



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

October 3, 2017

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

FROM: David D. Brown, Sr. Health Physicist */RA/*  
Uranium Recovery Licensing Branch  
Division of Decommissioning, Uranium Recovery,  
and Waste Programs  
Office of Nuclear Material Safety  
and Safeguards

SUBJECT: SUMMARY OF SEPTEMBER 14, 2017, CATEGORY 2 MEETING  
WITH URANIUM RECOVERY INDUSTRY AND PUBLIC ON  
HEALTH PHYSICS TOPICS

On September 14, 2017, the U.S. Nuclear Regulatory Commission (NRC) staff hosted a public meeting at the NRC headquarters between NRC staff and participants from both the uranium recovery industry and public on various health physics topics. A summary of the meeting is enclosed.

Enclosure: Meeting Summary

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SUBJECT: SUMMARY OF SEPTEMBER 14, 2017, CATEGORY 2 MEETING  
WITH URANIUM RECOVERY INDUSTRY AND PUBLIC ON  
HEALTH PHYSICS TOPICS **DATE October 3, 2017**

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<b>DATE</b>	9/21/17	10/3/17

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## MEETING SUMMARY

DATE: September 14, 2017

TIME: 9:00 a.m. to 11:30 a.m.

PLACE: NRC Two White Flint North, Room T-8C5  
and teleconference and webinar  
11545 Rockville Pike  
Rockville, MD 20872

PURPOSE: The purpose of this meeting was to discuss generic health physics topics that are common to more than one uranium recovery licensee.

ATTENDEES: See attached Attendees List.

### **Introduction and Meeting Purpose**

This was a Category 2 meeting in accordance with the Commission's policy statement on "Enhancing Public Participation in NRC Meetings" (67 FR 36920). The NRC staff hosted this teleconference and webinar with representatives of the uranium recovery industry and interested members of the public as part of an ongoing technical information exchange on specific health physics topics that were identified as beneficial by the uranium recovery industry, in support of ongoing and planned licensing actions. The public meeting announcement and the NRC staff's slides for the webinar were made available in advance of the meeting on August 17, 2017, in the NRC's Agencywide Documents Access and Management System (ADAMS) at Accession Nos. [ML17229B519](#) and [ML17227A499](#), respectively. The final version of the NRC staff's presentation slides are attached. The only difference between the August 17, 2017, presentation slides and those used during the September 14, 2017, meeting is a correction on Slide 24 regarding the citation to Regulatory Guide 3.63.

The meeting began with participant introductions and a prepared statement by Mr. David Brown, Senior Health Physicist with the NRC's Uranium Recovery Licensing Branch, regarding meeting participation and issuance of the meeting summary. About 24 licensees and members of the public, and 9 members of the NRC staff, participated in this meeting. Following this introduction, Mr. Brown reviewed the agenda and summarized past workshops on health physics topics with the uranium recovery industry, beginning in 2009. Following the last meeting in September 2016, the NRC staff contacted licensees to develop the scope of this meeting, which is reflected in the topics selected for discussion items on radiation surveys, meteorological data, effluent quantities, public dose calculations, and applicability of NRC/DOT transportation regulations at uranium recovery facilities.

### **Radiation Surveys**

The first meeting topic began with an overview of the regulatory requirements for conducting radiation surveys at uranium recovery facilities. Mr. Brown reviewed three types of surveys using portable radiation survey instruments (area contamination surveys, personnel exit

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surveys, and equipment release for unrestricted use), summarized guidance for conducting beta and alpha surveys, and discussed recent NRC approvals of beta survey programs at three sites. Next, Mr. Brown explained current guidance for applying source efficiencies and instrument efficiencies for mixtures of radionuclides, and methods for assessing surface contamination in high-background areas. An example of a survey efficiency calculation using natural uranium was provided for discussion purposes. At the conclusion of the slide presentation, licensees participated in a discussion on recurrent radiation survey topics that are important to the uranium recovery industry.

Ms. Kari Toews of Cameco shared information on application of the NUREG-1757, Volume 2, Revision 1, Appendix O method at an operating facility, and concluded that it did not decrease the minimum detectable concentration (MDC) for the materials Cameco surveyed. On this point, there was general agreement among meeting participants that accounting for elevated background areas is an important component for these assessments.

Mr. Stephen Brown, a consultant, noted that the uranium recovery industry was not required to conduct beta surveys for many years, and relied on alpha surveys to meet regulatory requirements. He asked meeting participants to identify an operational condition where beta emissions exceeded the alpha emissions at a uranium recovery facility, and stated that alpha surveys only should be sufficient to demonstrate compliance. Ms. Toews recommended that the uncertainty in radiation measurements needs to be accounted for, as it can be a significant factor when conducting surveys. Mr. David Brown explained that beta surveys are required by license conditions, which ensure that beta-emitting radionuclides are accounted for throughout UR facilities, where different mixtures of alpha-emitting and beta-emitting radionuclides may be encountered. Mr. Oscar Paulson of Kennecott Uranium Company indicated that at his facility, he has not seen beta measurements exceed alpha measurements, and recommended instrument calibrations for beta measurements using a depleted uranium plate, rather than a high-energy beta source such as strontium-90.

David Brown explained how a high-energy beta source can be used for instrument calibration using International Standard Organization's standard no. 7503-1, and summarized the requirements for conducting beta surveys in accordance with NRC staff guidance on NRC Policy and Guidance Directive FC 83-23: Termination of Byproduct, Source and Special Nuclear Material Licenses (ADAMS Accession No. ML003745523). Similar to the meeting in September 2016 (ADAMS Accession No. ML16270A042), participants discussed the applicability of Regulatory Guide 8.30, which references alpha measurements only for regulatory compliance. The NRC staff discussed an interpretation of acceptable surface contamination levels for short-lived beta-emitting daughters of natural uranium in secular equilibrium with a parent, in a NRC memorandum dated January 13, 1992 (ADAMS Accession No. ML16265A249). This memorandum was shared with the uranium recovery industry following the September 2016 meeting on this topic.

### **Meteorological Data**

Mr. Brown presented an overview of the regulatory requirements for determining the representativeness of onsite meteorological data using Regulatory Guide 3.63, and discussed licensing reviews of meteorological data analyses that have been conducted by the NRC staff during the past seven years. Technical approaches considered acceptable by the NRC staff

include the use of multiple statistical analyses, as documented in two licensing cases since 2014. At the conclusion of the slide presentation, licensees and members of the public were invited to ask questions on meteorological data and radiation survey topics of interest.

Oscar Paulson asked for clarification of NRC guidance regarding the collection and analysis of onsite meteorological data for determining representativeness with meteorological data collected from nearby weather stations. Mr. Brown explained that the maximum distance considered acceptable for a nearby weather station is 50 miles, and meteorological data does not need to be collected from a meteorological station operated in the National Weather Service network if the station meets regulatory guidance contained in Regulatory Guide 3.63. Mr. Paulson and Mr. Brown discussed further the acceptability of using electronic and mechanical equipment for measure meteorological data, in accordance with regulatory guidance.

Marvin Lewis, a participating member of the public, inquired about regulatory requirements for monitoring effluents at uranium recovery facilities, and under what circumstances a licensee could not adequately account for its releases of airborne radioactivity during operations and expose a member of the public. Mr. Brown explained that the NRC staff reviews and approves a licensee's effluent monitoring system, and periodically conducts onsite inspections to verify that the licensee is operating its facility in compliance with regulatory requirements.

There were no additional questions from the industry or members of the public on the first two topics of this meeting, so it was agreed to move forward with the next topic on the agenda.

### **Effluent Quantities**

Mr. Brown summarized regulatory requirements for quantifying principal radionuclides released to unrestricted areas in liquid and gaseous effluents, and noted that in the past some licensees did not adequately specify effluent quantities in their semi-annual reports to the NRC. However, the uranium recovery industry has a good track record of adequately quantifying effluents by measurement or calculation. He emphasized that that licensees must account for all sources of radioactivity released from their facility, so that unmonitored releases do not exceed 30 percent of the total estimated effluent release, according to Regulatory Guide 8.37, "ALARA Levels for Effluents from Materials Facilities." During this overview, Mr. Brown reviewed six licensing cases that were approved by the NRC staff since 2014, and provided an example of an effluent quantity calculation for a generic in-situ recovery facility.

Mr. Stephen Brown asked whether the design objectives specified in 10 CFR 40.65 serve as a type of site-specific regulatory limit for possession of source material. Mr. David Brown explained that the design objectives are an official estimate of the radioactive emissions from a uranium recovery facility and are used to assess doses to members of the public. Also, he noted that there are separate requirements in 10 CFR 20.1302 for demonstrating compliance with dose limits for individual members of the public, and that the NRC staff position is that measurements are needed to verify calculations.

Mr. Michael Griffin of Strata summarized the methods used at their facility for compliance during the past few years, which includes both calculations using site-specific parameter values in the MILDOS code and performing measurements, in accordance with NRC staff guidance. Mr.

Stephen Brown added that it is important to collect and analyze an adequately representative sample for compliance.

Mr. Ryan Schierman of the State of Wyoming, Department of Environmental Quality asked whether licensees could improve their method of estimating effluent quantities for demonstrating compliance with 10 CFR 40.65. Mr. Brown explained that under the risk-informed, performance-based licensing framework, a licensee's Safety and Environmental Review Panel may review any changes, tests, or experiments to determine whether NRC approval is required prior to making the facility or procedural change.

### **Public Dose Calculations**

Mr. Brown provided an overview of regulatory requirements in 10 CFR 20.1302 for demonstrating compliance with annual public dose limits. He noted that, in the past, some licensees did not correctly measure radionuclide concentrations in proper locations or compare measurements to the appropriate effluent concentration values in 10 CFR Part 20 Appendix B. He noted that the NRC staff has approved dose calculation methods for six facilities, and reinforced that licensee's should be cognizant that the point of compliance in 10 CFR 20.1302(b)(2)(i) is the boundary of the unrestricted area, which is outside a restricted or controlled area. An example dose calculation was discussed with references to existing NRC guidance and ANSI standards.

At the conclusion of the presentation, Mr. Oscar Paulson discussed the preoperational (background) dose rate at the Sweetwater facility, and how external dose is accounted for in the assignment of total effective dose equivalent to a member of the public, since the facility is not currently operating. Mr. Brown indicated that if the dose calculation method has been approved, it is acceptable to continue using it. Also, Mr. Brown confirmed that his slides include a radon equilibrium factor of 0.5 for the purpose of calculating public dose.

A member of the public, Ms. Candace Head-Dylia, asked about the definition of a controlled area in 10 CFR Part 20, as it pertains to the current use of public roads near the Homestake Grants uranium mill tailings site. Mr. Brown provided information on controlled areas, and Mr. Duane Schmidt of the NRC staff recommended that this item could be discussed in greater detail during the next monthly stakeholder meeting with the NRC staff project manager for the Homestake facility. An action item from this meeting is to coordinate with Ms. Head-Dylia on the schedule for the next conference call. Ms. Head-Dylia also asked about the consideration of local terrain in the calculation of dose for members of the public that are located downwind of a facility. Mr. Brown stated that computer models take into account wind direction on an annual basis and takes into account the effect of local terrain on meteorology when calculating doses to members of the public.

### **NRC/DOT Transportation Requirements**

The final presentation was a brief overview of NRC and U.S. Department of Transportation requirements that are applicable to uranium recovery facilities. Mr. Brown noted that there have been several violations of transportation requirements recently. Mr. Oscar Paulson asked a question regarding excepted packages containing natural uranium samples. Mr. Paulson's question pertained to the table of activity limits in 49 CFR 173.425, "Table of activity limits –

excepted quantities and articles.” For normal form solids in a limited quantity package, the table in 49 CFR 173.425 states the activity limit is  $10^{-3} A_2$ . However, the  $A_2$  value for natural uranium is unlimited (see 49 CFR 173.435, “Table of  $A_1$  and  $A_2$  values for radionuclides”). As a result, if someone assumed only natural uranium (and not its short-lived progeny) were present in the package, one might conclude there is no quantity limit on a limited quantity package of natural uranium. However, as Mr. Paulson stated during the discussion, a package containing natural uranium would contain a mixture of radionuclides. The radionuclide mixture would include the isotopes of natural uranium (uranium-234, uranium-235, and uranium-238) and, at a minimum, all short-lived radioactive progeny of these isotopes. In this case, Mr. Brown agreed with the approach described by Mr. Paulson, which is essentially that the mixture rule in 49 CFR 173.433(d)(5) applies to the calculation of the applicable  $A_2$  value for a mixture of natural uranium and its progeny.

At the conclusion of the meeting, Mr. Brown asked all stakeholders for additional comments. There were no additional comments from licensees or members of the public. The webinar terminated at 11:30 EDT.

Specific action items identified by the staff during this meeting are summarized in the table below.

<b>Action Items</b>		
<b>Issue</b>	<b>Responsible Party</b>	<b>Response</b>
Several industry representatives requested a 1992 NRC letter interpreting acceptable surface contamination levels for short-lived beta-emitting daughters of natural uranium in secular equilibrium with a parent.	NRC	NRC staff made letter publicly available in ADAMS (ML16265A249) and forwarded it to meeting participants in September 2016.  The NRC staff is to redistribute the ADAMS accession number to meeting participants.  This action item is completed.
Coordinate with Ms. Head-Dylla on the schedule for the next conference call with the NRC Project Manager for the Homestake Grants uranium mill tailings site.	NRC	The NRC Project Manager for the Homestake Grants uranium mill tailings site has been informed of the question and will address it at the next conference call.  This action item is completed.

**ATTACHMENTS:**

1. List of Attendees
2. NRC Staff Presentation Slides



## MEETING ATTENDEES

**Date: September 14, 2017**

**Topic: Discussion of uranium recovery industry health physics topics**

<b>NAME</b>	<b>AFFILIATION</b>
Scott Bakken	Energy Fuels, Inc.
Aaron Linard	Uranerz Energy Corporation (Energy Fuels, Inc.)
Robert Meyer	AUC, LLC
Jim Viellenave	AUC, LLC
Michael Gaither	Lost Creek ISR, LLC
Alex Buerle	Lost Creek ISR, LLC
Michael Griffin	Strata Energy, Inc.
Royal Pond	Strata Energy, Inc.
Oscar Paulson	Kennecott Uranium Company
Scott Schierman	Uranium One Americas, Inc.
Larry Reimann	Cameco Resources
Larry Teahon	Cameco Resources
Kari Toews	Cameco Resources
Tammy Dyer	Cameco Resources
Casey Yada	Cameco Resources
Beth Frye	Cameco Resources
Ken Garroute	Cameco Resources
Katie Sweeney	NMA
Steven Brown	SHB, Inc.
Ryan Schierman	Wyoming Dept. of Environmental Quality
Dave Adams	Wyoming Dept. of Environmental Quality
Duane Schmidt	NRC
Andrea Kock	NRC
Dave Brown	NRC
Ron Burrows	NRC
Doug Mandeville	NRC
Bill Von Till	NRC
Jim Webb	NRC
Tony Huffert	NRC
Sarah Achten	NRC
Candace Head-Dylla	Bluewater Valley Downstream Alliance
Marvin Lewis	self
Jana Bergman	Curtiss Wright

NRC staff presentation slides for September 14, 2014 meeting

Current Uranium Recovery Health Physics Topics

ADAMS Accession No. ML17262A497