

January 14, 2014

MEMORANDUM TO: Bill Von Till, Chief
Uranium Recovery Licensing Branch
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

FROM: Douglas Mandeville, Project Manager **/RA/**
Uranium Recovery Licensing Branch
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
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SUBJECT: PUBLIC MEETING SUMMARY

On December 3, 2013, a Public Meeting was held with Power Resources, Inc., (PRI), doing business as Cameco Resources (Cameco), U.S. Nuclear Regulatory Commission (NRC) Headquarters. The purpose of the meeting was to discuss: (i) NRC staff's acceptance review of Cameco's alternate concentration limit request for Mine Unit B; (ii) Cameco's response to NRC staff's request for additional information on the license renewal application; (iii) Cameco's December 19, 2012, administrative amendment request; and (iv) potential licensing actions related to boundary changes and flow rate adjustments at Smith Ranch and its associated satellite facilities. A summary of the meeting is enclosed.

Docket No: 40-8964
License No: SUA-1548

Enclosure: Meeting Summary

cc: Meeting Attendees (via email)

CONTACT: Douglas Mandeville, FSME/DWMEP
(301) 415-0724

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DISTRIBUTION: DPersinko BSpitzberg/RIV LGersey/RIV Meeting Attendees

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NAME	DMandeville	SAchten	DMandeville
DATE	01/ 10 /14	01/ 14 /14	01/ 14 /14

OFFICIAL RECORD COPY

MEETING REPORT

DATE: December 3, 2013

TIME: 1:00 p.m. to 3:20 p.m.

PLACE: U.S. Nuclear Regulatory Commission
Two White Flint North, Rockville, Maryland
Room T8C5

PURPOSE: The purpose of the meeting was to discuss: (i) NRC staff's acceptance review of Cameco's alternate concentration limit for Mine Unit B; (ii) Cameco's response to NRC staff's request for additional information on the license renewal application; (iii) Cameco's December 19, 2012 administrative amendment request; and (iv) potential licensing actions related to boundary changes and flow rate adjustments at Smith Ranch and its associated satellite facilities.

ATTENDEES:

See Attendees List (Attachment 1).

BACKGROUND:

Power Resources, Inc. (PRI), doing business as Cameco Resources (Cameco), currently operates the Smith Ranch-Highland Uranium Project (SRHUP) under U.S. Nuclear Regulatory Commission (NRC) Source Material License SUA-1548. Cameco currently has several licensing actions in various stages of review by the NRC staff. These actions include:

- A request to approve alternate concentration limits (ACLs) at Mine Unit B dated May 22, 2013.
- A license renewal request for Smith Ranch dated February 1, 2012. NRC staff issued its request for additional information (RAI) on May 2, 2013 (ADAMS Accession Number ML13098A040).
- An administrative license amendment request dated December 19, 2012.

Additionally, Cameco is considering changes to its license boundary at Smith Ranch and flow rate adjustments at its North Butte remote satellite.

DISCUSSION:

NRC staff read the opening statement for the meeting. Attendees of the meeting were asked to provide brief introductions. NRC staff and Cameco provided an overview of the discussion topics planned for the meeting. Attachment 2 contains the meeting agenda included in the meeting notice.

A summary of the discussion topics from the meeting is contained below.

Mine Unit B ACL application

NRC staff initiated its acceptance review of Cameco's Mine Unit B (MUB) ACL application in June 2013. During its acceptance review, NRC staff identified several issues with the application. NRC staff discussed these issues during the meeting. The discussion topics below are organized to correspond to sections in Cameco's submittal. Note that NRC staff is not expecting a response to this meeting summary. However, these issues will need to be addressed in some manner for the NRC staff to be able to complete its technical review.

Section 3.2 - Recent and Projected Conditions

- Additional point of exposure (POE) well sampling is needed. The licensee has not provided a recent sample demonstrating the current water quality of all POE wells. Only a subset of POE wells were sampled in 2011 for Arsenic, Selenium, Uranium, and Radium-226. The remaining POE wells were last sampled in 1987. All POE wells should be sampled for a full suite of constituents (e.g. Wyoming Department of Environmental Quality [WDEQ] Guideline 8) which includes the proposed ACL parameters of Arsenic, Selenium, Uranium, and Radium-226.
- Additional point of compliance (POC) sampling is needed to assess stability trends. NRC staff's trend analysis of available stability data (2004, 2006, 2011) using ProUCL 5.0 shows statistically significant increasing trends in several POC wells for Uranium, Radium-226, Selenium, and Arsenic. All POC wells should be sampled for ACL parameters to assess the current stability trends.
- The number, current condition, and use of all water wells within 2 kilometers (km) of MUB have not been satisfactorily established. In Section 1.2.5.4 of the application, surrounding land and water use, no description was provided of the current condition or use of water wells within 2 km of MUB. In an independent search of Wyoming State Engineer's Office (WSEO) records, NRC staff found numerous water wells within 2 km of MUB located in sections 29, 28, 21, 20, 16 and 17. Many were not identified in the application.

Section 3.3 Flow and Transport Modeling

- Ground water model
 - Modeling documentation was not provided in hard copy or electronic form. The 2011 ground water modeling report was referenced, but not provided.
 - The ground water model did not consider the impact of the current or future use of wells that exist near the site on the ground water flow model.
 - The ground water model did not capture the ground water divide that was demonstrated in the northern portion of MUB in the most recent potentiometric surface of the 30 sand.
 - The model did appear to consider the presence of the mine workings on the northwest side of MUB, which are known to exist.
- Geochemical model
 - All simulations used water from a POC well sample obtained in 2011 as the initial condition for the ACLs. Some POC wells have not shown stability in the ACL parameters. It is unknown if this initial condition is representative.
 - All of the models showed sensitivity to grid size. In the model simulation from monitor well (MW) 45 to MW 37 in the southern portion of MUB, the one dimensional model

is comprised of nine cells of 50 m each. NRC staff simulations of this case with smaller cell sizes showed model results are very sensitive to number of cells.

- The assignment of solution water quality within cells does not appear to be representative. In the model simulation from MW 45 to MW 37 in the southern portion of MUB, the model uses four cells upgradient of the highest concentration in MUB. The solution water quality in all four upgradient cells were set at background levels from the POE even though some cells were located within MUB. The middle two cells in MUB were set at the highest concentration at the POC, and the last three cells before the down gradient POE were set at background levels even though they were all within MUB. Typically, it is best practice to assign water quality to a model using interpolated concentrations from measured values at existing wells.
- The definition of geochemical solid phase in the some model cells was not completely justified. In the MW 45 to MW 37 pathway simulation, down gradient cells (seven to nine) were assigned a solid phase which included barium sulfate. NRC staff found no justification for the presence of natural barium sulfate which greatly increases Radium-226 precipitation in the model. NRC staff observes that pyrite was also added as a solid phase in down gradient cells (seven to nine) with no clear justification (e.g., core data). Pyrite greatly enhances precipitation of uranium.
- Modeling files were only provided in hard copy format. Availability of the electronic version of pH-REdox-Equilibrium (PHREEQC) input files would significantly aid NRC staff's ability to validate simulations.
- NRC staff attempted to verify the licensee's PHREEQC simulation, but was unable to do so for the first case the licensee presented. NRC staff attempts resulted in numerous execution issues including non-convergence of the solver.
- Results of geochemical modeling were not clear to the NRC staff. For example, in the first case, the results at the down gradient were posted every 61 years on the same graph over 1000 yrs., so resolution of values was not possible.

Section 4.1 Human Health Hazard Assessment

- The cumulative risks from ACLs were not considered. For individual ACL constituents, the licensee stated these values will meet 1E-4 human health risk, but did not account for cumulative risks from combined constituents.
- Some of POE wells currently exceed proposed ACL concentrations. Two POE wells measured in 2011, M-63 (0.0967 mg/l) and M-62 (0.171 mg/l) exceed the proposed POE uranium concentration of 0.09 mg/l. NRC staff observes that the 2011 values are also above their original baseline.
- Hazard assessment incorrectly states that aquifer exemption prohibits ground water use by humans now or in the future. NRC staff observes that the aquifer exemption only precludes use as public water supply under the Safe Drinking Water Act. NRC staff's understanding is that state classification of ground water as Class IV is not enforced to prevent future human ingestion.

Section 4.2 Exposure Assessment

- An exposure assessment based on the use of the water within the MUB 30 sand for livestock or irrigation was not presented. In Section 2.3.5 (page 55) of the application, the licensee states the aquifer exemption does not prevent livestock or irrigation use of water; however, the licensee does not present a hazard/exposure assessment from

stock watering/irrigation. NRC staff observes a non-resident rancher scenario of exposure from this water use has been provided in several non-in-situ recovery (ISR) ACL applications.

Chapter 5 Ground Water Monitoring Program

- No long term ground water monitoring design or plan was provided. The licensee has not presented a long term ground water monitoring plan to assess trends at POC wells or to verify geochemical modeling results at POE wells.

Chapter 6 Corrective Action and Mitigation Measures

- The corrective action costs were not justified. The licensee's corrective action analysis only considered refurbishment of the entire MUB wellfield infrastructure to support additional restoration across the entire wellfield. This scenario also included the installation of two new disposal wells at a cost at \$7.2 million. The licensee did not consider a scenario where targeted restoration would be performed in areas with higher ground water concentrations. The licensee also did not present cost estimates for targeted restoration of areas with higher ground water concentrations. NRC staff observes this may be a more likely scenario.
- No method to identify or protect the site from ground water use was offered to prevent private well use or installation in the ore zone aquifer or other aquifers in or around MUB. The NRC staff understands that neither WDEQ or WSEO monitors or notifies a potential well applicant of the aquifer exemption, current water quality or class of use of water at any time. Additionally, the NRC staff understands that WDEQ and WSEO also do not have any regulatory authority to stop a potential well applicant or user from accessing water in the aquifer exemption zone for any purpose. The NRC staff is aware of WDEQ's requirement of a deed notice for individual wellfields once all wells are plugged and abandoned, but the intent of this notification is unknown. NRC staff is unclear if the "deed notice" required by the State confers any protection such as identification of the exempted aquifer.

Chapter 7 ALARA Analysis

- The applicant did not demonstrate asymptotic trends for any ACL parameters. Asymptotic trends should be demonstrated for the proposed ACLs to show applicant has exhausted options to meet the ground water protection standards and as low as reasonably achievable (ALARA).
- The ALARA cost analysis is not justified. The corrective action cost analysis includes \$7.2 million for two additional deep disposal wells and \$2 million for infrastructure refurbishment of the wellfield. If these costs were reevaluated for a more realistic cost scenario such as targeted treatment of areas with high ground water concentrations, the value may be below a cost of \$2000/person rem.

License Renewal RAIs

- Cameco and NRC staff discussed MU5 at the Gas Hills remote satellite and its proximity to the Umetco facility. NRC staff observes that MU5 may be in the same horizon as the approved ACL for the Umetco facility. Cameco asked the NRC staff to identify which

figures lead to that observation.

- Cameco asked if it could obtain copies of the cultural resource survey reports provided to NRC staff by the Wyoming State Historic Preservation Office (SHPO). NRC staff stated that it did not have one of the requested surveys, but that the reports the NRC staff did have would be transmitted during the National Historic Preservation Act Section 106 consultation process. Cameco also asked about the status of the Section 106 process. NRC staff replied that it had entered survey data in GoogleEarth to determine the overlap between prior cultural resource surveys, and is in the process of determining the Area of Potential Effect (APE) for the proposed license renewal. NRC staff stated that it will provide this APE to the SHPO for concurrence.
- Cameco asked for clarification on environmental RAI ECO-1. NRC staff indicated that it was looking for the effects of ongoing operations on ecology to aid in the prediction of impacts during the proposed renewal period. Cameco stated that it was concerned about the amount of data needed and level of detail needed. NRC staff stated that using data for WDEQ permitting would be helpful, indicating that the data from the WDEQ permitting was summarized in the license renewal application (LRA) and thus not sufficient as presented. NRC staff will look at other recently prepared environmental review documents for further aid in regards to level of detail.
- Cameco asked about the possibility of submitting environmental RAI responses separately from the technical RAI responses. NRC staff's response to this question can be found in the Action Items discussion below.

Administrative license amendment request

- Cameco asked about the status of this request. NRC staff indicated that it is waiting for more clarity on the planned restart of the Highland central processing facility before finalizing its review of this request.

License boundary and flow rate changes

- Cameco has received approval from WDEQ Land Quality Division (LQD) for an incidental boundary revision to increase the WDEQ permit at Smith Ranch by approximately 40 acres. Cameco has a second request that is currently under review by WDEQ.
- Cameco also discussed the need to adjust the flow rate for the North Butte remote satellite facility. Further discussion of historical documents related to North Butte flow rates can be found in the Action Items discussion below.
- Cameco and NRC staff discussed how to address these issues from an NRC licensing perspective

No members of the public participated in the call.

ACTION ITEMS

The following action items were identified for the NRC staff:

- NRC staff will review information related to Gas Hills Mine Unit 5 and the Umetco ACL and will identify which information leads the staff to infer that operations in Mine Unit 5 may impact Umetco's ACL.

- Response: NRC staff has found two references to the colocation of the Umetco southwestern flow regime ground water contamination in the same Upper Wind River formation as the Cameco MU5 ISR proposed ore zone. ADAMS ML003678198 describes the geologic nomenclature used by Umetco. This document states the Cameco MU5 ore zone is in the 50 sand in the Upper Wind River Formation on page 2. ADAMS ML003706789 provides a specific reference on pages 5-6 to the potential for interaction between ISR operations in the Cameco MU5 50 sand targeted ore zone and the Umetco southwestern flow regime which is located in the Upper Wind River Formation.
- NRC staff has also found references to communication between the Lower Wind River Aquifer and Upper Wind River aquifer across the mudstone. This communication could enable further interaction between the Umetco southwestern flow regime ground water contamination and Cameco's proposed ore zone sands. ADAMS ML092250176 provides a north-south cross section in Figure 2-6 extending from the Umetco site through the western portion of the proposed Cameco MU 5. In this figure, the cross section between the MW-30 and Veca-3 wells indicates that the faulting allows communication between the Upper Wind River Formation and Lower Wind River Formation in Cameco MU5. In addition, the current Cameco license renewal application description of the PIX 97 nested wells on the eastern side of Cameco MU5 states the ore zone is in the 50 sand. During the pumping test of the PIX 97 50 sand production zone well, the PIX 97 upper aquifer well above the mudstone was found to be in communication with the ore zone.
- NRC staff has discussed the possibility of Cameco submitting the environmental RAI responses separately from the technical RAI responses. Our review timeline is based on acceptance of both safety and environmental RAI responses, so submitting one (environmental) before the other won't alter the review timeline. This is due to the linkage between the NRC staff's safety and environmental reviews. However, a split submission of the RAI responses may allow the NRC staff more time to review environmental RAI responses (and clarify, if necessary). Note that for any RAI response (whether safety and environmental responses are submitted at the same time or separately), it is important that the submittals agree.
- NRC staff reviewed the available documentation in the legacy version of ADAMS related to the April 1, 1992 submittal. NRC staff identified the legacy ADAMS accession number for this submittal as 9206020386. NRC staff issued a license amendment, dated May 21, 1992, that approved the operational changes to the North Butte facility requested on April 1, 1992. The approval is available in legacy ADAMS under Accession number 9206030288. These documents are in the process of being added to the current version of ADAMS.
- NRC staff will provide further guidance on the level of detail to address RAI ECO-1.

Two actions were identified for Cameco:

- Cameco will review the discussion topics from the MUB ACL discussion, evaluate the NRC staff's concerns, and propose a path forward for NRC staff's consideration.
- Cameco will review the available documentation related to boundary changes at Smith Ranch and flow rate adjustments at North Butte and will propose a path forward. NRC staff has made no determination yet if these actions could be approved using the safety and environmental review panel (SERP) process, or if a license amendment would be

necessary.

The meeting concluded at approximately 3:20 p.m. eastern time.

Attachments:

1. List of Attendees
2. Meeting Agenda

Meeting Attendees
Date: Tuesday December 3, 2013
Room T8C5
1:00 pm to 3:20 pm

Topic: Licensing issues related to recovery of uranium from phosphoric acid

NAME	AFFILIATION
Doug Mandeville	U.S. NRC
Elise Striz	U.S. NRC
Bill VonTill	U.S. NRC
Chris Pugsley	Thompson and Pugsley
Tony Thompson	Thompson and Pugsley
Dan Erskine	Intera
Larry Reimann	Cameco
Josh Leftwich	Cameco
Mirabelle Shoemaker	U.S. NRC
Varughese Kurian	U.S. NRC
James Park	U.S. NRC
Lifeng Guo	U.S. NRC
Jose Valdes	U.S. NRC
Paul Hildebrand (phone)	Lidstone and Associates
Chris Lidstone (phone)	Lidstone and Associates
Chester Hitchens (phone)	Lidstone and Associates
Miriam Whatley (phone)	Cameco
Angie Persico (phone)	Intera

MEETING AGENDA
Cameco Resources Smith Ranch License Renewal
December 3, 2013

MEETING PURPOSE: Meeting to Discuss Issues on Mine Unit B ACL Application, Smith Ranch License Renewal, Response to Request for Additional Information, and Other Licensing Actions

MEETING PROCESS:

<u>Time</u>	<u>Topic</u>	<u>Lead</u>
1:00 p.m.	Introductions	All
	Mine Unit B ACL	NRC
	License Renewal RAI Response	Cameco
	Administrative Amendment Request	Cameco/NRC
	Discussion of Other Licensing Actions	Cameco
	Public Comment/Questions	Moderator
4:00 p.m.	Adjourn	

Attachment

Attachment 1