



Memorandum

DCAS External Memorandum
Division of Compensation Analysis & Support

To: Metals and Controls (M&C) Special Exposure Cohort (SEC) Working Group

From: Peter Darnell, DCAS Health Physicist

Subject: NIOSH Response to the SC&A review of the NIOSH White Paper dated April 23, 2018

Date: October 18, 2018

NIOSH Response to the SC&A review of the NIOSH White Paper dated April 23, 2018

General Discussion

The following update is provided for the M&C SEC Working Group. NIOSH received SC&A's review of the M&C white paper (WP) dated April 23, 2018. NIOSH will provide a new WP to accommodate SC&A's review and recommendations. In addition, the WP will describe and model exposures to M&C personnel who performed maintenance type work in the Building 10 ceiling area, on the roof, or on the HVAC system. While the planned date for completion of this WP is December 2018, NIOSH will submit the WP as soon as practical.

Currently, NIOSH has completed its initial review of the WP and is working to complete comment resolution. NIOSH is compiling sample data for the areas outside Building 10 to better analyze data in support of the exposure models. The revision to the Evaluation Report (ER) is ongoing. NIOSH plans no new data captures or interviews before completing the WP or its revision of the ER. The remainder of this document briefly addresses SC&A comments on the NIOSH WP dated April 23, 2018. NIOSH plans no revision of this WP. NIOSH anticipates submitting more detailed comment resolutions and model updates in the WP scheduled for December 2018.

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NIOSH Responses to the SC&A Memo

SC&A's Recommendation 1

NIOSH should consider a more bounding concentration of uranium in soil for the purpose of reconstructing internal exposures to M&C workers involved in subsurface activities beneath Building 10.

NIOSH response

In its summary before this recommendation, SC&A discussed Weston data and its bearing on the bounding estimate. NIOSH didn't use the type of radiological controls and doses assigned by Weston to determine the bounding uranium concentration in the surrounding soil. However, NIOSH originally proposed the 50th percentile. The new WP uses the 95th percentile for air and other dose models.

SC&A provided several bullet point comments:

The values from CPS 1993, page 21, and Sowell 1985 (SRDB 94371) pages 69 and 90, represent single samples rather than average values like the rest of the aggregated data. The single CPS 1993 value comes from discussion of the maximum value in text. No measurement records could be located to support the value.

SC&A questions why Table 4 and Table 11 values from Sowell 1985 (SRDB 94371) were not used in the assessment. The samples represent surface soil sampling from the Building 12 burial area and areas outside Building 10, respectively. Other surface samples were used in the analysis from similar locations.

The values used in the modeling from Site Research Database (SRDB) 165968 (CPS n.d., pp. 7–20) represent diluted averages. NIOSH took the arithmetic average of total uranium (pCi/g) at each depth of the grid location and then took the arithmetic average of each depth in that grid location to come up with an average of the averages. An example of this calculation technique is shown below. These values were then input into the main outdoor model where they are further aggregated by a geometric mean. Although this aggregation technique results in a modestly lower dose, depending on the location it is not mathematically defensible.

NIOSH response

NIOSH anticipates that the data analysis discussion in the new WP will address the first 2 bullet points. The difference between averages used by SC&A versus those used by NIOSH varies at a maximum of about 7%. NIOSH will review the compiled sample data and present our findings in the new WP. With the decision to use the 95th percentile for areas outside Bldg. 10 subsurface

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models, the difference in the averages may not be consequential. NIOSH and SC&A agree that sufficient documentation exists to establish a bounding distribution of radiological materials found in the soils in and around the burial ground on site.

SC&A Discussion of Occupancy Rates

SC&A agrees that there is considerable uncertainty in this value. There is ample evidence from the interviews that many different people were involved in subsurface work in any given year and, therefore, it is unlikely that any single individual was involved in all subsurface activities. Hence, we believe that the approach used by NIOSH with respect to the 1 month-per-year assumption may benefit from further Work Group deliberation.

NIOSH response

NIOSH has updated the approach to occupancy rates in the new WP. The occupancy rate was doubled to account for both subsurface and roof work. The dose for the remainder of the year for these workers will be as outlined in the revised ER.

SC&A Discussion of Dust Loading

Hence, there is substantial agreement between the dust loading used in the white paper and those used by SC&A in its review of the SEC petition ER.

NIOSH agrees with this assessment.

SC&A Discussion of Inhalation Rate and Recommendation 2

NIOSH should consider adopting an inhalation rate commensurate with elevated breathing rates induced by physical exertion while individuals are involved with subsurface work.

SC&A's discussion before Recommendation 2 included: *As a claimant-favorable assumption, SC&A's petition ER review used a breathing rate of 2.5 m³/h, which is the recommended breathing rate for adult males engaging in moderate activities, including "heavy indoor cleanup [and] performance of major indoor repairs and alterations" in the U.S. Environmental Protection Agency (EPA) Exposure Factors Handbook (1997). Although it is unlikely that any individual respired at this rate during the entirety of their subsurface work, this rate bounds potential intakes.*

NIOSH response

During its review, NIOSH determined that this rate substantially over-estimates intake. NIOSH requests SC&A provide the data used to arrive at this recommendation.

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SC&A Discussion of Ingestion

SC&A cited NUREG/CR-5512 and found that the 50 mg/day value comes from a 1990 study by Calabrese et al. that found conservative adult soil ingestions in residential scenario are 50 mg/day.

SC&A also cited a section of the NUREG that states "... workers are assumed to ingest 10 mg of loose surface contamination..."

SC&A further states: This value is inconsistent with the value of 50 mg/day NIOSH used in the white paper. The difference appears to be the assumption of working conditions. Therefore, this subject requires further discussion.

NIOSH response

NIOSH used massed-based volumetric samples to model the exposures associated with soils and sediments (i.e., subsurface work). NIOSH believes it is inappropriate to apply the NUREG surface contamination method, referenced by SC&A, to the exposures associated with subsurface work. However, other exposures, including those associated with the ceiling/roof work are based on surface contamination levels. In these cases, NIOSH believes the NUREG surface contamination method is appropriate for use.

SC&A Discussion of External Exposures

The white paper continues to make use of film badge data collected during the Atomic Weapons Employer period as the basis for reconstructing external exposures during the residual period. SC&A notes that the SEC petition ER already intends to use the 1967 dosimetry data at the 95th percentile plus accommodations for potential missed dose for production workers. The proposed model in the white paper for subsurface workers assigning one third of the quarterly GM of the 1967 results to account for one month of subsurface work will effectively reduce the dose assigned to subsurface workers in comparison to other production workers. This is unacceptable, given the additional exposure risks for subsurface workers. Neither model takes source term depletion into account.

NIOSH response

The WP uses 2/3 the quarterly dose for workers assigned to maintenance work. This dose is assigned in addition to the residual dose assigned to co-located worker dose for the remaining 10 months of the year. There is no reduction of dose because standard cleaning and environmental reduction factors at the site may have less effect on the source term at maintenance work locations. Regarding the revised ER's use of the 95th percentile, NIOSH will assign doses not

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associated with maintenance work based on the geometric mean and account for source term depletion for non-maintenance exposures. NIOSH provides additional details in our F2 and O5 Issues Matrix responses (<https://www.cdc.gov/niosh/ocas/pdfs/dps/dc-metcontimsec236-101218-508.pdf>).

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