U. S. Nuclear Regulatory Commission Staff Request for Additional Information on Uranium One USA, Inc. Submittal dated June 5, 2015, Regarding License Condition 11.3.a, Materials License SUA-1341; Docket No. 040-08502

Background

Uranium One USA, Inc.'s (Uranium One) revised response to LC 11.3.a. is provided in a letter dated June 5, 2015 (Uranium One 2015). The U.S. Nuclear Regulatory Commission (NRC) staff has started a technical review of the June 5, 2015, letter, and requires additional information to complete its review. The NRC staff has summarized Uranium One's proposal in Table 1 below. Upon organizing Uranium One's proposed survey methodology in the table to more clearly summarize sample types, locations, and frequencies, the NRC staff observed several deficiencies.

RAI No. 1. Radon progeny

Request for Additional Information

Please describe how effluent quantities of radon progeny will be estimated.

Regulatory Basis

Title 10 of the Code of Federal Regulations (10 CFR) Part 40.65, "Effluent monitoring reporting requirements," requires licensees to specify the quantity of each of the principal radionuclides released to unrestricted areas in liquid and in gaseous effluents during the previous six months of operation.

Description

With regard to Uranium One's proposed Method 1 and Method 2 estimates of air effluent quantities of radon and radon progeny using the ASTM D 5072-92 approach, which would apply to Christensen Ranch satellite facility, wellfields, and deep disposal well houses, Uranium One did not state how it would estimate quantities of radon progeny released. For example, for purposes of estimating effluent quantities of both radon and its short-lived progeny, when radon is measured, Uranium One may conservatively assume that short-lived radon progeny are in equilibrium with radon.

RAI No. 2. Sample frequencies

Request for Additional Information

Please describe sample frequencies for the Christensen Ranch de-gas column radon-in-water measurements and the deep disposal well house radon-in-water measurements.

Regulatory Basis

10 CFR 40.65, "Effluent monitoring reporting requirements," requires licensees to specify the quantity of each of the principal radionuclides released to unrestricted areas in liquid and in gaseous effluents during the previous six months of operation.

Description

With regard to Method 2 for both the Christensen Ranch de-gas column radon-in-water measurements and the deep disposal well house radon-in-water measurements using the ASTM D 5072-92 approach, Uranium One did not specify sample frequencies.

RAI No. 3. Sample methodology

Request for Additional Information

Please describe an acceptable method for surveys of radon-222.

Regulatory Basis

10 CFR 40.65, "Effluent monitoring reporting requirements," requires licensees to specify the quantity of each of the principal radionuclides released to unrestricted areas in liquid and in gaseous effluents during the previous six months of operation.

Description

With regard to Method 2 (and Method 1 for bag filter changes in modular buildings), as observed by NRC staff in comments on a similar plan (NRC 2015), the methodology proposed by Uranium One to estimate quantities of radon and radon progeny in air effluent for the Christensen Ranch satellite building, Irigaray central processing facility, resin truck, modular buildings, and well fields (production wells) is not correct. The modified Kusnetz method measures only radon progeny (i.e., working levels), not radon. In locations where only radon gas escapes from the ISR process in well-ventilated spaces, short-lived radon progeny concentrations in air will not be in equilibrium with concentrations of radon. This means that radon gas concentrations will be higher than would be estimated by measuring short-lived radon progeny alone and assuming that radon and its short-lived progeny are in equilibrium. A direct measurement of radon by track-etch detectors would be an acceptable approach in these areas. For purposes of estimating effluent quantities of both radon and its short-lived progeny, when radon is measured, Uranium One may conservatively assume that short-lived radon progeny are in equilibrium with radon. Uranium One may choose to adjust the frequency of track-etch measurements to meet target detection limits.

RAI No. 4. Surveys methods when measurements are not practicable

Request for Additional Information

Please describe an acceptable method for surveys of radon-222 in resin trucks and spills.

Regulatory Basis

10 CFR 40.65, "Effluent monitoring reporting requirements," requires licensees to specify the quantity of each of the principal radionuclides released to unrestricted areas in liquid and in gaseous effluents during the previous six months of operation.

Description

With regard to Method 2 measurements of radon and radon progeny released from resin trucks at the Irigaray facility, NRC staff has determined that attempting to account for this effluent quantity by direct measurements of either radon progeny (modified Kusnetz method) or radon (track-etch device) is not practicable. As stated in Regulatory Position C.3.3, "Unmonitored Effluents," of Regulatory Guide 8.37, "ALARA Levels for Effluents from Materials Facilities," where monitoring is not practicable, the license should estimate the magnitude of the unmonitored effluents. For resin truck releases, an approach under Method 2 that would be acceptable to NRC staff would be to estimate radon effluent quantities by assuming that the concentration of radon in transfer water used to mobilize and transfer resin from the resin truck is no greater than the concentration of radon in the incoming lixiviant from the wellfields, and that 100 percent of the radon is released during each transfer. For purposes of estimating effluent quantities of both radon and its short-lived progeny, when radon is measured, Uranium One could assume that radon is in equilibrium with its short-lived progeny.

With regard to Method 2 measurements of radon and radon progeny released from spills, Uranium One proposed in its June 5, 2015, letter (p. 8) that the modified Kusnetz method would be used to estimate radon emissions from spills. NRC staff finds that attempting to account for releases of radon and radon progeny from spills by direct monitoring of radon progeny in air (i.e., the modified Kusnetz method) after the spill has occurred is not reasonable or practicable. For spills, an acceptable approach under Method 2 for estimating radon effluent quantities would be to assume that the concentration of radon in water in the spill is no greater than the concentration of radon in the incoming lixiviant from the wellfields, and that 100% of the radon in the spill volume is released. For example, for purposes of estimating effluent quantities of both radon and its short-lived progeny, when radon is measured, Uranium One could assume that radon is in equilibrium with its short-lived progeny.

References

NRC (U.S. Nuclear Regulatory Commission) 2015. Letter from J. Saxton, NRC, to M. Griffin, Strata Energy, Inc., dated November 19, 2015, Re: U.S. Nuclear Regulatory Commission Verification of Strata's Response to License Condition 12.7, Ross In-Situ Recovery (ISR) Project, Crook County, WY, Source Material License SUA-1601, Docket No. 040-09091, TAC J00735. ADAMS Accession No. ML15278A110.

Uranium One 2015. Letter from S. Schierman, Uranium One, to R. Linton, NRC, dated June 5, 2015, Re: Request for Additional Information, License Condition 11.1, Part (a-d) Materials License SUA-1341, May 4, 2015. ADAMS Accession No. ML15181A357.

Table 1. NRC staff summary of effluent monitoring proposal at Willow Creek Project

Effluent Location	Particulate Matter	Radon	Radon Progeny
Christensen Ranch Satellite Plant	Semi-annual isotopic of monthly filters x building ventilation flow[1]	Method 1: Semi-annual radon-in-water loss ***Method 2: Assumes equilibrium – not valid***	***Method 1: Assumes equilibrium [?]*** Method 2: Monthly M.K.[2] samples x building ventilation flow rate
Christensen Ranch Process Vents	Not measured[3]	Method 1: Semi-annual radon-in-water loss Method 2: ***[Frequency?]*** de-gas column radon-in-water x column flow rate	***Method 1: Assumes equilibrium [?]*** ***Method 2: Assumes equilibrium [?]***
Irigaray Stack	Stack sampling[4]	Not measured[5]	Not measured[5]
Irigaray Plant	Semi-annual isotopic of monthly filters x building ventilation flow[1]	Method 1: Accounted for at Christensen Ranch Satellite ***Method 2: Assumes equilibrium – not valid*** ***Method 2: Assumes equilibrium – not valid***	Method 1: Accounted for at Christensen Ranch Satellite Method 2: Monthly M.K.[2] samples x building ventilation flow rate ***Method 2: Quarterly resin truck M.K.[2] sample x yellowcake precipitation tank exhaust flow rate– not practicable***
Modular Buildings	Not measured[6]	***Method 1 and 2: Assumes equilibrium – not valid***	Method 1 and 2: Monthly and semiannual M.K.[2] samples[7] x vent. flow rate
Wellfields	Not measured[6]	Method 1: Semi-annual radon-in-water loss ***Method 2: Assumes equilibrium – not valid***	***Method 1: Assumes equilibrium [?]*** Method 2: Semiannual M.K. of 3-5% of wells in each mine unit x 3 LPM flow rate per well
Spills	Not measured[6]	***Method 2: Assumes equilibrium – not valid***	***Method 2: M.K. sample – not valid***
DDW Houses	Not measured[6]	Method 2: ***[Frequency?]*** radon-in-water; 100% of radon released to air	***Method 2: Assumes equilibrium [?]***
Ponds	Not measured[6,8]	Not measured[8]	Not measured[8]

[1]Isotopic analysis includes natural uranium, thorium-230, radium-226, lead-210, and polonium-210.
[2]M.K. = modified Kusnetz method. For measurement of working levels (i.e., radon progeny only)
[3]Process vents for wet processes at this ISR would not contain significant particulate matter.
[4]Already part of approved sampling program
[5]The dryer is not a significant source of radon emissions
[6]Operating wellfields, modular buildings, deep disposal buildings, lixiviant spills, and ponds are not sources of significant diffuse emissions of particulate matter.
[7]Semiannual samples will be collected during bag filter changes. If semiannual samples exceed 2 standard deviations of monthly samples, then semiannual samples will be used to determine effluent quantities.
[8]Emissions from ponds are considered to be negligible (see EPA 40 CFR Part 61, Subpart W proposed rule)