UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 5, 2017

Mr. Larry Teahon
Manager of Safety, Health,
Environment & Quality
Crow Butte Resources, Inc.
86 Crow Butte Road
Post Office Box 169
Crawford, NE 69339-0169

SUBJECT: CROW BUTTE RESOURCES, INC., CROW BUTTE PROJECT - AMENDMENT NO. 2 TO SOURCE MATERIALS LICENSE SUA-1534 RE: QUALITY ASSURANCE PROGRAM, ALTERNATE DECOMMISSIONING (GROUNDWATER RESTORATION) SCHEDULE, POND INSPECTIONS, AND OTHER ADMINISTRATIVE CHANGES (CACS L00819, L00766, AND L00836)

Dear Mr. Teahon:

By letter dated July 27, 2016, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16222A356), Crow Butte Resources, Inc. (CBR) submitted a request for alternate decommissioning (groundwater restoration) schedule for the Crow Butte facility to the U.S. Nuclear Regulatory Commission (NRC). This request contained a summary of restoration activities being conducted by CBR. In conformance with 10 CFR 40.42 and license condition (LC) 10.6, CBR seeks NRC approval to extend the period of groundwater restoration beyond currently approved schedules for Mine Units 2–5 (refer to ADAMS Accession No. ML092510030) and the regulatory requirement of 24 months for Mine Unit 6.

The NRC staff has reviewed the request for an alternate decommissioning (groundwater restoration) schedule and finds it to be acceptable. Therefore, the NRC staff is approving the request and is modifying License Condition (LC) 10.6 of Source Material License SUA-1534 to incorporate the revised schedule. The enclosed Technical Evaluation Report (TER) documents the NRC staff's review of this request.

CBR also submitted a quality assurance program (QAP) in accordance with LC 9.12 in its renewed license issued on November 5, 2014 (ADAMS Accession No. ML13324A101). The TER details the NRC staff's review and approval of CBR's QAP. Therefore, LC 9.12 is deleted. However, after reviewing CBR's QAP program, the NRC staff observes that Section 5.4.1.2 of the updated license application pages provided under LC 9.4 (ADAMS Accession No. ML17034A044) is not consistent with the requirements of LC 9.7 or the revised description of weekly inspections in Section 13.4.2 of the QAP. LC 9.7 requires CBR to follow the guidance set forth in Regulatory Guide 8.31, with the exception of the daily inspections as provided in LC 9.7. CBR's current license does not allow for the performance of weekly inspections using a

designee as indicated in Section 5.4.1.2 of CBR's updated license application. This inconsistency was brought to CBR's attention in an NRC staff e-mail dated April 4, 2017 (ADAMS Accession No. ML17096A317).

In addition, by e-mail dated March 21, 2017 (ADAMS Accession No. ML17081A132), CBR transmitted an amendment request to update its evaporation pond onsite inspection program and to modify conditions 10.16 and 11.9 in license SUA-1534. The intent of the request is to allow for the revised evaporation pond inspection program when CBR determines that the evaporation pond liner system needs to be repaired, replaced, or both.

The NRC staff has reviewed the request to revise the evaporation pond onsite inspection program and finds it to be acceptable. Therefore, the NRC staff is approving the request and is modifying LC 10.16 and LC 11.9 of Source Material License SUA-1534 to incorporate the revised pond inspection program. The enclosed TER documents the NRC staff's review of this request.

As specified in the NRC staff's e-mail dated September 16, 2015 (ADAMS Accession No. ML15259A245), License Condition 11.12 was revised to provide additional clarification. Additionally, at CBR's request (ADAMS Accession No. ML16349A630) the address on Materials License SUA-1534 was updated. Please see the TER (Enclosure 1) for the specifics of the modifications.

Lastly, LC 9.2 was modified by adding references to CBR's recently submitted information and commitments that address the license conditions discussed above. LC 9.2, commonly referred to as the tie-down condition, requires the licensee to conduct operations in accordance with the commitments, representations, and statements contained in the license application and other submissions as noted. Please see the TER (Enclosure 1) for the specifics of the modification.

By e-mail dated August 29, 2017 (see ADAMS Accession No. ML17242A082), CBR agreed to these changes in Materials License SUA-1534.

These licensing actions meet the categorical exclusion provision for administrative changes in 10 CFR Part 51.22(c)(11). Therefore, no further environmental review is required for these actions.

As a result of this amendment, the NRC staff has completed its work on Cost Activity Codes (CACs) L00766 (Response to License Condition 9.12, Quality Assurance Program), L00819 (Alternate Decommissioning Schedule), and L00836 (Revision to Evaporation Pond Onsite Inspection Program). Therefore, these CACs will be closed with no further charges against them.

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's ADAMS. ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

If you have any questions, please contact Mr. Ronald A. Burrows, Project Manager, at 301-415-6443 or, by email at ronald.burrows@nrc.gov.

Sincerely,

/RA/

Bill Von Till, Branch Chief
Uranium Recovery Licensing Branch
Division of Decommissioning, Uranium Recovery
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

Docket No.: 40-8943
License No.: SUA-1534

Enclosure 1: Technical Evaluation Report
Enclosure 2: License Amendment 2 to Materials License SUA-1534

cc: D. Pavlick, Cameco Resources
D. Miesback, NDEQ

SUBJECT: CROW BUTTE RESOURCES, INC., CROW BUTTE PROJECT - AMENDMENT NO. 2 TO SOURCE MATERIALS LICENSE SUA-1534 RE: QUALITY ASSURANCE PROGRAM, ALTERNATE DECOMMISSIONING (GROUNDWATER RESTORATION) SCHEDULE, POND INSPECTIONS, AND OTHER ADMINISTRATIVE CHANGES (CACS L00819, L00766, AND L00836), DATED OCTOBER 5, 2017

ADAMS Accession No.: ML17013A659

OFFICE	DWMEP	DWMEP	DWMEP	DWMEP	OGC	DWMEP
NAME	TLancaster	RBurrows	SAchten	DMandeville	DCylkowski via e-mail	BVonTill
DATE	4/26/17	4/26/17	5/10/17	5/22/17	8/24/17	10/05/17

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TECHNICAL EVALUATION REPORT
QUALITY ASSURANCE PROGRAM, REQUEST FOR ALTERNATE DECOMMISSIONING (GROUNDWATER RESTORATION) SCHEDULE, POND INSPECTIONS, AND OTHER ADMINISTRATIVE CHANGES

DATE: October 5, 2017

DOCKET: 040-08943

LICENSE NO.: SUA-1534

LICENSEE: Crow Butte Resources, Inc.

SITE: Crow Butte Project

PROJECT MANAGER: Ronald A. Burrows

TECHNICAL REVIEWERS: Tom Lancaster, Ronald A. Burrows, Douglas T. Mandeville

Summary and Conclusions:

The licensee submitted information (CBR, 2017a) required by license condition (LC) 9.12 pertaining to its Quality Assurance Program (QAP). This submittal has been reviewed and approved by the U.S. Nuclear Regulatory Commission (NRC) staff. Accordingly, this license condition is being deleted with this amendment.

By letter dated July 27, 2016 (CBR, 2016d), Cameco Resources, Crow Butte Operation (CBR, or the licensee) submitted a request for alternate decommissioning (groundwater restoration) schedule for the Crow Butte facility to the NRC. In conformance with 10 CFR 40.42, CBR seeks NRC approval to extend the period of groundwater restoration beyond currently approved schedules for Mine Units 2–5 and the regulatory requirement of 24 months for Mine Unit 6. Based on the information provided in the application and the detailed review conducted of the alternate decommissioning (restoration) schedule for CBR's Crow Butte Project, the NRC staff concludes that the alternate decommissioning (restoration) schedule is acceptable and in the public interest. Therefore, the NRC staff will modify the last paragraph of LC 10.6 to incorporate the revised alternate decommissioning (restoration) schedule for Mine Units 2 through 6.

By e-mail dated March 21, 2017, CBR transmitted an amendment request to update its evaporation pond onsite inspection program and to modify conditions 10.16 and 11.9 in license SUA-1534 (CBR, 2017c). Both of these license conditions relate to the management and inspection of its evaporation ponds. The NRC staff reviewed CBR's proposed updated pond inspection program (CBR, 2017d) and finds that CBR's proposed revised evaporation pond inspection program meets the requirements of 10 CFR Part 40, Appendix A, Criterion 8A. Therefore, the NRC staff finds the proposed revised evaporation pond inspection program acceptable and will modify LC 10.16 and LC 11.9 accordingly.

By e-mail dated September 16, 2015 (NRC, 2015b), the NRC staff responded to a request by CBR with for a technical clarification of LC 11.12. As a result of this request, the NRC staff is revising LC 11.12 to more clearly state the requirement.

Lastly, the NRC staff amended license condition 9.2 by adding a reference to CBR's recently submitted information and commitments. License condition 9.2, commonly referred to as the "tie-down condition," requires the licensee to conduct operations in accordance with the commitments, representations, and statements contained in the license application and other submissions as noted.

The license amendments reviewed herein meet the categorical exclusion provisions in 10 CFR Part 51.22(c)(11). Therefore, no further environmental review is required for these actions.

Quality Assurance Program (QAP)

LC 9.12 states:

> The licensee shall submit a Quality Assurance Program (QAP) to the NRC for review and approval. The QAP will address the topics recommended in Regulatory Guide 4.15 (as revised).

Background

By letter dated November 27, 2007, CBR submitted an application for renewal of Source Materials License SUA-1534 (CBR, 2007). During its review of the licensee's application, the NRC staff found that the licensee's QAP did not provide adequate documentation of a QAP as recommended in Regulatory Guide 4.15 (Refer to Section 5.7.10.4 of NRC, 2014). Therefore, consistent with Appendix A of NUREG-1569 (NRC, 2003), the NRC staff reviewed the current LC 9.12 submittal in accordance with Acceptance Criterion 5.7.9.3(1) of NUREG-1569 (NRC, 2003) only as it pertains to Regulatory Guide 4.15 (NRC, 2007).

By letter dated December 31, 2014 (CBR, 2014a), as revised, in part, by e-mail dated April 30, 2015 (Revision 1, CBR, 2015a) the licensee submitted its response to LC 9.12. By letter dated August 10, 2015 (NRC, 2015a), the NRC staff accepted the licensee's submittals for a detailed technical response and transmitted a request for additional information (RAI) on the licensee's QAP.

The licensee responded to the NRC staff's RAI with a letter dated October 28, 2015 (CBR, 2015b), which included Revision 2 of the licensee's QAP. Revision 2 of the QAP revised the previous submittals in their entirety. Subsequently, the licensee provided Revision 3 (CBR, 2016a), Revision 4 (CBR, 2016b), Revision 5 (CBR, 2016c) and Revision 6 (CBR, 2017a) of the QAP, all revisions replacing the previous revisions in their entirety. As a result, Revision 6 of the QAP (CBR, 2017a) is the basis for this review.

Staff Review and Analysis of LC 9.12

Regulatory Guide 4.15, Section C, Regulatory Position, states, "The following presents the QA program elements that should be developed and implemented to ensure the quality of

data/results for radiological effluent and environmental monitoring programs" (NRC, 2007), which include the following:

1. Organizational Structure and Responsibilities of Managerial and Operational Personnel;
2. Specification of Qualifications of Personnel;
3. Operating Procedures and Instructions;
4. Records;
5. Quality Control in Environmental Sampling;
6. Quality Control in the Radioanalytical Laboratory;
7. Quality Control for Radioactive Effluent Monitoring Systems;
8. Verification and Validation;
9. Assessments and Audits; and
10. Preventive and Corrective Actions

The licensee's QAP addresses all of the program elements above as recommended by Regulatory Guide 4.15. The NRC staff observes that the licensee's verification and validation process (element 8 in the above list) includes the following commitment:

> Spreadsheets used for radiological monitoring are cross checked monthly by the RSO. The cross checks include the following:
>
> - Data entry;
> - Hand calculation of randomly selected radiological surveys; and
> - Hand calculation of formulas used

This commitment specifically addresses an NRC inspection finding (NRC, 2010a) that the NRC staff used in its evaluation of the licensee's renewal application and contributed to the determination that LC 9.12 was necessary (see Section 5.7.10 of NRC, 2014).

Specific quality assurance functions of the licensee's staff are described in QAP Sections 2 (Organizational Structure and Responsibilities), 8 (Sample Management and Quality Control), 10 (Verification and Validation), 11 (Preventive and Corrective Actions), 12 (Records), and 13 (Audits and Inspections). The inclusion of these specific functions addresses another basis for the NRC staff imposing LC 9.12 (refer to Section 5.7.10.3 of NRC, 2014).

Conclusion

The NRC finds the licensee's QAP program to be consistent with Regulatory Guide 4.15 (NRC, 2007) and therefore acceptable. As a result of this finding, the NRC staff approves the licensee's QAP and will remove LC 9.12 from Materials License SUA-1534 and amend LC 9.2 to include the commitments, representations, and statements made by CBR in its submission dated March 20, 2017 (CBR, 2017a).

Request for alternate decommissioning (groundwater restoration) schedule

The last paragraph of LC 10.6 states:

> The restoration schedule for Mine Units 1 through 5 shall be as described in the request dated July 24, 2009, (ADAMS Accession No. ML092220668) and as approved in NRC staff's letter dated February 18, 2010 (ADAMS Accession No. ML092510030).

Background

By letter dated July 27, 2016 (CBR, 2016d), CBR submitted a request for alternate decommissioning (groundwater restoration) schedule for the Crow Butte facility to the NRC. In conformance with 10 CFR 40.42, CBR seeks NRC approval to extend the period of groundwater restoration beyond currently approved schedules for Mine Units 2–5 (refer to LC 10.6 of NRC, 2016) and the regulatory requirement of 24 months for Mine Unit 6. Mine units 7-11 are currently in production.

Staff Review and Analysis

NRC staff reviewed CBR's above-referenced submittal with considerations listed in 10 CFR 40.42(i). These considerations are as follows:

> (1) Whether it is technically feasible to complete decommissioning within the allotted 24-month period;
>
> (2) Whether sufficient waste disposal capacity is available to allow completion of decommissioning within the allotted 24-month period;
>
> (3) Whether a significant volume reduction in wastes requiring disposal will be achieved by allowing short-lived radionuclides to decay;
>
> (4) Whether a significant reduction in radiation exposure to workers can be achieved by allowing short-lived radionuclides to decay;
>
> (5) Other site-specific factors which the Commission may consider appropriate on a case-by-case basis, such as the regulatory requirements of other government agencies, lawsuits, groundwater treatment activities, monitored natural groundwater restoration, actions that could result in more environmental harm than deferred cleanup, and other factors beyond the control of the licensee.

For the following reasons, considerations 2 through 5 above do support extending the schedule.

First, based on the NRC Crow Butte Renewal SER (NRC, 2014), NRC previously determined that sufficient waste disposal capacity is available to allow for the completion of restoration. Considering that the waste stream is expected to remain relatively the same or less during the deferred restoration, there are no waste disposal issues that would impact the CBR's ability to complete the restoration.

Second, the radioactive component of the restoration wastes generated for disposal from the remediation activities at the Crow Butte facility will be characterized predominantly by the long-lived radionuclides uranium-238 (4.5×10^9 year half-life), uranium 234 (2.4×10^5 year half-life), and radium-226 (1600 year half-life) (refer to Tables 6.1-3 through 6.1-6 of CBR, 2007, and LC 11.3(C) of NRC, 2016). Therefore, there are no volume reduction benefits that would be achieved by allowing short-lived radionuclides to decay, and there is no significant reduction in radiation exposure to workers that would be achieved by allowing short-lived radionuclides to decay.

Finally, there were no other site-specific factors identified by CBR or NRC staff that were appropriate to consider in this particular case.

Therefore, the NRC staff focused on the first consideration in 10 CFR 40.42(i): whether it is technically feasible for CBR to complete aquifer restoration within the currently approved schedule. Table 1 summarizes the start dates and the recent phases of groundwater restoration at Mine Units 2-6 (CBR, 2016d). Table 2 (below) summarizes the previously approved restoration schedule (NRC, 2010b) and the proposed alternate restoration for Mine Units 2-6.

Table 1 shows that groundwater restoration has required significantly more time than 24 months as prescribed in 10 CFR 40.42. Based on NRC staff's assessment of the data presented by CBR, the NRC staff agrees with CBR that the capacity of deep well disposal and the restoration circuit, as well as the need to maintain a hydrologic balance between the production and restoration mine units, make the restoration of each mine unit in a 24-month period technically infeasible (CBR, 2009, 2016d). However, staff also observes the efficiency of restoration was improved at CBR after 2009 with the use of a model-based restoration plan[1], sequencing of the mine units, and system infrastructure upgrades for increased restoration flow rates (NRC, 2010b). This improved restoration efficiency was demonstrated in CBR's 2013 documentation of the restoration status for Mine Units 2 and 3 (CBR, 2013). Relative to historical groundwater restoration monitoring data for Mine Units 2 and 3 prior to 2009, CBR's restoration monitoring data in the 2013 document showed higher rates of decline for groundwater analytes of concern at Mine Units 2 and 3 after 2009.

[1] MODFLOW2000 three-dimensional groundwater restoration flow modelling (calibrated to reflect current mine unit conditions) was used to project injection and extraction flow rates to optimize restoration by maximizing the flow paths through the affected groundwater zone.

CBR continues to update its groundwater restoration model annually with current performance data. These model updates have allowed CBR to renew projections of mine unit restoration timeframes and maintain the above-referenced gains in restoration efficiency (CBR, 2016d). Staff found CBR's recent restoration time-line projections between 2014 and 2016 (CBR 2014b, 2016d) were unchanged and thus reflect a sustained improved restoration efficiency at the mine units currently in restoration.

Table 1
Status of Groundwater Restoration at Mine Units 2 to 6

Mine Unit	Initiation of Groundwater Restoration	Phase of Groundwater Restoration on July 27, 2016
2	January 2, 1996	Preparing an Alternate Concentration Limit Application
3	July 22, 1999	Preparing an Alternate Concentration Limit Application
4	October 31, 2003	IX and RO Treatment
5	August 6, 2007	IX and RO Treatment
6	October 28, 2010	IX and RO Treatment

IX – Ion Exchange, RO – Reverse Osmosis

CBR provided (CBR, 2016d, 2017g) an alternate schedule for the completion of various phases of future groundwater restoration for each of the mine units currently in restoration (i.e., Mine Units 2–6). CBR now projects that groundwater restoration at Mine Units 2–6 will be completed and approved by NRC as annotated in Table 2 below (NRC, 2017g). CBR has completed restoration for MU's 2 and 3 and determined that the concentration of some of the constituents cannot be fully restored to background and therefore an application for alternate concentration limits (ACLs), as allowed in 10 CFR Part 40, Appendix A Criteria 5B(6)[2], is being prepared. The Since MU's 4-6 are in the same hydrogeologic conditions as MU's 2 and 3 it makes sense that ACL's will also be needed and this conclusion has been incorporated into the schedules in Table 2.

The NRC staff finds CBR's alternate schedule is reflective of the above-referenced sustained gains in restoration efficiency. Specifically, the alternate schedule is based on MODFLOW2000 three-dimensional groundwater restoration flow modelling (calibrated to reflect current mine unit

[2] 10 CFR Part 40, Appendix A Criteria 5B(6) states, "Licensees must provide the basis for any proposed limits including consideration of practicable corrective actions that limits are as low as reasonably achievable, and information on the factors the Commission must consider. The Commission will establish a site specific alternate concentration limit for a hazardous constituent as provided in paragraph 5B(5) of this criterion if it finds that the proposed limit is as low as reasonably achievable, after considering practicable corrective actions, and that the constituent will not pose a substantial present or potential hazard to human health or the environment as long as the alternate concentration limit is not exceeded."

conditions), which takes into account the flow capacity of the IX and RO circuits, wastewater volume, and mine unit pore volume. Thus, in accordance with NRC timely decommissioning requirements (NRC, 2008a), staff finds CBR's alternate schedule provides reasonable assurance that restoration will be completed as soon as practicable for the subject mine units.

Table 2
Groundwater Restoration Schedules at Mine Units 2 to 6

Mine Unit	Previously Approved Restoration Schedule*	Proposed Alternate Schedule for Submission of ACL Request**	Proposed Alternate Schedule for NRC Review of ACL Request**
2	July 1, 2012	December 31, 2018	December 31, 2020
3	July 1, 2013	December 31, 2020	December 31, 2020
4	January 1, 2015	March 31, 2019	March 31, 2021
5	July 1, 2016	July, 1, 2020	July, 1, 2022
6	N/A – 24 months from October 28, 2010	October 1, 2019	October 1, 2021

* (NRC, 2010b; CBR, 2010)
** (CBR, 2017g)

In addition, consistent with NRC guidance for other material licensees (e.g., NUREG-1757, Section 5.1), the NRC staff also evaluated whether this request is in the public interest and observed that nothing has changed concerning this evaluation since NRC's review of CBR's previous request for an alternate restoration schedule (NRC, 2010b). In evaluating whether this request is in the public interest, the NRC staff notes that allowing the licensee to extend the groundwater restoration period will reduce the overall health risk to the public by bringing the mine units closer to conditions that existed prior to the start of uranium recovery operations in those mine units. The NRC staff finds that allowing the licensee to extend the groundwater restoration period will not result in any significant change in the types, or significant increase in the amounts, of any effluents that may be released offsite. Therefore, the NRC staff concludes that approving this request is in the public interest.

Conclusion

Based on the information provided in the application and the detailed review conducted of the alternate decommissioning (restoration) schedule for CBR's Crow Butte Project, the NRC staff concludes that the alternate decommissioning (restoration) schedule is acceptable and in the public interest.

Therefore, the NRC staff will modify the last paragraph of LC 10.6 to incorporate the revised alternate decommissioning (restoration) schedule for Mine Units 2 through 6. The last paragraph of LC 10.6 will be modified as follows:

10.6 The restoration schedule for Mine Units 2 through 6 shall be as described in the request dated July 27, 2016, (ADAMS Accession No. ML16222A356) and June 21, 2017 (ADAMS Accession No. ML17173A388) and as approved in NRC staff's letter dated October 5, 2017 (ADAMS Accession No. ML17013A659).

Pond inspection program (LC 10.16 and LC 11.9)

LC 10.16 states:

> Each of the research and development (R&D) evaporation ponds shall have at least 0.9 meters (3 feet) of freeboard. Each of the commercial solar evaporation ponds shall have at least 1.5 meters (5 feet) of freeboard.
>
> Additionally, the licensee shall maintain, at all times, sufficient reserve capacity in the evaporation pond system to enable transferring the contents of a pond to the other ponds. In the event of a leak and subsequent transfer of liquid, freeboard requirements shall be suspended during the repair period.

LC 11.9 states:

> The licensee shall perform and document inspections in accordance with the February 5, 1996**,** revision to its Evaporation Pond Onsite Inspection Program.
>
> Any time 6 inches or more of fluid is detected in a commercial pond standpipe, it shall be analyzed for specific conductance. If the water quality is degraded beyond the action level, the water shall be further sampled and analyzed for chloride, alkalinity, sodium, and sulfate. Any time 6 inches or more of fluid is detected in an R&D pond standpipe, it shall be analyzed for specific conductance, chloride, alkalinity, sodium, and sulfate.
>
> Upon verification of a liner leak, the licensee shall notify NRC in accordance with LC 11.6, lower the fluid level sufficiently to eliminate the leak by transferring the pond's contents to an alternate cell or approved destination, and undertake repairs, as needed. Water quality in the affected standpipe shall be analyzed for the five parameters listed above once every 7 days during the leak period and once every 7 days for at least 14 days following repairs. The licensee shall submit a corrective action plan within 30 days to NRC for review. The corrective action plan will document steps to adequately address the leak and procedures used to verify that the leak has been adequately addressed and permanently fixed. The corrective action plan should also evaluate how much and for how long the diminished waste disposal capacity will impact operations.

Background

By e-mail dated March 21, 2017, CBR transmitted an amendment request to update its evaporation pond onsite inspection program and to modify conditions 10.16 and 11.9 in license

SUA-1534 (CBR, 2017c). Both of these license conditions relate to the management and inspection of its evaporation ponds. By e-mails dated April 12, 2017 (CBR, 2017d), and May 22, 2017 (CBR, 2017f), CBR replaced the previous submittals in their entirety. The NRC staff has documented its review of the May 22, 2017 (CBR, 2017f), submittal in this technical evaluation report (TER).

CBR's request seeks to revise its Evaporation Pond Onsite Inspection Program and to modify conditions 10.16 and 11.9 in its license to allow for the revised evaporation pond inspection program when CBR determines that the liner system needs to be repaired, replaced, or both. Neither CBR's current pond inspection program nor these two license conditions appear to have considered a scenario in which a liner system in a pond would need to be replaced. CBR submitted this amendment request to clarify how the evaporation ponds should be managed and inspected during a condition that requires a liner repair or replacement, or both.

The NRC staff accepted CBR's amendment request for review on April 20, 2017 (NRC, 2017).

Regulatory Requirements

The regulatory requirements for inspections of tailings impoundments and waste retention facilities located at in-situ recovery facilities are found in 10 CFR Part 40, Appendix A, Criterion 8A. This regulation requires daily inspections of tailings or waste retention systems. The NRC staff considers evaporation or storage ponds to be waste retention systems. The NRC staff provides guidance on how applicants and licensees can meet the daily inspection requirement in section 4.2.3 of NUREG-1569 (NRC, 2003) and in Regulatory Guide 3.11, Design, Construction, and Inspection of Embankment Retention Systems at Uranium Recovery Facilities, Revision 3 (NRC, 2008b). These documents also discuss maintaining adequate freeboard to prevent overtopping, identifying when a leak has occurred, and providing for adequate capacity in the event a leak is detected.

Staff Review and Analysis of LC 10.16 and LC 11.9

CBR currently performs its pond inspections of its five evaporation ponds in accordance with the February 6, 1996 version of its pond inspection program (CBR, 1996). The 1996 version of the evaporation pond inspection program was approved by the NRC staff (NRC, 1996). As the liners for the evaporation ponds have aged, the NRC staff understands that CBR has decided to replace the liner system in one of the ponds (CBR, 2016f). In reviewing its pond inspection program and associated license conditions, CBR observed that its current inspection program and the related conditions in license SUA-1534 do not address situations in which a pond is having its liner system replaced. CBR has proposed revisions to its pond inspection program to address a liner replacement scenario and submitted it for NRC review and approval. CBR has also proposed changes to conditions 10.16 and 11.9 of license SUA-1534, which relate to freeboard requirements and inspections of the evaporation ponds.

The applicable regulation in 10 CFR Part 40, Appendix A, Criterion 8A requires that inspections of tailings or waste retention systems be performed on a daily basis. The related guidance documents Regulatory Guide 3.11 (NRC, 2008) and NUREG-1569 (NRC, 2003) identify the activities that should be considered for different inspection frequencies. These guidance documents also discuss maintaining adequate reserve capacity in the event of a leak and

documentation of inspections. However, the documents do not provide guidance on inspections of waste retention systems when a liner system is being repaired or replaced.

The NRC staff reviewed CBR's proposed updated pond inspection program (CBR, 2017d) and has the following observations on the proposed changes to the program:

- CBR will continue to perform daily inspections of the evaporation ponds during liner repair and liner replacement periods.
- Pond water level measurements for a pond will be suspended when its liner system is being replaced.
- Inspections of the pond embankments (i.e., looking for slope movement or seepage) will continue during all phases of liner repair and replacement.
- Weekly inspections of the liner itself and the underdrain system will not be performed when the liner is being replaced.
- CBR has incorporated the action level for the leak detection system from its license renewal application into the pond inspection manual.
- During liner replacement, CBR proposes to maintain the freeboard requirements. If both a liner repair and replacement are necessary at the same time, CBR has proposed eliminating the freeboard requirements just during the liner repair timeframe.
- The pond inspection program calls for submittal of a corrective action plan. The pond inspection program identifies that one component of the corrective action plan is an evaluation of the impact of reduced waste disposal capacity on operations.

The NRC staff finds CBR's proposed revisions to the evaporation pond inspections acceptable for the following reasons:

- Inspections will continue to be performed on a daily basis, which meets the requirements of 10 CFR Part 40, Appendix A, Criterion 8A.
- A particular pond would need to be emptied of its contents during liner replacement to facilitate installation of the new liner. With an empty pond, there is no potential for a leak to occur and inspections of the underdrain are not necessary. Additionally, inspection of the liner system during replacement is not necessary as the pond will not be capable of holding liquids until it is returned to operation.
- CBR's pond inspection program will maintain adequate capacity in other ponds during periods of liner replacement.
- Corrective actions plans developed in response to pond repairs or replacement will address the impact of reduced waste disposal capacity on operation of the facility. The NRC staff observes that analyzing disposal capacity during preparation of a corrective action plan will provide CBR with the information it needs to address a shortfall in disposal capacity. The NRC staff observes that if a disposal capacity issue is identified, CBR could expedite the liner repair or replacement, alter operations to reduce the amount of waste generated, or pursue other short term disposal options. This could be the case in the event that a liner repair and liner replacement work is necessary at the same time. The NRC staff will require updates to the corrective action plan on a monthly basis until the pond replacement is returned to operation. The corrective action plan updates will keep the NRC staff informed on the status of the liner replacement and available disposal capacity.

- CBR's operational experience with the evaporation ponds has shown that when a pond leak is identified, the damage to the liner is typically found within 1 to 3 feet of the waterline (CBR, 2017e). The NRC staff observes that based on CBR's operational experience, the overall volume of water that is typically transferred when a leak is identified is relatively small compared to the overall storage volume in a particular pond.

Based on CBR's operational experience and the discussion of required corrective actions plans above, if one pond is out of service and the water level in a full pond has to be lowered to allow for a leak repair, the NRC staff has reasonable assurance that CBR will have sufficient capacity in the remaining pond, given the temporary suspension of the freeboard requirements if both a liner repair and replacement occur at the same time.

Conclusion

NRC staff has reviewed CBR's proposed revised evaporation pond inspection program. As described above, the NRC staff finds that CBR's proposed revised evaporation pond inspection program meets the requirements of 10 CFR Part 40, Appendix A, Criterion 8A. Therefore, the NRC staff finds the proposed revised evaporation pond inspection program acceptable.

Therefore, the NRC staff will modify LC 10.16 and LC 11.9 to incorporate the revised evaporation pond inspection program. LC 10.16 and LC 11.9 will read as follows:

10.16 Each of the research and development (R&D) evaporation ponds shall have at least 0.9 meters (3 feet) of freeboard. Each of the commercial solar evaporation ponds shall have at least 1.5 meters (5 feet) of freeboard. The licensee shall maintain at all times, except for the circumstances noted below, sufficient reserve capacity in the evaporation pond system to enable transferring the contents of a pond to the other ponds.

Liner Repair

In the event of a leak and subsequent transfer of liquid, freeboard requirements shall be suspended during the repair period.

Liner Replacement

In the event of a liner replacement, sufficient reserve capacity in the evaporation pond system to enable transferring the contents of a pond to the other ponds shall be suspended until the pond is returned to operation. The freeboard requirements shall not be suspended during this period.

Liner Repair and Liner Replacement

In the event a liner replacement and a liner repair becomes necessary at the same time, sufficient reserve capacity in the evaporation pond system to enable transferring the contents of a pond to the other ponds shall be suspended until the liner

replacement is complete. The freeboard requirements shall be suspended only during the liner repair period.

11.9 The licensee shall perform and document inspections in accordance with the May 22, 2017, revision to its Evaporation Pond Onsite Inspection Program (ML17142A383).

Any time 6 inches or more of fluid is detected in a commercial pond standpipe, it shall be analyzed for specific conductance. If the water quality is degraded beyond the action level, the water shall be further sampled and analyzed for chloride, alkalinity, sodium, and sulfate. Any time 6 inches or more of fluid is detected in an R&D pond standpipe, it shall be analyzed for specific conductance, chloride, alkalinity, sodium, and sulfate.

Liner Repair

Upon verification of a liner leak, the licensee shall notify NRC in accordance with LC 11.6, lower the fluid level sufficiently to eliminate the leak by transferring the pond's contents to an alternate cell or approved destination, and undertake repairs, as needed. Water quality in the affected standpipe shall be analyzed for the five parameters listed above once every 7 days during the leak period and once every 7 days for at least 14 days following repairs.

The licensee shall submit a corrective action plan within 30 days to NRC for review. The corrective action plan will document steps to adequately address the leak and procedures used to verify that the leak has been adequately addressed and permanently fixed. The corrective action plan should also evaluate how much and for how long the diminished waste disposal capacity will impact operations.

Liner Replacement

When it is determined that a liner replacement is necessary, the licensee shall notify NRC in accordance with LC 11.6, remove the fluids by transferring the pond's contents to an alternate cell or approved destination, and undertake the liner replacement. Once the transfer of fluids has been completed, measurement of the water level in the pond and the standpipes will be suspended until the liner is replaced and the pond is returned to operation.

The licensee shall submit a corrective action plan for the liner replacement within 30 days to NRC for review. The corrective action plan will document steps to adequately address the liner replacement, including a schedule for the liner replacement, and procedures used to verify that the liner replacement has been adequately addressed. The corrective action plan will also evaluate how much and for how long the diminished waste disposal capacity will impact operations. In addition, the licensee shall submit an update to the original corrective action plan, including any schedule changes and

changes to waste disposal capacity, every 30 days until the pond is returned to operation.

Other Administrative Requests

Clarification of LC 11.12

By e-mail dated September 16, 2015 (NRC, 2015b), the NRC staff responded to a request by CBR for a technical clarification of LC 11.12. As a result of this request, the NRC staff is revising LC 11.12 to more clearly state the requirement. The details of the revised text are provided below.

LC 11.12 states:

> If an overlying aquifer monitorin well in Mine Unit 6 or Mine Unit 8 is placed on excursion status per LC 11.5, the licensee shall test it weekly for natural uranium in addition to the required indicators of alkalinity, conductivity, and chloride. The natural uranium data from wells on excursion status in the overlying aquifer in Mine Units 6 or 8 shall be maintained in the on-site records. If a well in these specific mine units remains on excursion for more than 60 days, the licensee shall provide the natural uranium data with the UCL indicator data in the required sixty day excursion report in accordance with LC 11.5.

LC 11.12 will be modified to read as follows:

11.12 If an overlying aquifer monitoring well in Mine Unit 6 or Mine Unit 8 is placed on excursion status per LC 11.5, the licensee shall test it weekly for natural uranium in addition to the required indicators of alkalinity, conductivity, and chloride. The natural uranium data from wells on excursion status in the overlying aquifer in Mine Units 6 or 8 shall be maintained in the on-site records and shall be provided to the NRC within 60 days of the excursion confirmation in the written report specified in LC 11.5. If the natural uranium data are not available when that report is prepared, the data must be submitted as soon as they become available. In addition, if a well in these specific mine units remains on excursion for more than 60 days, the licensee shall provide the natural uranium data for the time period beyond 60 days in the quarterly report specified in LC 11.1(A).

Change of Corporate Address

By e-mail dated December 13, 2016 (CBR, 2016e), CBR requested a change to its corporate address on Materials License SUA-1534. The details of the revised text are provided below.

Block 2 of Materials License SUA-1534 states:

> 2020 Carey Ave., Suite 600
>
> Cheyenne, WY 82001

The corporate address in Block 2 of Materials License SUA-1534 will be revised to read as follows:

550 N. Poplar

Casper , WY 82601

License Condition 9.2

The first paragraph of LC 9.2 states:

> The licensee shall conduct operations in accordance with the commitments, representations, and statements contained in the license application dated November 27, 2007 (ADAMS package ML073480264), as supplemented by submittals dated August 28, 2008 (ML082410902), May 12, 2009 (ML091470116), July 13, 2009 (ML091980473), September 17, 2010 (ML102640195), September 28, 2010 (ML102740030), February 8, 2012 (ML120450518), April 19, 2012 (ML121170487), August 16, 2012 (ML12235A355), August 30, 2012 (ML12250A421), October 4, 2012 (ML12285A075), March 4, 2014 (ML14064A143), May 15, 2014 (ML14135A414), August 13, 2014 (ML14247A155), April 2, 2015 (ML15097A140), and the commitments submitted for verification listed below.

Staff Review and Analysis of LC 9.2

License Condition 9.2 is commonly referred to by the NRC staff as the tie down condition. Under this license condition, the NRC requires the licensee to conduct operations in accordance with the commitments, representations, and statements contained in the license application and other submissions as noted. Since the licensee has made additional commitments, representations, and statements in submissions to the NRC as discussed in prior sections of this TER, the NRC staff will amend this license condition to add references to those commitments, representations, and statements.

The first paragraph of LC 9.2 will be modified to read:

> The licensee shall conduct operations in accordance with the commitments, representations, and statements contained in the license application dated November 27, 2007 (ADAMS package ML073480264), as supplemented by submittals dated August 28, 2008 (ML082410902), May 12, 2009 (ML091470116), July 13, 2009 (ML091980473), September 17, 2010 (ML102640195), September 28, 2010 (ML102740030), February 8, 2012 (ML120450518), April 19, 2012 (ML121170487), August 16, 2012 (ML12235A355), August 30, 2012 (ML12250A421), October 4, 2012 (ML12285A075), March 4, 2014 (ML14064A143), May 15, 2014 (ML14135A414), August 13, 2014 (ML14247A155), April 2, 2015 (ML15097A140), March 20, 2017 (ML17080A486), and the commitments submitted for verification listed below.

Environmental Review and Consultations

In accordance with 10 CFR 51.22(b), the NRC staff has determined that an environmental assessment (EA) or an environmental impact statement (EIS) is not required for deleting LC 9.12, modifying LC 9.2 LC 10.6, LC 10.16, LC 11.9 and LC 11.12, and for changing the corporate address, which are administrative, organizational, or procedural in nature. Additionally, the NRC staff has determined that an EA or EIS is not required for modifying LC 10.6, LC 10.16, or LC 11.9, which result in a change in process operations. These actions are categorically excluded under 10 CFR 51.22(c)(11) from the requirement to prepare an EA or EIS, based on the following NRC staff findings:

- the deletion or modification of the LCs discussed above will not result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite;

- there will be no significant increase in individual or cumulative occupational radiation exposure as a result of the deletion or modification of the LCs discussed above;

- the deletion or modification of the LCs discussed above will not result in a significant construction impact; and

- there is no significant increase in the potential for or consequences from radiological accidents as a result of the deletion or modification of the LCs discussed above.

Section 7 of the Endangered Species Act (Act) [16 U.S.C. 1531 et seq.] outlines the procedures for Federal interagency cooperation to conserve Federally listed species and designated critical habitats. Section 7(a)(2) states that each Federal agency shall, in consultation with the Secretary, insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. The NRC staff has determined that a Section 7 consultation is not required because the proposed actions are administrative/procedural in nature and will not affect listed species or critical habitat. The NRC staff has also determined that the proposed actions are not a type of activity that have potential to cause effects on historic properties because they are administrative/procedural actions. Therefore, no additional consultation is required under Section 106 of the National Historic Preservation Act.

REFERENCES

10 CFR Part 40. *Code of Federal Regulations*, Title 10, Energy, Part 40, “Domestic Licensing of Source Material.”

CBR, 2017a. E-mail from L. Teahon, Cameco Resources, Crow Butte Operation, to R. Burrows, NRC, Quality Assurance Program, March 20, 2017, ADAMS Accession No. ML17080A486.

CBR, 2017b. Letter from L. Teahon, Cameco Resources, Crow Butte Operation, to the NRC, Annual Report of Changes, Tests, or Experiments, January 23, 2017, ADAMS Accession No. ML17034A044.

CBR, 2017c. E-mail transmittal of license amendment request to modify conditions 10.16 and 11.9 in license SUA-1534, March 21, 2017, ADAMS Accession No. ML17081A132.

CBR, 2017d. E-mail transmittal of revised license amendment request to modify conditions 10.16 and 11.9 in license SUA-1534, April 12, 2017, ADAMS Accession No. ML17102B500.

CBR, 2017e. E-mail from L. Teahon, Cameco Resources, Crow Butte Operation, to R. Burrows, NRC, Question on pond inspection program, May 18, 2017, ADAMS Accession No. ML17139C984.

CBR, 2017f. E-mail from S. Fox, Cameco Resources, Crow Butte Operation, to R. Burrows, NRC, transmittal of revised Crow Butte Evaporation Pond Onsite Inspection Program, May 22, 2017, ADAMS Accession No. ML17142A383.

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CBR, 2016a. E-mail from L. Teahon, Cameco Resources Crow Butte Operation, to R. Burrows, U.S. NRC, LC 9.12, February 4, 2016, ADAMS Accession No. ML16035A315.

CBR, 2016b. E-mail from L. Teahon, Cameco Resources, Crow Butte Operation, to R. Burrows, NRC, LC 9.12, February 11, 2016, ADAMS Accession No. ML16048A051 (Package transmitting the Quality Assurance Program).

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CBR, 2016e. E-mail from L. Teahon, Cameco Resources Crow Butte Operation, to R. Burrows, US NRC, December 13, 2016, ADAMS Accession No. ML16349A630.

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CBR, 2015b. Letter from L. Teahon, Cameco Resources, Crow Butte Operation, to the NRC, Request for Additional Information for Response to License Condition 9.12, Quality Assurance Program (QAP), October 28, 2015, ADAMS Accession No. ML15314A788.

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CBR, 2014b. 2015 Surety Estimate, Cameco Resources Crow Butte Operation, Source Materials License SUA-1534, September 30, 2014, ADAMS Accession No. ML14282A184.

CBR, 2013. Restoration Status for Mine Units 2 and 3 to support 2012 Surety Estimate , Cameco Resources Crow Butte Operation, Source Materials License SUA-1534, May 9, 2013, ADAMS Accession No. ML15159B198.

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