SEC-00236 Metals and Controls Corporation NIOSH Update on Thorium and Welding Exposure Model

Christine Corwin

Health Physicist

Teleconference of the Metals and Controls Work Group

January 9, 2020

Overview

- Summary of current NIOSH responses to the SC&A Review of the NIOSH White Paper: “Metals and Controls Corp. Thorium and Welding Exposure Model”

Summary of M&C Welding and Thorium Issues

- **2 Findings**
  - 2 In Progress
    - SC&A and NIOSH agreement on methodology needed
- **3 Observations**
  - 3 Resolved
    - SC&A and NIOSH in agreement

Finding 1: Thorium Internal Exposures Model

- NIOSH underestimated the Th-232 concentration in the sediments and residues in the pipes under Building 10, leading to an underestimate of Th-232 intakes by workers performing subsurface activities.
  - Uranium to thorium ratio
    - Sowell data cannot be used (with the exception of 2 samples in Table 11) because the Th-232 data is consistent with naturally occurring Th-232 in soils.
    - The only data that can be used is Sowell Tables 5A and 6A.

Finding 1: Thorium Internal Exposures Model (continued-1)

  - NIOSH Response: The ratio provided was intended to be supplemental information to support the conservatism in the model where NIOSH assumes subsurface sediments contained equivalent mass concentrations of natural uranium and Th-232.

- New NIOSH bounding method to estimate intakes
  - Assuming that the specific activity of the uranium contamination in the pipe sediments was that of natural uranium is not valid.
    - NIOSH Response: Any adjustment that would result in a higher specific activity (i.e., a higher enrichment for uranium) would be less favorable to the claimant.

Finding 1: Thorium Internal Exposures Model (continued-2)

- SC&A alternate method
  - paired-sample method to determine a uranium to thorium ratio.
    - NIOSH Response: the assumption of equivalent mass is the most claimant-favorable and defensible approach.
  - OCAS-TIB-009 to determine daily ingestion rates.
    - NIOSH Response: the use of NUREG/CR-5512 to determine ingestion intakes when exposures are characterized by mass-based samples is more appropriate than the use of OCAS-TIB-009.
    - This issue was addressed in the Board Review System (BRS) Overarching Issue #2.

Finding 2: Welding Internal Exposures Model

- NIOSH understated the resuspension factor related to activities accompanying welding.
  - NIOSH Response: The decision to use a resuspension factor of 1×10^{-2} as opposed to 1×10^{-3} is considered a technical basis document (TBD) issue. The 1×10^{-2} resuspension value in the reference from OTIB-0070 is listed in Table 5.11 of the reference (SRDB REF ID 77730 p. 55) and footnoted: “Values not used due to unrepresentative conditions”. Therefore, NIOSH believes that the use of a 1×10^{-3} resuspension factor is claimant appropriate.

Observation 1: Thorium Internal Exposures Model

- SC&A Review
  - The uranium inventory cited by NIOSH is inconsistent with that in the source document.
- NIOSH Response
  - The inventory is not used in the proposed dose methodology, NIOSH acknowledges that this was a data entry error.
- Action Needed
  - The data entry error will be corrected in the TBD.

Observation 2 : Welding Internal Exposures Model

- SC&A Review
  - NIOSH should clarify the source of the 4 hour per month time estimate.
- NIOSH Response
  - An incorrect source (reference) was used, the correct reference was subsequently provided.
- Resolution
  - The reference will be corrected in the Evaluation Report (ER).

Observation 3: Welding Internal Exposures Model

- SC&A Review
  - In estimating doses from the welding scenario, NIOSH should assign doses using the most claimant-favorable isotope of thorium or uranium, selected from isotopes known to have been used at M&C.
- NIOSH Response
  - NIOSH agrees with this observation and intends to apply it to the exposure model.
- Resolution
  - NIOSH will ensure the revised ER's exposure model reflects the observation.

Summary for Path Forward

- Finding 1
  - Underestimate of Th-232 intakes by workers performing subsurface activities
    - Uranium to thorium ratio
    - New NIOSH bounding method to estimate intakes
    - SC&A alternative method
- Finding 2
  - Underestimate of resuspension factor related to activities accompanying welding
    - TBD issue

Summary for Path Forward *(continued)*

- Observation 1
  - inventory data entry error to be corrected in the TBD.
- Observation 2
  - the reference for the 4 hour per month time estimate will be corrected in the revised ER.
- Observation 3
  - the exposure model in the revised ER will assign dose from the most claimant-favorable isotope.