

December 24, 2002

MEMORANDUM TO: Christopher I. Grimes, Program Director  
Policy and Rulemaking Program  
Division of Regulatory Improvement Programs, NRR

FROM: Joseph L. Birmingham, Project Manager */RA/*  
Policy and Rulemaking Program  
Division of Regulatory Improvement Programs, NRR

SUBJECT: SUMMARY OF DECEMBER 4, 2002 MEETING WITH THE NUCLEAR  
ENERGY INSTITUTE (NEI) TO DISCUSS THE OCCUPATIONAL AND  
PUBLIC RADIATION SAFETY CORNERSTONES

On December 4, 2002, Nuclear Regulatory Commission (NRC) staff met with representatives of NEI at NRC headquarters in Rockville, Maryland. Meeting participants are listed in Attachment 1 of this memorandum. The meeting was held to discuss revisions to the radioactive material control portion of NRC Manual Chapter 0609D, a proposed Frequently Asked Question (FAQs) for the Significance Determination Process (SDP), and other radiation safety issues.

After introductions, the group began discussion of the occupational radiation safety cornerstone. Ralph Andersen, of NEI, distributed a proposed Frequently Asked Question, (FAQ) that concerned compliance with technical specifications for control of entry into containment, a technical specification locked high radiation area, using the outer containment door. In the FAQ, control of entry into the containment is authorized by the shift supervisor and, during an extended entry, control is maintained by de-energizing an electronic lock and card reader device which locks the outer containment door. After discussion, the staff indicated that it appeared to be appropriate for an FAQ but felt a need to review it further. The staff agreed to review and revise the draft FAQ.

The group discussed the status of the Significance Determination Process (SDP) for a revised skin dose. This SDP had been routed for comments and the staff had received substantive comments from NEI.

Ralph Andersen raised a question concerning the reportability of shallow dose exposures from hot particles under the revised Part 20. The staff responded that the issue would have to be resolved as an NRC policy and was outside the scope of this meeting. Mr. Andersen agreed to write a letter to the Director of Nuclear Reactor Regulation (NRR) to get a formal response from NRR.

The group then began discussion of the public radiation safety cornerstone. Steve Klementowicz, of the NRC, stated that a revision to the Radioactive Material Control branch of the Public SDP was issued on November 15, 2002. The guidance now states that radioactive material found outside of the licensee's radiological control area (RCA) but within the protected area will not be counted as an occurrence. This revision had been discussed in several previous public meetings.

There was an extended discussion on several approaches for a simple direct way to develop inspection criteria to determine a level of radioactive material found outside the licensee's RCA that should be classified as a minor inspection item. There were two proposals; a specific radiation level, above background, measured with a sensitive instrument, and a value based on natural radioactivity in food products such as bananas and nuts. Mr. Andersen agreed to ask members of his task group to prepare a draft protocol to discuss at the next meeting. Mr. Klementowicz agreed to look at how such a protocol would fit into the SDP.

The group next discussed a definition of an "occurrence" to be placed into the Radioactive Material Control SDP and a draft revision to the Objective of the Public Radiation Safety cornerstone. Steve Klementowicz passed out a copy of the draft revision to the objective. The draft revision, with added material based on comments is attached (Attachment 3). The draft revision is designed to recognize that the Public Radiation Safety cornerstone is intended to include an assessment of findings which involve a licensee's control of radioactive material within its site as well as once it is released into the public domain. The group discussed the draft for a short time and agreed to discuss it further at the next meeting. The group also discussed a future need to clarify how the SDP assesses discrete radioactive particles. Mr. Andersen agreed to provide a proposed draft at the next meeting.

The group proposed to hold the next meeting January, 23, 2003, 9-12 p.m. Having concluded the agenda, the meeting adjourned.

Project No. 689

Attachments: As stated

cc w/att: See list

**List of Attendees for December 4, 2002 Meeting  
Public and Occupational Radiation Safety Cornerstones**

<b>NAME</b>	<b>ORGANIZATION</b>
Ralph Andersen	NEI
Roger Pedersen	NRC/NRR/IEHB
Steve Klementowicz	NRC/NRR/IEHB
Kathy Halvey Gibson	NRC/NRR/IEHB
Joseph Birmingham	NRC/NRR/RPRP
Industry representatives via teleconference	

Occupational Exposure Control Effectiveness Performance Indicator (PI)  
Frequently Asked Questions

1. Worker electronic dosimeter alarms not reported promptly to Health Physics

Question: While in a high radiation area (HRA) removing scaffold, workers inadvertently dislodged lead shielding around a hot spot flush rig and created conditions that required posting a locked HRA (dose rates in excess of 1 rem per hour). Several minutes later when they moved to a location closer to the hot spot, the three scaffold workers received dose rate alarms. Upon receiving the alarms, they immediately left the area and the alarms cleared. After reading their dosimeters and verifying that they had not received any unexpected dose, they discussed the alarms with their supervisor and concluded that the momentary alarm was not unexpected since general area dose rates in the HRA could have caused the alarms. When the three workers attempted to log out of the RCA at the access control point, Health Physics (HP) discovered that all three individuals received a "Dose Rate" alarm on their electronic dosimeters. Independent from the ensuing exposure investigation, and approximately within the same time period (within minutes), a HP technician found radiation levels in excess of 1 rem per hour when performing a routine survey to support removal of the hot spot flush rig. The HP technician established proper controls and posting for the area and discovered that local shielding around the flush rig had been disturbed. Does this count against the technical specification high radiation area occurrence PI?

Answer: Yes, because the circumstances represent the creation of a technical specification high radiation area (> 1,000 mrem/hour) without the proper corrective actions (i.e., posting and controls) being taken. The dosimeter alarms that occurred represented an opportunity for timely corrective action to be taken by Health Physics, i.e., to re-evaluate the radiological conditions in the area and establish proper controls and posting. The opportunity was "missed" when the workers did not promptly notify Health Physics about the dosimeter alarms. If Health Physics had been promptly notified and responded properly in a timely manner, this would not count against the PI.

2. ALARA issue that is not within the scope of the Occupational Exposure Control Effectiveness PI

Question: The scope of a job changed such that completion of the job would involve additional collective dose with regard to the original estimate. From the time that the work activities deviated from the original plan to the time that ALARA staff documented a revision to the plan and a new collective dose estimate, an individual received more than 100 mrem TEDE from external dose while continuing to work on this job. During this timeframe, the worker was performing activities outside of the original work plan. The time period from deviation from the original plan to documentation of the revised plan and dose estimate for the job is approximately one day. The licensee defines an "unintended exposure event" for TEDE in their procedures as a situation in which a worker receives 100 mrem or more above the electronic dosimeter dose alarm set point for a given RCA entry. On this job, all of the workers maintained their individual dose below the electronic dosimeter dose alarm for every RCA entry performed. Is this situation an "unintended exposure event"?

Answer: No, the described circumstances appear to represent an ALARA issue, not a performance deficiency with regard to the scope of the Occupational Exposure Control Effectiveness PI. The purpose of the PI is to address the Occupational Radiation Safety Cornerstone objective of "keep[ing] occupational dose to individual workers below the limits specified in 10 CFR Part 20 Subpart C." During development of the Performance Indicators, it

was decided not to pursue a PI for the ALARA-based objective in the Occupational Radiation Safety Cornerstone. That objective is met through the ALARA inspection module. Further, with regard to "Unintended Exposure", the PI states that it is "incumbent on the licensee to specify the method(s) being used to administratively control dose." In this case, the licensee has apparently selected the use of electronic dosimeter alarm set points as the method for administratively controlling external dose, in which case the applicable criterion for the PI would be if the external dose exceeded the alarm set point by 100 mrem or more.

3. Electronic dosimeter placement determined "after-the-fact" to not have been located at the maximum point of DDE

Question: During a review of electronic dosimeter (ED) /TLD discrepancies of eddy current workers, it was noted that for two of the workers, the electronic dosimeter under-reported the dose compared to the recorded official dose by TLD. An investigation revealed the following:

- Multiple TLDs were placed on each worker for work on the platform. Locations included the head, chest, upper left and upper right arms.

- A single electronic dosimeter was placed on either the right or left upper arm, depending on which arm the worker was most likely to use when manipulating the robot inside the man way.

- A "jump ticket", containing the authorized dose was used for each entry.

- The radiation protection technicians used telemetry connected to the ED to control exposures. Video and voice communications were also part of the remote monitoring system.

- Estimated dose for each entry was recorded, based on the electronic dosimeter. The same TLDs were used for multiple entries. As a result, a direct comparison of TLDs to electronic dosimeter readings on a per entry basis could not be performed.

- Estimated (ED) doses for the two workers, with the highest official doses, were low by 39% and 44%.

- One of the workers with an authorized dose of 300 mrem for an entry received an estimated (ED) dose of 275 mrem. Using a ratio of TLD to ED dose of either his total exposures or the other worker's total exposures for the job, a corrected dose in the range of 450 to 460 mrem could be calculated for the single entry.

- Estimated (ED) dose for 12 of 15 workers was low, when compared to the TLD at location of highest recorded exposure.

Does this constitute an unintended exposure occurrence in the Occupational Radiation Safety Cornerstone as described in NEI 99-02?

Answer: No, assuming that a proper pre-job survey and evaluation was performed. Although, in retrospect, it was determined that the estimating device was not placed in the location of highest exposure, it was placed in the area anticipated to receive the highest exposure and used appropriately to keep exposure below the authorized dose per entry. Record dose was properly assigned using the results of the TLD placed at the location of highest exposure.

4. Administrative error that does not, in itself, represent a performance deficiency

Question: A radiation worker entered the containment during power operation. At that time, the containment was a posted locked high radiation area with dose rates > 1,000 mrem per hour. Prior to entering the containment, the worker in error logged onto the wrong radiation work permit (RWP), which did not allow access to a locked high radiation area. In fact, the individual had been approved for entry into the containment, conformed with the controls specified in the correct RWP, and met all other requirements for entry, including being aware of the radiological conditions in the area being accessed, proper electronic dosimeter alarm set points, continuous coverage by Health Physics, etc. There was no "unintended exposure." The single error was related to logging onto the wrong RWP. Does this type of error count against the PI for Technical Specification High Radiation Area (>1,000 mrem per hour) occurrences?

Answer: No, as described, this would not count against the PI. The performance basis of the PI was met because the worker was properly informed about radiological conditions and the proper radiological controls were implemented. The worker's error in logging in on the wrong RWP is an administrative issue that is not considered a deficiency with regard to the performance basis of the PI.

## DRAFT

Public Radiation Safety: OBJECTIVE: to ensure adequate protection of public health and safety from exposure to radioactive materials released into the public domain as a result of routine civilian nuclear reactor operation.

### Problem:

The Objective focuses on "... radioactive materials released into the public domain...." The narrow focus of the Objective has created confusion with the intent of the Radioactive Material Control branch of the Public Radiation Safety cornerstone. This is because the Radioactive Material Control SDP is intended to include an assessment of findings which involve a licensee's failure to control licensed radioactive material within its site as well as situations which involve the exposure of a member of the public from radioactive material inappropriately released from the site. The objective should also be broad enough to include all four branches of the Public Radiation Safety cornerstone. To achieve this broad range of programs covered by the cornerstone, the Objective needs to specifically include other aspects of the regulations while the radioactive material is still on the licensee's site; surveying, control, evaluation, and storage.

### Proposed revision:

Public Radiation Safety: OBJECTIVE: to ensure adequate protection of public health and safety from exposure to radioactive materials generated as a result of routine civilian nuclear reactor operation. Adequate protection is based on the licensee's compliance with regulatory requirements to survey, control, evaluate, package and transport radioactive materials.

## DRAFT

Contact: Steve Klementowicz  
301-415-1084  
[SXX@NRC.gov](mailto:SXX@NRC.gov)

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Attachments: As stated  
cc w/att: See list

**CC:** Nuclear Energy Institute  
**Via email:** Mr. Ralph Andersen, Sr. Proj. Mgr  
rla@nei.org

Project No. 689  
Mr. Jim Davis, Director  
jwd@nei.org

**NRC Distribution:** Mtg. Notice w/NEI re Public Radiation Protection SDP 12/04/02  
ADAMS/PUBLIC OGC ACRS

**Email**

BSheron      WBorchardt      BBoger      SWest      JBirmingham      AHsia, RES  
DMatthews/FGillespie      CHinson      CGrimes      AHayes      TQuay  
RPedersen      JWigginton      KGibson      SKlementowicz      KBrock      SMorris, EDO

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