May 10, 2011

MEMORANDUM TO: Bill von Till, Chief
Uranium Recovery Licensing Branch
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

FROM: Stephen J. Cohen, Team Leader **/RA/**
Uranium Recovery Licensing Branch
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

SUBJECT: INDUSTRY/AGENCY HEALTH PHYSICS FOCUS GROUP MEETING SUMMARY

Enclosed with this memorandum is a report of the meeting between representatives of the uranium recovery industry and the U.S. Nuclear Regulatory Commission staff to discuss certain health physics issues that have emerged during the review of license applications for new uranium recovery facilities and expansions. If you have any questions, please contact me.

Enclosure: Report of Meeting

cc: Meeting Attendees

MEETING REPORT

DATE: April 11, 2011

TIME: 9:00 a.m. to 4:00 p.m.

PLACE: U.S. Nuclear Regulatory Commission Headquarters
11545 Rockville Pike, Room T8C5
Rockville, MD 20852
301-415-7000

PURPOSE: The purpose of this focus group is to provide a forum to discuss, in detail, certain health physics issues that have emerged during the review of license applications for new uranium recovery facilities and expansions. U.S. Nuclear Regulatory Commission (NRC) staff and industry representatives will attempt to either resolve these issues or develop a path forward to resolution. An agenda for this meeting is provided as Attachment 1.

ATTENDEES:

See Attached Attendees List (Attachment 2).

BACKGROUND:

NRC staff has held workshops since 2007 to provide guidance to potential uranium recovery applicants and current licensees regarding the information required in an application for a new facility or expansion. The latest such meeting was held in Denver, Colorado, on January 11 and 12, 2011. The staff and industry representatives agreed to set up a focus group to resolve outstanding health physics issues in lieu of attempting to resolve issues in a large conference setting.

DISCUSSION:

NRC staff started the meeting by reading an opening statement followed by introductions. Topics to be addressed during this meeting were, as follows:

- Meteorological Data
- Compliance with 10 CFR Part 20, exposure limits for Radon-222 and progeny.
- Compliance with 10 CFR 20.1301/1302 (doses to the public) and Subpart C (doses to workers)
- Beta Surveys
- Derived Air Concentration values for assess dose to workers
- Measurement of doses to particulate radionuclides

Meteorological Data

Industry representatives stated their understanding of the issue, which is that the staff does not necessarily accept that offsite meteorological data is representative of conditions at a proposed uranium recovery site. The staff's skepticism is based, in part, on differences that have been observed in the data from existing meteorological stations presented in applications. The staff also reiterated EPA's findings that "…a quantitative method does not exist for determining representativeness absolutely" (EPA-454/R-99-005) and that NRC staff meteorologists have arrived at the same conclusion. However, industry believes that based on statistics and the purpose of the data, offsite meteorological data could be used to estimate doses to members of the public and locate monitoring stations.

Staff discussed Regulatory Guide 3.63 in part that onsite meteorological measurements are tied to specific regulations and that this information is used to estimate maximum doses to the public and environmental impacts from particulate releases. Regulatory Guide 3.63 recommends 12 months of continuous monitoring, but does not provide any objective criteria for using offsite data. However, the regulations in 10 CFR Part 40, Appendix A, allow for alternatives to the requirements.

Industry stated that software could be used to statistically evaluate offsite data making it suitable for onsite analyses. Furthermore, MILDOS-AREA calculations could be performed to demonstrate that regardless of wind direction and using conservative input parameters, doses to the public would be below regulatory limits. Therefore, onsite measurements may not be necessary to address maximum expected dose prior to an application being submitted for NRC technical review. However, unless an applicant agreed to monitor all 16 compass downwind sectors during operations, it would have to submit this data prior to operations. Staff reiterated previous guidance that predictive models, such as MILDOS-AREA, are not acceptable as the sole mean of demonstrating compliance with dose limits. The main reasons for this are the uncertainties associated with mill releases and atmospheric transport.

The staff questioned the logic of performing such an analysis without confirmation that the monitoring stations during operations would be correctly located. The staff emphasized that preoperational and operational sampling locations should be the same, and without onsite data collection, the applicant would not know if the operational sampling locations were located correctly. Industry responded by stating that preoperational sampling locations could be adjusted based on onsite wind measurements.

Although not specifically discussed at the meeting, the staff has previously suggested the following strategy regarding environmental baseline data collection. The applicant would have to either assume that any radionuclide that may be subject to decommissioning standards is not present (i.e., has a zero concentration value in the background) or would have to sample in all 16 compass downwind sectors prior to operations. Regulations in 10 CFR Part 40, Appendix A, Criterion 7, require "…complete baseline data on a milling site and its environs." The industry's suggested approach does not appear to take into consideration the stated purpose of Criterion 7, mainly "…to evaluate environmental impacts of operations; and to detect potential long-term effects."

The final conclusion was that the staff agreed that industry can propose alternatives; however, industry is responsible for justifying such alternatives.

Compliance with 10 CFR 20.1301/1302 (doses to the public) and Subpart C (doses to workers)

Industry representatives presented their understanding of the issue, which is the manner in which one demonstrates the maximally exposed member of the public. Historically, an applicant would consider the site boundary and nearest residence as areas for maximally exposed members of the public because conventionally mills had discrete radiation sources, such as the tailings impoundment and mill buildings. However, ISRs are expansive facilities with diffuse sources covering hundreds or thousands of acres.

Industry stated that an approach used by one applicant was to create a list of potential maximally exposed members of the public, model multiple "receptors", and create isodose maps of the site. These isodose maps could be used to identify the maximally exposed member of the public. The staff concurred that based on guidance in NUREG-1736 (2001), such an approach appears reasonable.

Industry also inquired into the ability to use modeling to determine compliance with annual dose limits during operations. Staff repeated earlier guidance that modeling could not be relied on solely to estimate doses. At least during the early stages of operations, some type of confirmatory sampling would be required. However, after a certain period of time, licensees could request a cessation to confirmatory sampling.

Derived Air Concentration values for assessing dose to workers

Industry reiterates the question of whether or not the solubility of the yellowcake product is mixed. Industry referred to recent work by Cameco to characterize the solubility and isotopic content of its yellowcake products. Results indicated that the DAC for uranium is 4.8×10^{-10} at PRI, which represents a mixed DAC.

Cameco's results also indicate that Crow Butte's and Smith Ranch's yellowcake is >99 percent uranium. Industry states that this result is predictable because ISR does not remove thorium-230 and radium does not absorb to the resin. Furthermore, thorium-234 and protactinium-232 require months to grow in. However, yellowcake is not stored at uranium recovery facilities for months. Staff pointed out that the product is only one source of exposure. Other sources include spills, leaks, maintenance, and general contamination. Any yellowcake that remains as contamination will have the potential to decay into its daughter products prior to being detected.

Industry requested that the staff use Cameco's data as a surrogate for other ISR facilities or in combination with work previously performed by COGEMA at its Irigaray/Christensen Ranch facility (now known as Uranium One's Willow Creek facility). The staff stated that it will review Cameco's information as part of the review for ongoing actions, but will not be able to assess its use for general surrogate purposes for at least another year. At that point, such inhalation classification information would be considered in the revision of Regulatory Guide 8.30 and would involve input from Agreement States.

Staff repeated guidance previously presented to industry in 2009, that assumptions of inhalation Class W for radiotoxicity and inhalation Class D for chemotoxicity would be acceptable to the staff. These assumptions would be valid for the life of the facility because they would be conservative. However, some additional characterization would be required to use different inhalation classes.

Beta Surveys

Industry stated that beta surveys should be a function of the milling product. In uranium mills, yellowcake is not stored for any length of time; therefore, beta-emitting progeny do not grow in. In-growth requires four months to attain equilibrium, and yellowcake is shipped before then. Consequently, beta surveying should not be required.

The staff stated that aged yellowcake could occur in scale or in filters, and exposures could then occur in non-routine maintenance. Industry responded by stating that while the staff could be correct, surveying for beta is difficult because of gamma interference. Furthermore, industry testing demonstrated that where no alpha is detected, no beta radiation is present.

Staff stated that licensees could characterize their sites to determine ratios of beta to alpha. In addition, licensees would need to determine the scan minimum detectable concentration (MDC) taking into account various surfaces and conditions (e.g., wet or dry). Using this information, licensees could argue that by surveying for alpha contamination, the beta contamination could be derived. Additional characterization would be required with a change in process.

Compliance with 10 CFR Part 20, exposure limits for Radon-222 and progeny

Industry stated that assessing doses due to radon is very difficult for two reasons. First, the current state of art in radon detection equipment is not capable of distinguishing doses from uranium recovery operations and background. Second, radon releases from ISRs and possibly conventional mills are too low to be distinguishable from background.

Industry presented two examples. First, the calculated error for the radon detectors used at uranium recovery sites is 0.1 pCi/l. This is well within background variability at uranium recovery facilities and is similar to the concentration value in Part 20, Appendix B, Table 2, for air (0.1 pCi/L). NRC staff did not agree with a direct comparison of the uncertainty of individual measurements to the Appendix B, Table 2 value as a reason that measurements are not capable of detecting radon at the concentrations needed to demonstrate compliance. Staff stated that licensees could calculate the overall uncertainty in the average net concentration, using standard propagation of uncertainty methods, to determine if the techniques are sensitive enough. Industry provided further details on uncertainties for individual measurements (gross results with associated uncertainty), but had not calculated an overall uncertainty in the average net concentration.

Second, at one conventional mill facility, downwind radon concentrations are lower than upwind concentrations, because of radionuclides that blow off dry playa lakes, and the fact that the water in the facility's tailings impoundment significantly attenuates radon emissions. Industry then posed the question of how to actually calculate a dose to the public considering these conditions. The staff acknowledged difficulties in certain circumstances with assessing doses from radon.

According to the NRC staff, licensees have a choice of compliance methods for meeting the public dose limit: (1) comparison of measured concentrations to concentration values for air specified in 10 CFR Part 20, Appendix B; or (2) performing dose assessments. Staff indicated that for either case, licensees can take account of the radon progeny equilibrium factor. With this adjustment, the compliance concentration could be 0.2 pCi/L. If dose assessments are performed, additional flexibility is gained, because the dose limit is 100 mrem/yr compared to the 50 mrem/yr dose level at which the Appendix B, Table 2, values were determined.

Industry also asked about using modeling to calculate doses. Staff stated that a sampling program to confirm the dose assessments would be required. Such sampling could include pregnant and barren lixiviant sampling to estimate losses, header house monitoring, wellhead monitoring. Licensees could eventually discontinue sampling, with NRC approval, if the sampling results sufficiently confirm the modeling results.

Measurement of doses to particulate radionuclides

This issue is similar to the DAC issue raise previously; therefore, no further discussion was warranted.

Guidance Development

Although it was not a specific discussion topic, the issue of guidance development was raised by the staff. The staff stated that because of resource constraints, it will focus efforts on the core missions of licensing, oversight, and inspections. Consequently, certain regulatory guide revisions, such as those for Regulatory Guide 8.30, will not be completed for at least 1 more year. Industry representatives acknowledged this situation and agreed with the staff that the core missions were a higher priority than guidance revisions.

ACTIONS:

None

ATTACHMENTS

1. Agenda
2. List of Attendees

MEETING AGENDA

U.S. Nuclear Regulatory Commission/Industry Health Physics Focus Group
April 11, 2011

MEETING PURPOSE: The purpose of this focus group is to provide a forum to discuss, in detail, certain health physics issues raised by the U.S. Nuclear Regulatory Commission staff and industry's questions regarding issue resolution.

MEETING PROCESS:

April 11, 2011

Time	Topic
9:00 a.m.	Introductions

- Meteorological data.
- Compliance with 10 CFR 20 exposure limits for Rn-222 and progeny.
- Compliance with 10 CFR 20.1301/1302 (doses to the public) and subpart C (doses to workers).
- Questions from members of the public.
- Beta surveys (beta monitoring of personnel upon leaving the restricted area, beta monitoring for release for unrestricted use, and release of equipment).
- Identification of the appropriate derived air concentration in assessing dose to the worker.
- Measurement of doses to particulate radionuclide other than uranium, specifically radium-226 and thorium-230 in uranium recovery facilities.
- Questions from members of the public.

4:00 p.m. Adjourn

Attachment 1

MEETING ATTENDEES

April 11, 2011, USNRC Headquarters, 9:00 a.m. to 4:00 p.m.

Topic: Industry/NRC Focus Group on Health Physics Issues

NAME	AFFILIATION	PHONE NUMBER	E-MAIL
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Attachment 2

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Date	05/05/11	05/05/11	05/09/11	05/06/11	05/09 /11	05/10/11

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