NIOSH Response to SC&A Findings on SEC-00223 Carborundum Company Niagara Falls, NY

National Institute for Occupational Safety and Health

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Finding 1:

NIOSH Failed to Prescribe a Methodology to Assess Doses to Skin of Hands and Forearms to X-Ray Diffraction (XRD) Apparatus

NIOSH Response: NIOSH reevaluated dose from XRD. See separate paper *External Dose Assessment from X-Ray Diffraction at Carborundum Company, Niagara Falls, NY*. That paper provides revised dose estimates and addresses issues identified by SC&A. NIOSH concludes that the exposure to a *Rad Production Support* personnel as specified in the DR methodology (10.8 R/yr shallow dose to skin and 115 R/yr to the hands and extremities) would be assigned to XRD technicians as a bounding estimate of dose.

Finding 2:

NIOSH Failed to Address Thorium as a Possible Radiation Source

NIOSH Response: There is no information that suggests any thorium work that should be covered under EEOICPA, nor is there information indicating thorium work was performed during the AWE covered period. An interview with a former worker indicated thorium fuel pellet work was done in 1955 (Ref ID 142193). NIOSH also has information from an interview with a claimant [redacted] that indicates thorium work in the mid-1950s. Neither of those references provides details.

NIOSH has a reference that states Carborundum had two labs for studying radioactive material: there was one lab for uranium and thorium work, and another lab for plutonium work (Ref ID 147253, p. 18). This is consistent with information provided by former workers during interviews.

NIOSH has a 1961 Carborundum document that lists government funded Carborundum research and development contracts from around 1950 through 1961 (Ref ID 147253, pp. 27-28). None of the work listed includes or suggests thorium work; however, subcontract AT-34 with General Electric is listed from 1955 through 1958, but that reference indicates the scope of that contract was "classified" at that time. Other references indicate that contract was for the GE Aircraft Nuclear Propulsion (ANP) program that included work with uranium. It is possible the thorium work mentioned by the former worker may have been some experimental work under that subcontract. Records indicate some government-owned property was on-hand at Carborundum after termination of the GE subcontract and was subsequently transferred from the GE contract to Carborundum's contract with the AEC in 1959, including some small quantities of uranium (<1 kg) (Ref ID 142022, pp. 235-260).

Based on available information, it appears that non-covered uranium work was performed for several years prior to the 2nd AWE period, and some thorium work may have been done in 1955. Any alpha emitting radionuclides in the air from both AEC operations in 1959 (and contamination from previous non-covered work) are reflected in the reported

uranium (gross alpha) airborne radioactivity measurements. External dose from residual contamination would be insignificant in comparison to the doses assigned for the AEC contract work starting in 1959.

Finding 3:

NIOSH Failed to Account for the Use of ^{90}Sr in Thickness Gauges at Carborundum

NIOSH Response: The 1952 New York Times reference that SC&A discussed in the report indicates the sources were used in the "coated products division plant" to automatically control the thickness of sandpaper. As part of a reorganization and modernization program, Carborundum opened a new plant in 1947 for its Coated Abrasives Division, one of four divisions of the company at that time. The plant was located in Wheatfield, NY, in Niagara County, not at the Buffalo Avenue complex headquarters in Niagara Falls (Ref ID 73136, p. 67). One of the people interviewed for the Evaluation Report also said sandpaper was not made at the Buffalo Avenue Plant (Ref ID 142194).

NIOSH concludes the Sr-90 sources that were mostly likely at the Coated Abrasives Division Plant in Wheatfield, which is not a listed facility under EEOICPA. Therefore, assessment of dose from those sources is not applicable.

Finding 4:

NIOSH Failed to Assign Doses from Medical X Rays During the First Operational Period

NIOSH Response: The example DR report reviewed by SC&A had a statement indicating "No medical X-ray doses were assessed." The First Operational Period covers June 1943 through September 1943. The Evaluation Report (section 7.3.2) cites a reference that stated there were no health surveillance requirements for the 1943 work. SC&A mentioned a claimant indicated Carborundum required X-rays during that time, and dose should be assigned whether or not required by the AEC. NIOSH agrees that dose from a single X-ray examination should be assigned in dose reconstructions for claimants with employment in 1943.

Finding 5:

"Example DR" Failed to Assign Doses from Medical X Rays During the Second Operational Period

NIOSH Response: The example DR report reviewed by SC&A had a statement on the last line indicating "No medical X-ray doses were assessed." To clarify, the example DR Report did not say they were not applicable; they were just not provided with the example calculations. NIOSH agrees that X-ray doses are applicable, as indicated in ER section 7.3.2.

Finding 6:

Inappropriate and Incorrect Use of FGR 12

NIOSH Response: NIOSH concurs with SC&A that the factors provided in TBD-6000 provide for external dose from contamination and air immersion provide higher doses than the factors in the example DR, which were derived from Federal Guidance Report Number 12. Therefore, the methods will be revised to use the TBD-6000 factors.

Finding 7:

Dose calculations in "Example DR" Are Not Reproducible

NIOSH Response: Table 2 of the SC&A report shows doses estimated by NIOSH in the Example DR and doses estimated by SC&A for the same organs. It shows disagreement, some significant. The examples provided by NIOSH were not precise best estimates, and it appears the calculations by SC&A were also not precise estimates. NIOSH employed some efficiency measures in the example DR, some of which resulted in marginally higher dose. Although NIOSH does not have the details of SC&A's calculations, the descriptions indicate some efficiency measures were used to estimate dose. Separate responses for external and internal dose differences are provided below. NIOSH can provide an updated example dose calculation showing details of the annual dose calculations. However, SC&A also had comments on interpretation of data to estimate both internal and external doses. Those comments, while not at the level of a finding, should be resolved before NIOSH provides an updated example calculation.

External Dose:

SC&A Table 2 shows NIOSH had external dose totals nominally 10% higher than SC&A calculated. As noted by SC&A, NIOSH used the higher Exposure (R) organ DCFs for calculating certain doses from uranium metal when the lower personal dose equivalent DCFs (H_p10) factors should have been used. NIOSH agrees with SC&A's comment on the appropriate factors to use for exposure to uranium metal. NIOSH also employed some efficiency measures that resulted in some other marginal overestimates.

Internal dose:

Most notable in SC&A Table 2 is a large discrepancy in internal doses to the skin, liver, and kidneys. The total internal dose reported by NIOSH in the example DR is significantly higher than the total internal dose calculated by SC&A. SC&A's total internal dose to the lung is only marginally different than the total provided by NIOSH, presumably within the accuracy of efficiency measures used to estimate dose.

The large discrepancy in the internal dose to the skin, liver, and kidneys is due to the NIOSH example DR incorrectly using solubility Type F as one of the possible solubility types for intakes from the 1943 uranium metal grinding work (Type S was correctly used for the lungs). NIOSH agrees with ER section 7.2.2.1 that only uranium solubility Types M and S should be considered for the metal grinding work in 1943, thus the reported internal doses in the example DR for the skin, liver, and kidneys are too high. NIOSH dose estimates for Type M are similar to those provided by SC&A, but there are small differences similar to those discussed below for the lung.

Regarding the relatively small difference in the lung dose calculations, some efficiency measures were used to estimate the doses. One such example is SC&A's use of DCAL to calculate internal doses. DCAL doses are likely close, but different. (NOTE: SC&A commented that previous dose estimates using DCAL for an audit of case [redacted] were virtually identical to the dose estimate by NIOSH; however, the SC&A report for the audit of that case indicates SC&A used IMBA to check the NIOSH dose calculations, not DCAL). NIOSH also used some efficiency measures for certain intake components. NIOSH typically employs efficiency measures when they are deemed sufficient to determine the outcome of a claim. More accurate estimates are required when the outcome of dose reconstruction requires it (when overestimated or underestimated doses are not sufficient to determine compensability).