

Issue Review for CR-2013-000764

CR Title:	Personnel Contamination Event in Unit 2 Containment
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CR Significance Level:	2
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Evaluator: Robert Keene	Date: 08/25/2013
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I. Problem Statement:	A 1.56 uCi hot particle was identified on an individual's cheek while exiting the RCA.
II. Background / Analysis:	<p>On 07/19/2013, an SNS worker exited Unit 2 Containment and alarmed the IPM-8 at the RCA exit. He was working the entire time in Unit 2 Containment 617' elevation at the North end of the cavity from 0711 to 1027. The individual was cutting with the Volume Reduction Station (VRS) and pulling poles (long handle tools) out of the water. The wet part of the pole was not pulled up to the level of the worker and the worker did not directly handle any wet material. He was wearing one set of protective clothing with hood and no face shield. A face shield was not required by RP for his tasks. Worker did state his hood would frequently rotate on his head and would partially cover his face. He would then adjust his hood using his hands with outer gloves on. Workers do not typically wear hard hats so they have issues with hoods staying in place while working. At one point an RP technician instructed the worker to notify RP if required to handle wet part of pole. No improper radiation worker practices were observed and worker stated he never contacted the wet part of pole. It is believed the particle was transferred to the workers gloves at some point then transferred to the workers hood. The particle then moved to the face through various adjustments of the hood. It is unknown where or how the particle was transferred to the workers gloves. Observations by one RP technician of other workers indicated they sometimes may handle wet material without and RP technician being present to perform surveys. Other RP technicians indicated this is not the case. A follow-up survey was performed on cavity walkways, bridge and poles. Multiple DRPs found on cavity walkways ranged from 20k to 2 million dpm with sticky roller. Poles ranged from 6k to 10 k dpm, bridge ranged from 1k to 10k dpm. The contamination identified through sticky roller surveys is most likely caused by migration of particles from the water to dry surfaces of material via evaporation and could also migrate via objects removed above the surface of the water and subsequently drying out just prior to being wiped down. All objects removed from the pool are wiped down by SNS and surveyed by RP.</p> <p>Surveys are performed daily of cavity walkways by performing gross area maslin smears. These surveys have not identified the presence of gross high levels of contamination or hot particles. Typical results are < 20k dpm. After the event sticky rollers were used for surveys of the walkways and identified the levels of contamination up to 2 million dpm. After this event, RP began performing sticky roller surveys of the 617' elevation walkways in both Unit 1 and Unit 2 containments. RP also began performing hourly personnel surveys while personnel are directly handling wet material.</p> <p>Decontamination (wet mopping) of general areas is rarely performed in both Containments. In addition to the above actions, it is recommended wet mopping</p>

be performed in both Containments at least twice per shift. Sticky roller surveys in both Containments should continue to be performed also, twice per shift. Direct surveys of general areas on 617' and bridge should be performed twice per shift concentrating on areas where particles could be trapped and not recovered through sticky rollers and wet mopping. Personnel surveys should continue to be performed hourly while personnel are directly handling wet material and documented on Attachment 1 of ZS-RP-106-002-005, *Identification and Control of Discrete Radioactive Particles*. Other actions that would be taken in accordance with ZS-RP-106-002-005 are not deemed necessary due to few particles being identified meeting the threshold for posting and controlling as a Hot Particle Area. Environmental restrictions also are not conducive to posting and controlling the area as a Hot Particle Area and adding additional PCE requirements. This is the first event where a hot particle has been identified on an individual since the start of the project. Two other discrete radioactive particles with dose consequences have been identified on individuals working in the same area in the past 2 years however they did not exceed 1 uCi threshold.

Dose assessment was performed based upon entire time in RCA; assuming conservatively the particle was transferred to the workers face at the time of entry. The individual will be assigned 1.98 mrem SDE, 17.4 mrem LDE, and 27.4 mrem DDE.

The underlying cause of the event is driven to be inadequate survey of the work area. RP personnel were under the assumption if no discrete radioactive particles were identified on the maslin then no particles were present and contamination was being controlled. Maslin performs well when looking for gross areas of contamination but has been proven through this event to be inadequate in identifying discrete radioactive particles.

EVENT CODE:

3D RADIATION PROTECTION – RP Survey Inadequate

CAUSE CODES:

A3-Human Performance LTA

B3-Knowledge Based Error

C05-Incorrect assumption that a correlation existed between two or more facts

EXTENT OF CONDITION:

The spread of contamination has been an ongoing issue at Zion since the start of the project. In some cases it has been deemed not ALARA to perform decontamination. Initially 8 personnel were requested for decontamination, laundry and trash support throughout the project. Only 2 personnel were provided initially and a 3rd was supplied approximately one year later. Zion has had approximately 309 personnel contamination events since the start of the project. Decontamination efforts have been minimal at best due to the lack of personnel. Of the 309 PCEs we have had, 70 of them have been on individual's shoes. Over 50% of the 309 PCEs have been due to contamination spread, housekeeping and accidental contact. The majority of the contamination being generated has been in Unit 1 and Unit 2 Containments (CNMTs) via various D&D processes. Less than desirable air flow changes occur every time the CNMT vestibule doors are opened between CNMT and the Auxiliary Building (AB). Air flow always flows from the CNMTs to the AB when the doors are opened. It would be prudent to perform wet mopping of the 617' AB elevation twice per shift to assist with controlling

	<p>migration of contamination from the CNMTs to the AB. D&D has begun working on multiple elevations in the AB. Radioactive material is constantly being disassembled and moved around various elevations prior to removal for shipment. This process could lead to increased probability of the spread of contamination. Therefore, it is desired to perform wet mopping of all effected elevations of the AB twice per shift. Once fuel transfer operations begin, multiple evolutions in this area could lead to particle migration and contamination spread as well. Therefore, it is desired to perform wet mopping of the Fuel Building twice per shift. RP currently has just enough labor support to maintain trash and laundry necessities. Additional labor support is required to perform mopping of the areas listed above in an effort to minimize the buildup of contamination in contaminated areas, minimize the spread of contamination outside of contaminated areas and reduce the probability of Personnel Contamination Events. The suggested labor support is 3 additional laborers and 1 working foreman to run all 7 laborers. The laborers and foreman would report directly to RP each day.</p> <p>A contributing cause to this event has been deemed to be inadequate housekeeping of the area leading to the accumulation of discrete radioactive particles.</p> <p>CAUSE CODES: A4-Management Problem B2-Resource Management LTA C03-Insufficient manpower to support identified goal/objective</p>
<p>III. Immediate Actions Taken:</p>	
<p>1.</p>	<p>(Action): Started performing DRP surveys multiple times per shift using sticky rollers and personnel surveys every hour while individuals are directly handling items in contact with the water. (Addresses: A3-B3-C05-Incorrect assumption that a correlation existed between two or more facts) COMPLETED BY: Pam Johnson DATE COMPLETED: 07/19/2013</p>
<p>2.</p>	<p>(Action): Performed dose evaluation including Lens of the Eye, Deep Dose and Shallow Dose COMPLETED BY: Jared Smith DATE COMPLETED: 07/22/2013</p>
<p>3.</p>	<p>(Action): Distributed First Notification# FN-2013-309 (Site Specific First Notification# RP-2013-0001). COMPLETED BY: ES&H DATE COMPLETED: 07/22/2013</p>
<p>IV. Planned Actions:</p>	
<p>1.</p>	<p>(Action): Revised Unit 1 and Unit 2 SNS RWPs to require use of face shields when handling wet material/equipment around the cavity and to provide the latitude in wearing skull caps in lieu of full hoods. (Addresses: A3-B3-C05-Incorrect assumption that a correlation existed between two or more facts) OWNER: Meribeth Bass DUE DATE: 07/25/2013 (Complete)</p>
<p>2.</p>	<p>(Action): REVISE Unit 1 and Unit 2 SNS RWPs/ALARA Plans to include requirements for personnel monitoring, sticky roller survey, direct surveys and wet mopping as delineated in this review. (Addresses: A3-B3-C05-Incorrect assumption that a correlation existed between two or more facts) OWNER: Pat Hoppe DUE DATE: 09/05/2013</p>

3.	<p>(Action): DISCUSS new management expectations and reinforce procedure/RWP/ALARA Plan requirements with all RP technicians supporting the SNS group in both Unit 1 and Unit 2 Containments. (Addresses: A3-B3-C05-Incorrect assumption that a correlation existed between two or more facts) OWNER: Pam Johnson DUE DATE: 09/05/2013</p>
3.	<p>(Action): OBTAIN additional RP laborer support for decontamination efforts to consist of 3 laborers and 1 working foreman. (Addresses: A4-B2-C03-Insufficient manpower to support identified goal/objective) OWNER: Robert Keene DUE DATE: 10/03/2013</p>