

April 2, 2015

Mr. Larry Teahon, Manager
SHEQ
Cameco Resources
Crow Butte Operation
86 Crow Butte Road
P.O. Box 169
Crawford, Nebraska 69339-0169

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION, RESPONSE TO LICENSE
CONDITION 11.11, CROW BUTTE RESOURCES, INC., CRAWFORD,
NEBRASKA, LICENSE SUA-1534 (TAC L00762)

Dear Mr. Teahon:

By letter dated January 2, 2015 (Agencywide Documents Access and Management System ML15009A031), Cameco Resources Crow Butte Operation (Cameco) submitted to the U.S. Nuclear Regulatory Commission (NRC) staff a response to license condition 11.11 of SUA-1534 providing information on its airborne effluent and environmental monitoring program. The NRC staff has accepted this response for a detailed technical review and has completed its technical review of the response. During our technical review, the NRC staff identified certain areas of deficiency for which we are requesting additional information. The staff's request for additional information (RAI) is enclosed herein. This RAI is organized according to the sections in the response. Please either respond to this RAI or provide a schedule for submitting your responses within 30 days of receipt of this letter.

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 Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

L. Teahon

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If you have any questions, please contact me at 301-415-6443, or by e-mail at Ronald.Burrows@nrc.gov.

Sincerely,

/RA/

Ronald A. Burrows, Project Manager
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:
Request for Additional Information

cc: D. Miesbach, NDEQ
D. Pavlick, CBR

L. Teahon

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**U.S. Nuclear Regulatory Commission
Request for Additional Information
Cameco Resources Crow Butte Operation
Technical Review of Response to License Condition 11.11
For Source Material License SUA-1534**

The purpose of the following Request for Additional Information (RAI) is to provide the additional information and data that are necessary for the U.S. Nuclear Regulatory Commission (NRC) to review Cameco Resources Crow Butte Operation's (Cameco's, or the licensee) response to License Condition 11.11 (Cameco, 2015).

License Condition 11.11(A)

RAI 1:

Description of Deficiency

The staff cannot complete its evaluation of NUREG-1569, Acceptance Criteria 4.1.3(2) and 5.7.7.3(1) for radon releases from the main plant.

Basis for Request

NUREG-1569, Acceptance Criteria 4.1.3(2) and 5.7.7.3(1) refer, in part, to the As Low As Reasonably Achievable (ALARA) aspects of Regulatory Guide (RG) 8.37. RG 8.37 states, in part, "When practicable, releases of airborne radioactive effluents should be from monitored release points (e.g., monitored stacks, discharges, vents) to ensure that the magnitude of such effluents is known with a sufficient degree of confidence to estimate public exposure."

The staff requires additional clarification of Cameco's proposed radon monitoring program for the main plant.

Request for Additional Information

Please provide the following information:

- A. Please describe how radon daughter activity will be addressed for all radon sources originating from the main plant.
- B. Please provide a drawing that details current tank vent connections so that staff can verify the tank vent locations shown in the drawing "Tank Vent Locations" attached to Cameco's January 2, 2015, submittal (submittal).
- C. Please provide assumptions for air flow through open doors and justification for disregarding this pathway if applicable.

Enclosure

RAI 2:**Description of Deficiency**

The staff cannot complete its evaluation of NUREG-1569, Acceptance Criteria 4.1.3(2) and 5.7.7.3(1) for particulate releases from the main plant.

Basis for Request

NUREG-1569, Acceptance Criteria 4.1.3(2) and 5.7.7.3(1) refer, in part, to the ALARA aspects of RG 8.37. RG 8.37 states, in part, "When practicable, releases of airborne radioactive effluents should be from monitored release points (e.g., monitored stacks, discharges, vents) to ensure that the magnitude of such effluents is known with a sufficient degree of confidence to estimate public exposure."

The staff requires additional clarification of Cameco's proposed particulate monitoring program for the main plant.

Request for Additional Information

- A. Please provide clarification on the historical particulate sampling data for the Main Plant as discussed in Cameco's submittal. Please provide this data if not already submitted.
- B. Please provide additional information on the proposed semi-annual isotopic analysis proposed in Cameco's submittal including location of filters, a description of the sampling method, isotopes to be analyzed, and assumptions regarding air flow through open doors and justification for disregarding this pathway if applicable.

RAI 3:**Description of Deficiency**

The staff cannot complete its evaluation of NUREG-1569, Acceptance Criteria 4.1.3(2) and 5.7.7.3(1) for radon releases from the wellhouses.

Basis for Request

NUREG-1569, Acceptance Criteria 4.1.3(2) and 5.7.7.3(1) refer, in part, to the ALARA aspects of RG 8.37. RG 8.37 states, in part, "When practicable, releases of airborne radioactive effluents should be from monitored release points (e.g., monitored stacks, discharges, vents) to ensure that the magnitude of such effluents is known with a sufficient degree of confidence to estimate public exposure."

In its submittal, the licensee stated that radon concentrations in air released from the wellhouses will be based on four production and four restoration wellhouses monitored with Track Etch cups. The average radon emission per wellhouse will be attributed to the remaining operational wellhouses in each group.

The staff requires additional clarification of Cameco's proposed radon monitoring program for the wellhouses.

Request for Additional Information

- A. Please describe how radon daughter activity will be addressed for radon sources originating from the wellhouses.
- B. Regarding the four monitored wellhouses in each operational group (i.e., production and restoration), will the original four monitored wellhouses remain constant from year to year or will other wellhouses be included in the monitoring program on a random or other basis?

RAI 4:

Description of Deficiency

The staff cannot complete its evaluation of NUREG-1569, Acceptance Criteria 4.1.3(2) and 5.7.7.3(1) for radon releases from the wellfield.

Basis for Request

NUREG-1569, Acceptance Criteria 4.1.3(2) and 5.7.7.3(1) refer, in part, to the ALARA aspects of RG 8.37. RG 8.37 states, in part, "When practicable, releases of airborne radioactive effluents should be from monitored release points (e.g., monitored stacks, discharges, vents) to ensure that the magnitude of such effluents is known with a sufficient degree of confidence to estimate public exposure."

In addition, RG 8.37 states, in part, "If a licensee has release points for which monitoring is not practicable, the licensee should estimate the magnitude of the unmonitored effluents" and "When practicable, unmonitored effluents should not exceed 30% of the total estimated effluent releases."

In its submittal, the licensee stated that the amount of radon released from the production wellheads is minor compared to the quantity released from the main plant and the wellhouses.

Regarding spills, the licensee stated that the radon concentration will be based on an estimate using MILDOS.

The staff requires additional clarification of Cameco's proposed radon monitoring program for the wellfield.

Request for Additional Information

- A. Consistent with RG 8.37, please provide an estimate of the radon released from the production wellheads to account for this source.

- B. Regarding spills, is the assumption that all radon in the spilled production fluid is released (100%) or is a smaller amount assumed?

License Condition 11.11(B)

RAI 5:

Description of Deficiency

The staff cannot complete its evaluation of NUREG-1569, Acceptance Criteria 4.1.3(5).

Basis for Request

10 CFR 20.1301(a) requires, in part, that each licensee shall conduct operations so that the total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem in a year.

License Condition 11.2 requires, in part, that a land use survey be submitted with the licensee's analysis of the dose to individual members of the public consistent with 10 CFR 20.1301 and 10 CFR 20.1302.

NUREG-1569, Acceptance Criteria 4.1.3(5) recommends that the application demonstrates that the operations will be conducted so that all airborne effluent releases are ALARA.

In its submittal, the licensee stated that the assessment of the maximally exposed member of the public will be updated annually with current meteorological data and the results compared to the previous year's reported data. In addition, the licensee stated that if there is no statistical difference after 3 years, it will request that the analysis be updated every 5 years.

The NRC staff observes that changes in land use may result in changes to the maximally exposed member of the public.

Request for Additional Information

- A. Please describe how a yearly analysis of the maximally exposed member of the public in accordance with 10 CFR 20.1301 would be performed, taking into account potential land use changes, on a proposed five-year update schedule.
- B. Please provide details on what current meteorological data will be used for the annual updates.

License Condition 11.11(C)**RAI 6:****Description of Deficiency**

The staff cannot complete its evaluation of the licensee's proposed methodology for factoring in radon-222 (radon) progeny into analyzing potential public dose from operations consistent with 10 CFR 20.1302.

Basis for Request

10 CFR 20.1301(a) requires, in part, that each licensee shall conduct operations so that the total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem in a year.

A year is defined in 10 CFR 20.1003 as the period of time beginning in January used to determine compliance with 10 CFR Part 20.

The licensee stated that the annual radon concentration at the receptor will be determined by calculating the average net radon concentration at the receptor location.

Request for Additional Information

Please describe the time period that background concentrations of radon with progeny will be collected to derive average net radon concentrations at the receptor location. If the time period for the background measurements of radon with progeny is not concurrent with operational monitoring results, please provide justification for this approach.

RAI 7:**Description of Deficiency**

The staff cannot complete its evaluation of the licensee's proposed methodology for factoring in radon-222 (radon) progeny into analyzing potential public dose from operations consistent with 10 CFR 20.1302.

Basis for Request

10 CFR 20.1301(a) requires, in part, that each licensee shall conduct operations so that the total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem in a year.

The licensee stated that an alternate approach to measuring net radon concentrations at a receptor location is to utilize release rates for radon from the facility, as discussed in its response to LC 11.11(A), and to use this information as input into the MILDOS-AREA atmospheric dispersion code to calculate a dose at a receptor location.

The NRC staff previously determined (NRC, 2014a, 2014b) that using calculations and models with no monitoring results to support either is not sufficient to demonstrate compliance with public dose limits.

In addition, the NRC staff observes that FSME Interim Staff Guidance FSME-ISG-01, *Evaluations of Uranium Recovery Facility Surveys of Radon and Radon Progeny in Air and Demonstrations of Compliance with 10 CFR 20.1301*, Revised Draft Report for Comment (NRC, 2014c) recommends that when radon is measured at release points and a model is used to calculate a dose to a receptor that "...NRC staff should ensure that the licensee has measured (or the licensee commits to measuring) radon or radon progeny in air to provide validation that regulatory limits are not exceeded."

Request for Additional Information

Please provide a description of measurements of radon or radon progeny in air to ensure the dose to members of the public do not exceed regulatory limits for this alternate approach.

License Condition 11.11(D)

RAI 8:

Description of Deficiency

The staff cannot complete its evaluation of NUREG-1569, Acceptance Criterion 5.7.4.3(1) for radon releases from the main plant.

Basis for Request

Regarding the determination of occupational dose, the requirements in 10 CFR 20.1204 specify, in part, that a licensee shall "...take suitable and timely measurements of:

- (1) Concentrations of radioactive materials in air in work areas; or
- (2) Quantities of radionuclides in the body; or
- (3) Quantities of radionuclides excreted from the body; or
- (4) Combinations of these measurements."

In addition, the requirements of 10 CFR 20.1501 specify, in part, that a licensee "...shall make or cause to be made, surveys of areas, including the subsurface, that —

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Are reasonable under the circumstances to evaluate —

- (i) The magnitude and extent of radiation levels; and
- (ii) Concentrations or quantities of residual radioactivity; and
- (iii) The potential radiological hazards of the radiation levels and residual radioactivity detected."

In its response to LC 11.11(D), the licensee stated that “Concentrations for radon and its daughters in the wellfield as well as outside of the Main Plant will be negligible compared to the dose limits for occupationally exposed workers and therefore it will not be used in the annual occupational dose assessment.”

The NRC staff observes that the licensee did not provide any measurements or analysis of concentrations for radon and its daughters in the wellfield or outside of the Main Plant to justify disregarding this potential occupational exposure pathway.

Request for Additional Information

Please provide measurements of concentrations for radon and its daughters in the wellfield and outside of the Main Plant or an analysis to justify disregarding this potential occupational exposure pathway.

RAI 9:

Description of Deficiency

The staff cannot complete its evaluation of NUREG-1569, Acceptance Criterion 5.7.4.3(1) for potential particulate releases from the main plant.

Basis for Request

The requirements in 10 CFR 20.1204 provide conditions whereby a licensee may disregard certain radionuclides when a mixture of radionuclides exists in air.

LC 10.8 requires the licensee, in part, to “...conduct isotopic analyses for alpha- and beta-emitting radionuclides on airborne samples at each in-plant air particulate sampling location at a frequency of once every six months for the first two years and annually thereafter to ensure compliance with 10 CFR 20.1204(g).”

In its response to LC 11.11(D), the licensee stated that air sampling filters within the main plant and wellhouses will be analyzed for U-nat, Th-230, Ra-226, and Pb-210. The NRC staff observes that the licensee did not provide an analysis on disregarding other potential radionuclides (e.g., Th-234, Po-210) that may exist in equilibrium with other measured radionuclides in order to demonstrate compliance with 10 CFR 20.1204.

Request for Additional Information

Please provide an analysis and justification for disregarding other potential airborne particulate radionuclides that may contribute to occupational dose to demonstrate compliance with 10 CFR 20.1204.

Administrative Issues

License Condition 11.11(C)

1. The member of the public likely to receive the maximum dose is referred to as the Edelman resident. In Section 3 of the Addendum to the submittal, the maximum receptor dose is referred to as “#27 (Gibbons)”. Please clarify if these receptors are referring to the same resident.

Addendum

2. In Table 2.1-1, the value of $3E-12$ (W) is provided for the Thorium-230 entry for “10 CFR 20 Effluent Concentration”. However, this appears to be the value for the Derived Air Concentration (DAC) and the correct 10 CFR 20, Appendix B, Table 2, Effluent Concentration value appears to be $2E-14$. Please confirm the correct value.
3. In Section 2.1, a comparison is made between the airborne particulate concentrations measured at environmental monitoring stations AM1, AM2, and AM3 with the effluent concentration values in 10 CFR 20, Appendix B, Table 2. Please provide a description of how these environmental monitoring station results, located at a distance from the source, are used to infer the vacuum dryer particulate source term.

References

Cameco, 2015. Letter from D. Pavlick, Cameco Resources Crow Butte Operation, to U.S. NRC, Response to License Condition 11.11(A), 11.11(B), 11.11(C) and 11.11(D), January 2, 2015, ADAMS Accession No. ML15009A031.

NRC, 2014a. Letter from A. Persinko, NRC, to M. Thomas, Uranerz Energy Corporation, “Safety Evaluation Report, Nichols Ranch ISR Project, License Amendment, License Conditions 12.7 through 12.14, Source Materials License SUA-1597, April 15, 2014, ADAMS Accession No. ML14087A244.

NRC, 2014b. Letter from R. Linton, NRC, to S. Schierman, Uranium One USA, Inc., “Denial of Acceptance for Review, Information Required by License Condition 11.3, Uranium One USA, Inc., Willow Creek Project, Campbell and Johnson Counties, Wyoming, Materials License SUA-1341 (TAC No. J00711), November 12, 2014, ADAMS Accession No. ML14295A668.

NRC, 2014c. U.S. NRC, FSME Interim Staff Guidance FSME-ISG-01, Evaluations of Uranium Recovery Facility Surveys of Radon and Radon Progeny in Air and Demonstrations of Compliance with 10 CFR 20.1301, Revised Draft Report for Comment, March 2014, ADAMS Accession No. ML13310A198. Published for comment March 27, 2014 (79 FR 17194).