

May 4, 2015

Mr. Scott Schierman
Sr. Health Safety and Environmental Specialist
Uranium One USA, Inc.
907 N. Poplar Street, Suite 260
Casper, Wyoming 82601

SUBJECT: URANIUM ONE, USA, INC., WILLOW CREEK PROJECT, CAMPBELL AND JOHNSON COUNTIES, WYOMING, LICENSE SUA-1341, ACCEPTANCE FOR REVIEW AND REQUEST FOR ADDITIONAL INFORMATION, LICENSE CONDITION 11.3, PART A-D, (TAC J00711)

Dear Mr. Schierman:

By letter dated January 20, 2015, Uranium One, USA, Inc. (Uranium One) submitted its responses to Nuclear Regulatory Commission (NRC) letters dated November 12, 2014, and December 15, 2014, related to Materials License SUA-1341, License Condition 11.3, Parts a-d. Uranium One's responses were been made publicly available on January 22, 2015, and placed in the NRC's Agencywide Documents Access and Management System (ADAMS) and can be found at ML15040A077.

The NRC staff has reviewed Uranium One's responses. NRC staff has determined that the responses, along with previous information provided by Uranium One, are acceptable for detailed technical review, however, NRC staff requires additional information in order to complete the review. The request for additional information is provided in the enclosure. Within 35 days of the date of the letter, please provide the information requested. We are available to meet with you to discuss the requested information.

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 ADAMS. ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

If you have any questions concerning this letter, please contact me, either by telephone at (301) 415-7777, or by e-mail at Ron.Linton@nrc.gov.

Sincerely,

/RA/

Ron C. Linton, Project Manager
Uranium Recovery Licensing Branch
Division of Decommissioning, Uranium Recovery,
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

Docket No.: 040-08502
License No.: SUA-1341

Enclosure:
Request for Additional Information

cc: Luke McMahan, PG (WDEQ-LQD)

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Ron C. Linton, Project Manager
Uranium Recovery Licensing Branch
Division of Decommissioning, Uranium Recovery,
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Office of Nuclear Material Safety
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Docket No.: 040-08502

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Enclosure:

Request for Additional Information

cc: Luke McMahan, PG (WDEQ-LQD)

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REQUEST FOR ADDITIONAL INFORMATION (RAI)
Uranium One USA, Inc. (Uranium One), Willow Creek Project, January 20, 2015 responses
to NRC letters dated November 12, 2014 and December 15, 2014
for License Condition (LC) 11.3 (a-d)

The following RAI's are focused on LC 11.3 (a)

1) Licensee Statement of Position

Uranium One (licensee) identifies (Pg. 1) two methods for determining the amount of radon emanating from the Willow Creek facilities. Uranium One indicated that the first methodology involves sampling the incoming lixiviant for radon using the American Society for Testing and Materials (ASTM) test method ASTM D 5072-09. Uranium One implies that this approach overestimates the amount of true effluent released from these sources.

Technical Basis

NUREG-1569 Acceptance Criteria 4.1.3(2) indicates that the gaseous and airborne particulate effluent control systems are acceptable if monitoring and control systems for the facility are appropriate for the types of effluents generated and the intended purposes of measurement devices are clearly stated and criteria for monitoring are provided.

RAI LC 11.3 (a) #1

NRC staff cannot determine if the intended purposes of measurement devices and criteria for monitoring (sampling the incoming lixiviant) are being used at both the Christensen Satellite Plant and Irigaray Plant or just the Christensen Satellite Plant. The licensee needs to clarify the intended purposes.

2) Licensee Statement of Position

The licensee indicates (Pg. 1) that they will use ASTM-D5072-09 for sampling the lixiviant. ASTM D5072-09 is a standard for drinking water. The method is designed on the premise that a faucet (See 10.1) is available to extract the water.

Technical Basis

NUREG-1569 Acceptance Criteria 4.1.3(2) indicates that the gaseous and airborne particulate effluent control systems are acceptable if monitoring and control systems for the facility are appropriate for the types of effluents generated and the intended purposes of measurement devices are clearly stated and criteria for monitoring are provided.

RAI LC 11.3 (a) #2

NRC staff cannot determine if the monitoring is appropriate for the types of effluent generated. More specifically, NRC staff cannot determine if the sampling locations are representative of the effluent. The licensee needs to address the following:

Enclosure

- a) Provide the location where Uranium One plans to extract the water from the incoming lixiviant to perform the ASTM D 5072-09 method.
- b) Demonstrate how Uranium One will control the pressure and prevent spills using the ASTM D 5072-09 method since the incoming lixiviant will likely be under pressure greater than a typical residential drinking water system.
- c) Demonstrate how does Uranium One plans to extract the liquid and prevent potential spills.
- d) Please provide a piping diagram and sketch of the sampling station.
- e) Please provide a technical basis or demonstrate that the radon sample collected using the ASTM 5072-09 method is representative of the radon (Rn-222) concentration in the incoming lixiviant.

3) Licensee Statement or Position

Uranium One states (Pg. 2) that, "The measurement will be made at the top hatch."

Technical Basis

NUREG-1569 Acceptance Criteria 4.1.3(2) indicates that the gaseous and airborne particulate effluent control systems are acceptable if monitoring and control systems for the facility are appropriate for the types of effluents generated and the intended purposes of measurement devices are clearly stated and criteria for monitoring are provided.

RAI LC 11.3 (a) #3

NRC staff cannot determine if the monitoring is appropriate for the types of effluent generated. The licensee needs to address the following:

- a) Specify what top hatch is referenced (hatch of a truck, tank, etc.).
- b) Specify if this top hatch will be open or closed.
- c) Specify what type of measurement(s) is being taken.
- d) Provide a technical basis indicating why sampling will be performed at the hatch and provide a discussion if this is this representative of the effluent.

4) Licensee Statement or Position

Uranium One states (Pg. 2) that, "The second method involves characterizing each potential source of radon and cumulating the total of the sources for a total effluent release."

Technical Basis

NUREG-1569 Acceptance Criteria 4.1.3(2) indicates that the gaseous and airborne particulate effluent control systems are acceptable if monitoring and control systems for the facility are appropriate for the types of effluents generated and the intended purposes of measurement devices are clearly stated and criteria for monitoring are provided.

RAI LC 11.3 (a) #4

NRC staff cannot determine if the monitoring and method(s) is appropriate for the types of effluent generated. NRC staff cannot determine if Uranium One will combine the sum of the quantity from multiple methods or a single method. Please provide clarification if Uranium One will combine the sum of the quantity from multiple methods or a single method. If a single method is used, please provide a description of the method used.

5) Licensee Statement or Position

Uranium One states (Pg. 2) that, "Sampling of the elution tanks will be performed initially on a quarterly and then a semi-annual basis."

Technical Basis

NUREG-1569 Acceptance Criteria 4.1.3(2) indicates that the gaseous and airborne particulate effluent control systems are acceptable if monitoring and control systems for the facility are appropriate for the types of effluents generated and the intended purposes of measurement devices are clearly stated and criteria for monitoring are provided.

RAI LC 11.3 (a) #5

NRC staff cannot determine if the monitoring methodology and frequency is appropriate for the types of effluent generated. The licensee needs to address the following:

- a) Explain the method Uranium One will use to sample the elution tanks. For example, identify if the sample is an air sample or a liquid sample, how will the sample be collected and at what frequency the sample be collected.
- b) Provide an explanation and demonstrate that the samples from the elution tanks are representative of the effluent release.

6) Licensee Statement or Position

Uranium One states (Pg. 3) that, "Routine sampling will be used to determine the effluent leaving the Christensen Satellite facility. Radon effluent from the Christensen plant is estimated using average monthly radon concentrations, the activity (0.33 WL [working level] is equal to 3.0×10^{-8} uCi/ml) released can be calculated using the equation below."

Technical Basis

NUREG-1569 Acceptance Criteria 4.1.3(2) indicates that the gaseous and airborne particulate effluent control systems are acceptable if monitoring and control systems for the facility are appropriate for the types of effluents generated and the intended purposes of measurement devices are clearly stated and criteria for monitoring are provided.

RAI LC 11.3 (a) #6

The licensee states (Pg. 3) that, "Routine sampling will be used to determine the effluent leaving the Christensen Satellite facility." The licensee also states (Pg. 3), "Radon

effluent from the Christensen plant is estimated using average monthly radon concentrations.” These two statements are confusing and need clarification. It is not clear if the licensee is attempting to measure the concentration based on routine sampling or estimating the activity being released using an occupational concentration limit from 10 CFR Part 20 Table 1. This method is also referenced on page 4 and page 5 of Uranium One’s responses. It is not clear how the results from the routine sampling will be integrated into the estimated concentration. Please clarify the method used to determine the effluent leaving the Christensen Satellite facility.

7) Licensee Statement or Position

The licensee states (Pg. 4) that, “If the high elution tank after sampling shows concentrations below 0.03 WL it will be assumed to be negligible and will not be included in the effluent released from the facility.”

Technical Basis

NUREG-1569 Acceptance Criteria 4.1.3(2) indicates that the gaseous and airborne particulate effluent control systems are acceptable if monitoring and control systems for the facility are appropriate for the types of effluents generated and the intended purposes of measurement devices are clearly stated and criteria for monitoring are provided.

RAI LC 11.3 (a) #7

The negligible value identified by the licensee is above the public concentration value of $1.0 \text{ E-}10 \text{ uCi/mL}$ (0.1 pCi/L). This value represents 10% of the occupational concentration limit from 10 CFR Part 20 Appendix B, Table 1. The public concentration limit is $1\text{E-}10 \text{ uCi/mL}$. The licensee needs to explain why 0.03 (i.e., $3.0 \text{ E-}09 \text{ uCi/mL}$) WL is assumed to be negligible.

8) Licensee Statement or Position

The licensee states (Pg. 5) the following, “Therefore Uranium One will consider the radon coming off the dryer stack to be minimal and will not be included in required reporting requirements for effluent releases.”

Technical Basis

NUREG-1569 Acceptance Criteria 4.1.3(2) indicates that the gaseous and airborne particulate effluent control systems are acceptable if monitoring and control systems for the facility are appropriate for the types of effluents generated and the intended purposes of measurement devices are clearly stated and criteria for monitoring are provided.

RAI LC 11.3 (a) #8

Please explain why radon coming off the dryer stack is considered minimal. Please provide data or calculations to support this statement.

9) Licensee Statement or Position

The licensee states (Pg. 5) that, "Modular buildings are sampled on a monthly basis for radon progeny using the Kusnetz methodology."

Technical Basis

NUREG-1569 Acceptance Criteria 4.1.3(2) indicates that the gaseous and airborne particulate effluent control systems are acceptable if monitoring and control systems for the facility are appropriate for the types of effluents generated and the intended purposes of measurement devices are clearly stated and criteria for monitoring are provided.

RAI LC 11.3 (a) #9

The licensee needs to provide more detailed technical information as follows:

- a) Please explain in detail how the modular building will be sampled. For example, explain what method will be used to sample the modular building, how long the sample be collected, and how the concentration and the quantity released will be determined.
- b) Explain if the Kusnetz methodology used is the original method, the modified method, or both. If original Kusnetz method is used, please explain why this method was chosen over the modified method.

10) Licensee Statement or Position

Uranium One (Pg. 5, Second Equation)

$$\text{quantity emitted } \frac{\mu\text{Ci}}{\text{ml}} = \frac{\text{Average Concentration } \frac{\mu\text{Ci}}{\text{ml}} \times \text{Sample Volume (ml)} \times \text{Time (min)}}{\text{Sample Time (min)}}$$

Technical Basis

NUREG-1569 Acceptance Criteria 4.1.3(2) indicates that the gaseous and airborne particulate effluent control systems are acceptable if monitoring and control systems for the facility are appropriate for the types of effluents generated and the intended purposes of measurement devices are clearly stated and criteria for monitoring are provided.

RAI LC 11.3 (a) #10

NRC staff has determined that this equation is not correct. The equation results in a concentration and not a quantity. In addition, the equation does not take into consideration the well head vent rate of three liters per minute and the equation does not take into consideration the conversion from liters to milliliters. Please correct this equation.

11) Licensee Statement or Position

The licensee states (Pg. 7) that, "Analysis of filters will be for Ra-226, Po-210, Th-230, and Pb-210 as per LC 11.3."

Technical Basis

NUREG-1569 Acceptance Criteria 4.1.3(2) indicates that the gaseous and airborne particulate effluent control systems are acceptable if monitoring and control systems for the facility are appropriate for the types of effluents generated and the intended purposes of measurement devices are clearly stated and criteria for monitoring are provided.

RAI LC 11.3 (a) #11

The licensee did not identify natural uranium (Unat) as an analyte. Provide an explanation as to why Unat will not be analyzed or include Unat into the suit of analytes.

The following RAI's are focused on LC 11.3 (b)

1) Licensee Statement or Position

The licensee states (Pg. 7) that, "10 CFR Part 20.1301 list another option to demonstrate compliance, however Uranium One will use the first method in demonstrating public dose."

Technical Basis

10 CFR Part 20.1301 and 10 CFR Part 20.1302

RAI LC 11.3 (b) #1

NRC staff determined that this statement, "10 CFR Part 20.1301 list another option to demonstrate compliance ..." is not correct. 10 CFR Part 20.1302, not 10 CFR Part 20.1301, provides another option to demonstrate compliance. Please correct this statement.

2) Licensee Statement or Position

The licensee states (Pg. 7) that, "10 CFR Part 20.1301 list another option to demonstrate compliance, however Uranium One will use the first method in demonstrating public dose."

Technical Basis

10 CFR Part 20.1301 and 10 CFR Part 20.1302

RAI LC 11.3 (b) #2

- a) Please explain the statement, "...Uranium One will use the first method in demonstrating public dose." NRC staff cannot determine if Uranium One is referring to the first method on the first page or a different method.
- b) If Uranium One is using measurement(s) method, please clarify what type of measurements Uranium One plans on using.
- c) NRC staff is not clear as to how the licensee will use the measurements taken in the field and its application with the software program MILDOS. Provide an explanation how the software tool MILDOS and the effluent measurements will be used.

3) Licensee Statement or Position

The licensee states (Pg. 8) that, "The emissions or source term from Irigaray should be higher."

Technical Basis

10 CFR Part 20.1301 and 10 CFR Part 20.1302

RAI LC 11.3 (b) #3

NRC staff cannot determine if this statement is correct. Please provide a technical basis explaining why the emissions or source terms from Irigaray should be higher.

4) Licensee Statement or Position

The licensee states (Pg. 8) that, "Historically, the environmental stations located at Irigaray have been applied to Christensen under the assumption that it would overestimate the true particulate emission from Christensen Ranch. Uranium One will verify this assumption by comparing the isotopic analysis and drier stack test emissions from Irigaray to the isotopic analysis of the Christensen plant air particulate samples."

Technical Basis

10 CFR Part 20.1301 and 10 CFR Part 20.1302

RAI LC 11.3 (b) #4

NRC staff cannot determine if the assumption is correct that data from Irigaray can be applied to Christensen. Please provide actual data or calculation and technical basis for these assumptions.

For example, if Uranium One is planning on measuring the radon in the pregnant lixiviant from the wellfields to the Christensen plant, using the ASTM method as discussed on page 1, and assuming that all the radon in the pregnant lixiviant is released to the atmosphere, then the release of radon from the Christensen Ranch facility may be higher than the concentrations from Irigaray due to the larger amount of radon in the pregnant

lixiviant. When considering the response, the licensee should take into consideration the above statements.

5) Licensee Statement or Position

The licensee states (Pg. 9 and 10) that, "Dose conversion factors are established by taking the 10 CFR Part 20 Appendix B, Table 2 value for radon with progeny present in air (2×10^{-10} uCi/mL or 0.2 pCi/L).

Technical Basis

10 CFR Part 20.1301 and 10 CFR Part 20.1302

RAI LC 11.3 (b) #5

The discussion on pages 9 and 10 are not consistent with current regulatory standards. Please revise the dose conversion factors and revise any calculations that were derived from using the incorrect conversion factor.

The dose conversion factor used should be 500 mrem/yr per pCi/L. This is based on the 10 CFR Part 20 Appendix B, Table 2 limit of 1×10^{-10} uCi/mL or 0.1 pCi/L. 10 CFR Part 20 Appendix B, Table 2, states that, "The concentration values given in columns 1 and 2 of table 2 are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent of 0.05 rem (50 millirem or 0.5 millisieverts)." Thus $500 \text{ mrem/yr} / 0.1 \text{ pCi/L} = 500 \text{ mrem/yr per pCi/L}$.

10 CFR Part 20.1301 assigns a total effective dose equivalent (TEDE) limit of 100 mrem per year. This is not to be confused with the dose limit in 10 CFR Part 20 Appendix B, Table 2 for members of the public. The TEDE in 10 CFR Part 20 Appendix B, Table B is the dose limit from breathing or drinking that concentration over a year. This would represent a TEDE or a committed effective dose equivalent of 50 mrem/yr. The TEDE from 10 CFR Part 20.1301 allows the licensee to apply an additional 50 mrem per year to the member of the public from an external dose, or some combination thereof.

In addition, if the licensee was to apply an equilibrium ratio of 0.5, as suggested in the interim draft radon guidance, to the 10 CFR Part 20 Appendix B, Table 2 limit for Rn-222 with daughters, then the licensee could use the 0.2 pCi/L value ($0.1 \text{ pCi/L} / 0.5 = 0.2 \text{ pCi/L}$). This would still be equivalent to the 50 mrem/yr. If Uranium One assumes an equilibrium ratio of 100% then the Rn-222 with progeny concentration value would be 0.1 pCi/L.

The following RAI's are focused on LC 11.3 (c)

1) Licensee Statement or Position

The licensee states (Pg. 11) that "Annually an assessment will be performed to determine if methodologies are still conservative and maximally exposed individual receptor

locations still represent the individuals most potentially affected by Uranium One operations.” The licensee plans to use MILDOS to make this assessment.

Technical Basis

10 CFR Part 20.1301 and 10 CFR Part 20.1302

RAI LC 11.3 (c) #1

Provide additional details and discussion how actual field measurements will be incorporated into MILDOS during the annual assessment.

2) Licensee Statement or Position

The legend in Attachment 2, Identification of Maximum Exposed Individual, Radiological Assessment of the Willow Creek Christensen Ranch Satellite Facility, is expressed in dose.

Technical Basis

10 CFR Part 20.1301 and 10 CFR Part 20.1302

RAI LC 11.3 (c) #2

NRC staff cannot determine if the dose represents one hour or one year. Please identify if the legend is expressed in mrem per hour or mrem per year.

The following RAI's are focused on LC 11.3 (d)

No comments or RAIs

General Comment(s)

1. Uranium One may want to consider to re-organizing the structure of the response in LC 11.3(a) to clarify responses. Under the Irigaray Plant heading, there is some discussion about Christensen Ranch. NRC staff suggests keeping the two facilities separate. If there is something pertinent about Christensen Ranch that may be applicable to Irigaray, please make that clear.
2. Other suggestions include:
 - a. Clearly identify all release points for each facility. The licensee appears to identify all release points but because of the way the licensee has organized responses some release points may have been missed (see #1 under General Comments).
 - b. Clearly identify all equations for each facility or area and discuss parameters in enough detail to support the use of the equation. This may cause the discussion to be repetitive, but it would help the reader understand what equations are being

used for each facility. For example, a discussion of the radon concentration in air should state radon is collected at “xxx specific location” of the “xxx facility” using “xxx specific method.” A discussion of flow rate should state that the flow rate was determined by “xxxx method” or using “xxxx meter” and for “xxxx duration.” The licensee should use caution when discussing and describing the flow rate of the system and the flow rate for the measurement as these are different measurements. Identify all frequencies of sample collection.

- c. Clearly identify the measurements collected, where the measurements are collected, and why the measurements are collected.