate the maximum volume of these waste streams generated at each of the Project sites on a per-year and per-ISR phase basis.

Section 3.12.2.2 of the ER describes only generally the byproduct-material-contaminated waste streams that are and would be generated at the Smith Ranch site. In order for the NRC to perform a thorough and complete analysis of waste-management impacts, this additional information is requested.

RAI Waste-5

Please provide additional information regarding the nature and characteristics of the solid-phase waste streams, which would be classified as non-byproduct, that would be generated at all of the Smith Ranch Project sites by ISR process phase

- A. Please specify each solid-phase, non-byproduct waste stream that would be generated at each Smith Ranch Project site during all ISR process phases.
- B. Please estimate the maximum volume of these waste streams generated at each of the Project sites on a per-year and per-ISR phase basis.

Section 3.12.2.1 of the ER describes only the non-byproduct, solid-phase waste streams that are and would be generated at the Smith Ranch site. In order for the NRC to perform a thorough and complete analysis of waste-management impacts, this additional information is requested.

Historical and Cultural Resources**RAI CR -1**

Please provide a comprehensive summary of all past historical- and cultural-resource surveys (or inventories) that have been conducted within the proposed Smith Ranch Project boundaries.

- A. Please provide a table identifying each survey, the number of acres surveyed, the respective survey's sponsor, the organization that conducted the survey, the year of the respective survey, a description of the survey methodology, and a list of all historical and/or cultural properties identified during each survey. Please provide a brief summary discussion of each cultural and/or historical survey effort, including the methodology for each survey.

B. Please provide the following maps:

- i. Please provide maps which indicate the current SUA-1548 license boundaries and the superimposed boundaries of each of the previous cultural-resource surveys at all of the Smith Ranch Project sites (one map per site) to facilitate comparison of the respective survey areas.
- ii. Please provide redacted and un-redacted maps which identify the locations of all historical and/or cultural properties that have been identified within each of the Project sites' boundaries.
- iii. Please provide maps which indicate the areas within all of the Project sites' boundaries that have not been addressed through an intensive-level historical- and cultural-resource survey.
- iv. Please provide a map(s), assessment(s), and/or review(s) of all Project sites where areas may be sensitive for deeply-buried prehistoric properties that are typically not identifiable by surface examinations or shallow probing.

RAI CR-2

Please discuss Cameco's plans to address the potential impacts to historical and/or cultural properties in areas that have not been covered by intensive cultural-resource surveys and/or areas that were surveyed prior to 2004.

The data requested above will assist the NRC during its assessment of the Smith Ranch Project's compliance with Section 106 of the NHPA. Some of these data have already been provided for some portions of Project sites. Final maps for the North Butte site have been compiled, and surveys for the Gas Hills site are ongoing under BLM oversight. With the additional information requested by the NRC, cultural-resource information can be collated for the entire Smith Ranch Project. Accordingly, this information will assist the NRC in its analysis of the impacts to historical and cultural resources of the Smith Ranch Project.

Further, 2004 is the year that the latest revisions to the National Historic Preservation Act (NHPA)-implementing regulations at 36 CFR 800 were promulgated. Thus, this year is the generally accepted, standard-of-practice year that is used to identify historical- and cultural-resource surveys that meet modern standards and those that do not. However, the Wyoming State Historic Preservation Office (SHPO) has not established a distinct policy on this issue, and it may judge past work on a case-by-case basis. For areas that may be sensitive for deeply-buried prehistoric properties, the Wyoming SHPO could find it necessary to complete additional field visits or cultural-resource field inventories for specific sites to be identified in order to ensure that full identification and consideration of historical and cultural properties are in compliance with Federal cultural-resource-protection statutes.

RAI CR-3

Please provide all State of Wyoming Cultural Resource Site forms for all identified historical and/or cultural properties within the existing and proposed Smith Ranch Project boundaries.

Please note that copies of all Site forms where the respective properties have been formally designated as "Not Eligible for Inclusion on the National Register of Historic Places" through a deliberate consensus determination with the Wyoming SHPO and/or the National Register of Historic Places will not be needed by the NRC. These Site forms will provide the NRC with additional information to use in its cultural-resource impacts analysis.

RAI CR-4

Please provide additional information regarding all historical and/or cultural properties located within all Smith Ranch Project boundaries.

- A. Please provide a table with information concerning each historical and/or cultural property presently identified within the current and proposed Project boundaries, indicating each respective Determination of Eligibility (DOE).
- B. Please identify which historical and/or cultural properties have the potential to be directly or indirectly impacted by proposed uranium-recovery activities at all Smith Ranch Project sites during all Project phases. Please also identify those historical and/or cultural properties that, in Cameco's opinion, it would deliberately avoid during any Smith Ranch Project activities.

The information presented as a result of RAI CR-A above, should include the recommended DOE by the sponsoring agency, whether a formal DOE through consensus has been reached in consultation with the Wyoming SHPO or Keeper of the National Register, or a formal DOE which is unresolved. This information will assist the NRC in its assessment potential impacts to historical and/or cultural properties in compliance with Section 106 of the NHPA. In addition, this information will provide the NRC summary data necessary to conduct a completeness review and to seek comments from the Wyoming SHPO, Advisory Council on Historic Preservation, Interested Tribes and the public.