

# **NIOSH RESPONSE TO SC&A REVIEW OF ORAUT-RPRT-0080**

**Response Paper**

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**National Institute for Occupational  
Safety and Health**

January 30, 2018

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<u>Response Paper</u>	<u>NIOSH Response to SC&amp;A Review of ORAUT-RPRT-0080</u>	<u>January 30, 2018</u>
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## **PURPOSE**

This response paper is the National Institute for Occupational Safety and Health's (NIOSH) response to Sanford Cohen and Associates' (SC&A) review of ORAUT-RPRT-0080, *Potential Neptunium Exposure to Plutonium Fuel Facility Construction Workers in Building 235-F at the Savannah River Site* (SRDB 165590).

## **OVERVIEW**

The SC&A review of ORAUT-RPRT-0080 indicates that the PuFF construction workers should be treated as a special subset of the Savannah River Site (SRS) construction workers, in contrast to the conclusions of the report and without argument that these conclusions are incorrect.

The ORAUT-RPRT-0080 report (SRDB 165590) is an examination on whether the presence of the Neptunium Billet Line (NBL) in Building 235-F posed special exposure hazards to the workers in the same building who were constructing the Plutonium Fuel Form Facility (PuFF) between 1973 and 1977. Section 1.0, Introduction, states that the intent

*...is to determine if workers constructing the PuFF facility received significant exposure from the work in the neptunium billet line.*

SC&A appears to agree, in Section 5.0, SC&A Conclusions and Recommendations, that the neptunium production lines posed no unusual source of exposure to the workers. The first sentence in Section 5.0, SC&A Conclusions and Recommendations, is:

*SC&A agrees that there were radiological controls and safeguards in place to limit the spread of contamination, and thus potential exposures to workers involved in the construction of the PuFF, to within acceptable levels.*

Section 5.0 continues:

- *Although the NBL was classified as a high hazard facility, there is no indication it significantly affected the surrounding areas.*
- *... there appears very little likelihood that the construction workers building the PuFF facility in Building 235-F between 1973 and 1977 would have received inadvertent, unmonitored internal or external exposures.*

The second sentence of Section 5.0, in opposition to the previous statements that exposure was unlikely, does not rule out exposure to neptunium:

Response Paper	NIOSH Response to SC&A Review of ORAUT-RPRT-0080	January 30, 2018
----------------	--	------------------

*However, SC&A does not agree that the lack of monitoring records for an individual worker indicates that no exposures occurred as was indicated in Section 5.0 of RPRT-0080.*

Except for the above sentence stating that unmonitored exposure would have been an unlikely occurrence for a PuFF construction worker, the report does not discuss potentially unmonitored workers. However, construction trade worker coworker doses will be assigned to construction trade workers at SRS for the period of 1973 to 1977 using individual monitoring records and in accordance with ORAUT-OTIB-0081, *Internal Coworker Dosimetry Data for the Savannah River Site* (SRDB 163843).

## **RESPONSES TO SPECIFIC FINDINGS AND OBSERVATIONS**

***Finding 1:*** *The conclusion that routine daily and weekly contamination survey activities restricted all potential radioactive contamination to the prescribed limits is supported by survey documentation that only covers approximately 11% of the total PuFF construction time. It is unknown whether the currently missing daily/weekly survey logs are available and have not been captured or are unavailable.*

NIOSH agrees that these forms do not cover the entire construction period. All field-generated forms of any particular type may not have been acquired from the site, including the routine contamination survey forms for Building 235-F during the PuFF construction period. Contamination survey forms that were completed between December 1973 and December 1974, at the beginning of the PuFF construction, were available and were reviewed. These forms indicated the frequencies and areas that were routinely monitored in the building and referenced the applicable limits and responses for exceeding the limits. The conclusions stated in ORAUT-RPRT-0080 (SRDB 165590) are partially based on the review of those contamination control measures. NIOSH is unaware of any information that would indicate a review of further contamination survey forms would lead to different conclusions.

The conclusions in the report are not solely based on the contamination control measures described on these forms but are also based on air data as discussed below and on engineering controls such as the routinely confirmed building design for air flow from areas of expected low to no contamination to areas of expected higher contamination.

***Finding 2:*** *A temporal gap in currently available air sampling in the construction area exists from approximately July 1974 to early November 1976. During this temporal gap, more than 75% of the total construction work for the PuFF was performed.*

The available air concentration results for the Construction Area cover a period in 1974 at the beginning of construction of the PuFF and a second period in 1976 and 1977 at and extending past the end of construction as seen in Figures 3-1 and A-1 from ORAUT-RPRT-0080 (SRDB 165590). Air sampling results for all other areas, including the NBL and for those areas between the line and the Construction Area, are available for this temporal gap and were reviewed for this report. The conclusions in the report are based on the results that were available.

Response Paper	NIOSH Response to SC&A Review of ORAUT-RPRT-0080	January 30, 2018
----------------	--	------------------

The air sample results for areas other than the Construction Area are presented in the plots in Attachment A to ORAUT-RPRT-0080 (SRDB 165590) (Figures A-2 through A-8.). Routine air sample results from the production area and from areas between the production area and the Construction Area are concurrent with results for the Construction Area at the beginning of construction and with Construction Area results at the end of construction. With the exception of a gap in the routine air sample results between July 18, 1974 and December 8, 1974 for Room 107B, air sample results for these areas continue throughout the temporal gap between June 1974 and November 1976. There are no apparent trends for any location during this time that would indicate air concentrations in the Construction Area would have been significantly different during the gap than during the periods prior to and after it. NIOSH is unaware of the reason for the gap in air samples at Room 107B but notes that air sampling for the other two locations at the NBL, 107A and 107D, continued throughout this period (SRDB 165590, Figures A-4, A-5, and A-6).

Note, also, that roughly ten times as many samples were collected in the NBL areas and in the intermediate areas than for the Construction Area, as shown in Table 2-3 (SRDB 165590).

***Finding 3:*** *Based on a review of a subset of construction trade worker claim files for SRS during the period of interest (December 1973–January 1977), SC&A feels that there is a considerable amount of uncertainty in trying to credibly place a worker at the PuFF construction operation versus any other location within F Area (let alone at other SRS site areas). Therefore, SC&A does not see a credible way to restrict the assignment of unmonitored doses to claims based on work directly associated with PuFF construction.*

Doses will be assigned to construction trade workers at SRS for the period of 1973 to 1977 using individual monitoring records and, for unmonitored workers, in accordance with ORAUT-OTIB-0081 (SRDB 163843).

***Observation 1:*** *Based on the statements in RPRT-0080, Section 5.0, SC&A presumes that NIOSH does not intend to assign any unmonitored coworker intakes or external doses to PuFF construction workers. Therefore, any dose assigned to this subset of construction workers would be based solely on individual monitoring records (where available).*

The conclusion of the report is that there are no unusual exposures for workers in the PuFF Construction Area resulting from the NBL. In terms of exposure, they do not form a distinct subset from all SRS construction trade workers. Doses will be assigned to unmonitored construction trade workers at SRS for the period of 1973 to 1977 in accordance with ORAUT-OTIB-0081 (SRDB 163843).

***Observation 2:*** *RPRT-0080 is not clear about how (or if) stationary film monitoring stations found in Building 235-F will be utilized in individual dose reconstructions for workers who were not directly monitored for external radiation. Ambient exposure rates have been derived in NIOSH 2005 based on annual environmental monitoring, but it is not clear that they are representative of exposures experienced within Building 235-F.*

Response Paper	NIOSH Response to SC&A Review of ORAUT-RPRT-0080	January 30, 2018
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Fixed film monitoring stations for Building 235-F are not discussed in the report nor have any been identified. However, survey forms indicate that the work areas and corridors were routinely monitored for ambient levels.

The primary source of external exposure in Building 235-F was the NBL. PuFF construction workers would not have had access inside the NBL due to work controls in place. There is no indication that external doses for the PuFF construction workers should be handled differently than for all other SRS workers.

**Observation 3:** *The calculated geometric mean and 50th percentile values for available air samples in the Construction Area are comparable and/or bound the calculated air samples from the 107F – Regulated Corridor and the 107B – NBL End locations. These locations are either directly adjacent to the NBL (107F – Regulated Corridor) or inside the airlocks of the NBL (107B – NBL End).*

In their review, SC&A notes the small differences in the geometric mean (GM) and 50<sup>th</sup> percentile values for the air data results at locations nearer to the NBL and those in other areas. These summary statistics are derived from air sample results with inherent variability due to counting statistics and radioactive decay. They are presented in Table 2-3 (SRDB 165590) to show the air concentrations were, for the greatest part, low even in the areas around the NBL. The report shows that the GM and 50<sup>th</sup> percentile values for the air sample results taken in the same room as the NBL, in areas near the NBL, and in the Construction Area, were less than 2% of the site’s Radioactivity Concentration Guides.

Below in Figure 1 are plotted the air sample results used in in ORAUT-RPRT-0080. The Construction Area results are shown as blue dots. All other locations results are shown as orange crosses. The horizontal lines show the 95<sup>th</sup> percentile values from Table 2-3. Note that this graph is linear and contains data plotted as the semi-logarithmic graphs in Appendix A of the report.

The 95<sup>th</sup> percentiles are included in Table 2-3 to describe the range of the air results. The 95<sup>th</sup> percentile for the Construction Area air samples is substantially lower than the values for the air sample results in the same room as the NBL and the areas near the NBL.

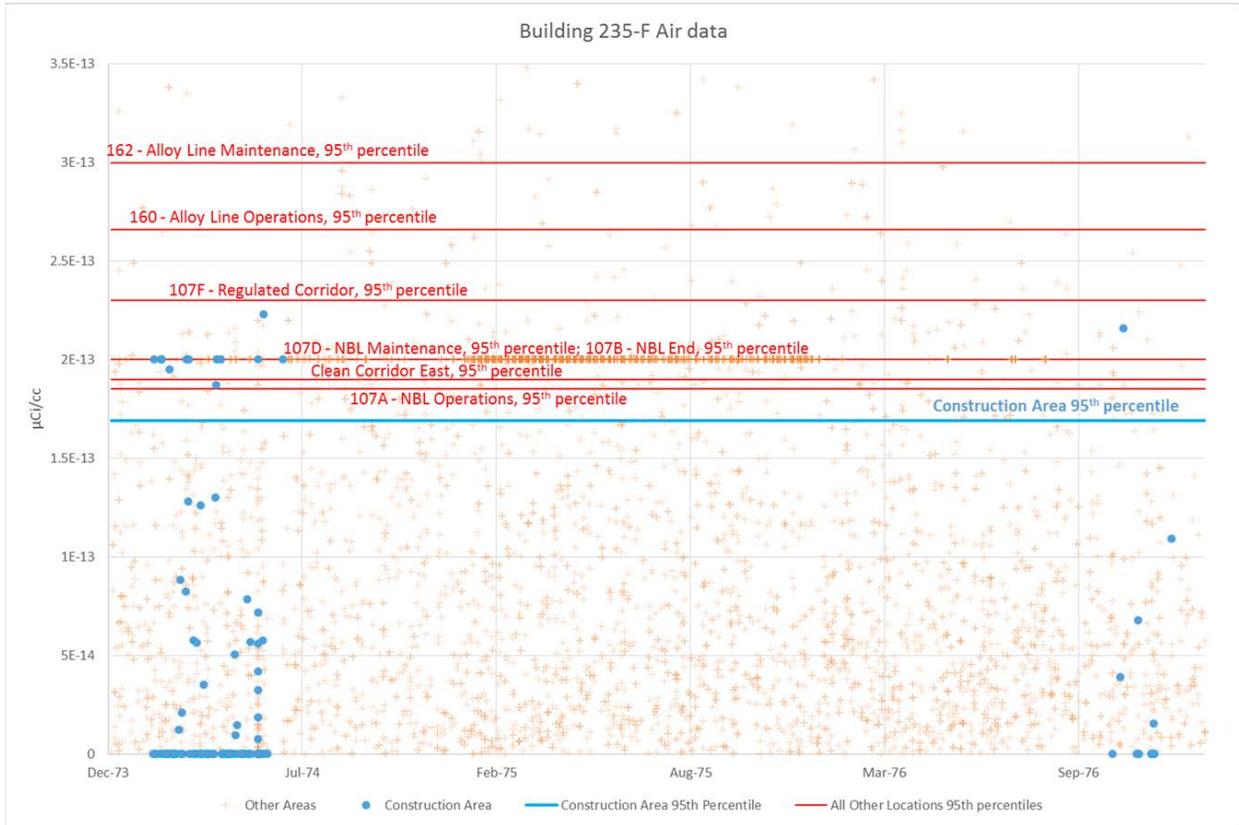


Figure 1. Air Data for Building 235-F