



# SEC-00236 Metals and Controls Corporation Petitioner Concerns

**Christine Corwin**  
**Health Physicist**

**Teleconference of the Metals and Controls Work Group**  
January 9, 2020

# Background

- The National Institute for Occupational Safety and Health (NIOSH) presented the Evaluation Report (ER) for SEC-00236, Metals and Controls Corp. (M&C) to the Advisory Board on Radiation and Worker Health on August 24, 2017.
- A petitioner raised a concern about the adequacy of the Evaluation Report in addressing maintenance-type work.
- In response to this concern, on September 5, 2017, NIOSH initiated strategies to continue M&C research and further develop the Evaluation Report.
  - review monitoring records in the Site Research Database (SRDB)
  - Conduct interviews with M&C workers

## Background *(continued)*

- From October 24, 2017, through October 26, 2017, NIOSH, Oak Ridge Associated Universities (ORAU), and Sanford Cohen & Associates (SC&A) personnel interviewed 12 former M&C workers and individuals knowledgeable about maintenance work. Interviewers asked questions regarding the frequency and duration of work, including heating, ventilation, and air conditioning (HVAC), utility and drain line maintenance, and new equipment installations.
- On December 13, 2018, during a full Advisory Board meeting, the M&C Working Group presented an update. The petitioners also made a statement with their concerns (Elliott, 2018).

# Petitioner Concern 1

- NIOSH has failed to satisfy fundamental regulatory requirements for estimating maximum radiation doses and identifying radionuclides and maximum quantities:
  - Source term characterization is incomplete;
  - Incomplete knowledge of the nature, frequency, and duration of jobs performed in intimate contact with the source term;
  - A complete absence of any measurements or monitoring of the workers who are covered by this petition;
  - And no comparable population with measurements or monitoring data that can be relied on as a surrogate for the class in question.

# Response to Petitioner Concern 1

- 42 CFR 83, Section 83.13, Subpart C (42 CFR 83) states that radiation doses are considered to be estimated with sufficient accuracy if NIOSH has access to sufficient information to estimate the maximum radiation dose, for every type of cancer for which radiation doses are reconstructed, that could have been incurred in plausible circumstances by any member of the class.
- NIOSH believes that there is adequate information in the residual contamination period at M&C to meet the requirement:
  - Utilized contamination survey data from the end of the AWE operational period (1967);

## Response to Petitioner Concern 1 *(continued)*

- Utilized contamination survey data from the end of the residual period (1982);
- Utilized data that was taken before D&D to characterize the subsurface environments, and the roof and overhead areas.

# Response to Petitioner Concern 1 *(continued-1)*

- NIOSH believes it has estimated the maximum radiation dose that could have been incurred under plausible circumstances.
  - Knowledge of the source term of radioactivity that was present;
  - Knowledge of the work activities involved with this source term;
  - The use of surrogate dust-loading data qualified in accordance with OCAS-IG-004 (NIOSH 2008).
- Maximizing conditions are used to estimate dose
  - The use of the 95<sup>th</sup> percentile contamination levels when assessing source terms;
  - The use of the most claimant-favorable solubility types.

## Response to Petitioner Concern 1 *(continued-2)*

- During periods of residual contamination, it was known that NIOSH would typically have access to sparse workplace monitoring data and often no worker monitoring data.
  - ORAUT-OTIB-0070, *Dose Reconstruction during Residual Radioactivity Periods at Atomic Weapons Employer Facilities* (ORAUT 2012);
  - OCAS-TIB-009, *Estimation of Ingestion Intakes* (NIOSH 2004);
  - Battelle-TBD-6000, *Site Profiles for Atomic Weapons Employers that Worked Uranium Metals* (Battelle 2011).

## Response to Petitioner Concern 1 *(continued-3)*

- In the absence of little or no monitoring data, these documents rely on surrogate data and models to estimate internal and external exposure.
  - Through its contractor, the Advisory Board has reviewed each of these documents for scientific validity.
  - All findings and issues raised during the review process of these documents were resolved and the documents were revised accordingly.
- 

## Petitioner Concern 2

- The petitioner noted that the 1996 drain characterization survey in the interiors of Bldg. 10 and Bldg. 4 only analyzed the sediment and soil samples for isotopic uranium. Therefore, we can never know for sure what the thorium concentrations might have been.

## Response to Petitioner Concern 2

- NIOSH has addressed the petitioner's concern about the lack of thorium analysis of sediment and soil samples in the *Metals and Controls Corp. Thorium and Welding Exposure Model* white paper (NIOSH 2019).
  - Calculated air concentrations can be used to bound internal thorium exposures that occurred while performing subsurface maintenance within Building 10.
  - For those areas where gross alpha contamination surveys are available, NIOSH will continue to estimate worker doses using the most claimant-favorable isotope of thorium or uranium.

## Response to Petitioner Concern 2 *(continued)*

- For the burial area and Building 10 outside perimeter, NIOSH can use isotopic thorium-232 results to model air concentrations breathed by maintenance workers as previously described in the *Metals and Controls Corp. Maintenance Exposure Model* white paper (NIOSH, 2018b).

## Petitioner Concern 3

- By the time the drain survey was conducted in 1995, there had been close to 30 years of disturbances of the drain lines during the residual period, they were snaked numerous times, and some of the most plugged sections had been removed entirely. Therefore, there is no guarantee that the levels documented in the drain survey represent the maximum levels ever present, and to which the M&C maintenance workers would have been exposed.

## Response to Petitioner Concern 3

- NIOSH has addressed the petitioner's concern regarding the effect of 30 years of disturbance and removal on the representativeness of sediment analysis in the *Metals and Controls Corp. Maintenance Exposure Model* white paper (NIOSH 2018a);
  - The drainage system under Building 10 required frequent maintenance during the residual period including the years prior to the characterization.
  - Since this maintenance could have potentially removed sediments with the highest uranium concentration and made the geometric mean of the survey data under-conservative, NIOSH calculated the 95<sup>th</sup> percentile concentration and will use it to bound exposures.

## Petitioner Concern 4

- The gross alpha screening analysis methodology that was used for the 1994-1995 comprehensive characterization surveys, for the majority of subsurface soils other than the drain survey area, was biased low at concentrations above the 30 pCi/gram cleanup standard.

## Response to Petitioner Concern 4

- The subsurface exposure model developed by NIOSH (NIOSH 2018b) used data from the following outside areas:
  - surrounding Building 10;
  - former Burial Area;
  - Metals Recovery Area;
  - Building 11 Stockade Area;
  - Building 11 Railroad Spur Area;
  - Building 12 West and South Lawn Areas.

## Response to Petitioner Concern 4 *(continued)*

- These areas were characterized with 2,391 soil samples collected prior to the remediation of each area from 1985 to 1995.
- The data was presented in four site documents containing survey data, grid sampling methodology, and sample screening methodology (Sowell, 1985), (CPS, 1992), (CPS, 1995), (CPS undated).
- NIOSH reviewed M&C's sampling practices and gross alpha screening method and has not identified a bias that would affect the conservativeness of our exposure model.

## Petitioner Concern 5

- The petitioner cited remarks made by the Chair of the M&C work group, at the 126th Meeting of the Advisory Board on December 13, 2018, referring to contaminated soil and other debris removed (by railcars) during the 1992-1996 decommissioning activities from a site that had been released for unrestricted use. The petitioner stated that this residual contamination exposed M&C maintenance workers to unknown and unknowable levels of exposure.

## Response to Petitioner Concern 5

- The railcars of contaminated material generated after the U.S. Nuclear Regulatory Commission (NRC) initially released Building 10 are related to the changing release criteria and the subsequent use of more comprehensive investigative methods.
- The additional contamination identified using updated methods, including sections of the concrete floor and subsurface material, was previously inaccessible, and, as such, did not present a significant exposure hazard.
- Contamination data collected by M&C after the NRC initially released Building 10 was incorporated in the NIOSH exposure models.

## Petitioner Concern 6

- Concerning the incomplete knowledge of the nature, frequency, and duration of jobs performed; the degree of confidence that the NIOSH and SC&A technical experts place in the one-month duration estimate for all intrusive activities, both subsurface and in overhead areas, seems overly confident.

## Response to Petitioner Concern 6

- Initially NIOSH allowed 1 month of additional exposure for subsurface work. NIOSH has evaluated additional exposure scenarios for maintenance workers and now provides for 2 months per year of these enhanced exposures.

Note: Welders receive an additional 48 hours of exposure/year

- NIOSH assumes that the same person does all of the work associated with the highest concentrations of airborne contaminants.
- Considerations for exposure duration:
  - Workers visited buildings throughout the site and some spent time in the High Flux Isotope Reactor (HFIR) area which is not a covered area;

## Response to Petitioner Concern 6 *(continued)*

- Workers were promoted or changed job titles during the evaluated period which effected their exposure potential.

## Petitioner Concern 7

- There is a complete absence of any measurements or monitoring of the workers who are the subject of the petition. NIOSH has relied on measurement and monitoring data for several surrogate populations that are not comparable to the typical M&C maintenance worker in the class covered by the petition. The surrogate classes proposed by NIOSH do not adequately characterize the maximum radiation dose to any member of the class covered by the petition.

## Response to Petitioner Concern 7

- NIOSH analyzed M&C maintenance work including use of personal protection equipment (PPE) and safety/health protocols, and modeled associated exposures using plausible circumstances and without taking credit for any PPE or exposure limiting procedures.
- NIOSH created additional exposure models to address worker contact with sediments and to allow for longer exposure occupancy durations.
- NIOSH used maximizing assumptions (resuspension factors) to address work scenarios that involved work with accumulated dust (overhead area and welding).

## Response to Petitioner Concern 7 *(continued)*

- NIOSH applied the use of the 95<sup>th</sup> percentile radioactivity levels in its models to accommodate any uncertainty associated with work process assumptions.
- NIOSH assumes the same person does all of the work associated with the highest concentrations of airborne contaminants, which provides additional conservatism to the exposure models.

## Petitioner Concern 8

- NIOSH has failed to take a broader, and more accurate, view of the typical M&C maintenance worker. The measurement and monitoring data from the 1960s, 1980s and the 1990s for radiation workers and D&D workers, on which NIOSH has relied for their dose reconstruction modeling, are not suitable to estimate the bounding dose for the class of M&C maintenance workers.

## Response to Petitioner Concern 8

- NIOSH presented the SEC-00236 Evaluation Report to the Advisory Board on August 24, 2017. The petitioner subsequently raised a concern about the adequacy of the Evaluation Report in addressing maintenance work.
- In response to this concern, NIOSH obtained additional information and developed models in subsequent white papers that bound doses to workers that performed more invasive tasks as identified by the petitioner.
- The methods for the reconstruction of doses during periods of residual contamination have been established, documented, and accepted for use at numerous AWE sites with operations similar to those at M&C.

## Response to Petitioner Concern 8 *(continued)*

- For maintenance activities that were unique at M&C, NIOSH used monitoring data from measurements obtained before D&D along with maximizing assumptions to create bounding exposure models.

## Petitioner Concern 9

- An M&C Health Physicist expressed concerns that NIOSH was using measurement and monitoring data collected for D&D workers during the 1990s decommissioning project as a surrogate for the types of exposures received by M&C Maintenance Workers during the residual period for estimating a bounding dose. The M&C Health Physicist also claimed that members of the Advisory Board stated that it is virtually impossible to identify every conceivable exposure scenario that the M&C maintenance workers were exposed to.

## Response to Petitioner Concern 9

- NIOSH only used the D&D exposure data for its comparative value and not for dose reconstruction modeling.
- NIOSH used monitoring data from measurements obtained before D&D along with maximizing assumptions to accommodate any extreme conditions encountered by M&C maintenance personnel to create bounding exposure models.
- NIOSH researched M&C maintenance work and interviewed workers to model exposures associated with their worst-case tasks.
  - Whenever new exposure scenarios were identified, NIOSH evaluated them and created additional exposure models as necessary.

# References

- 42 CFR 83, *Procedures for Designating Classes of Employees as Members of the Special Exposure Cohort Under the Energy Employees Occupational Illness Compensation Program Act of 2000*; Final Rule, Federal Register/Vol.69, No. 104/Friday, May 28, 2004. [SRDB Reference ID 22001]
- Battelle 2011, *Battelle-TBD-6000, Site Profiles for Atomic Weapons Employers that Worked Uranium Metals*, Rev. 1; Division of Compensation Analysis and Support (DCAS); effective June 17. [SRDB Ref ID: 101251]
- Creative Pollution Solutions, Inc. (CPS). (1992). *Radiological characterization of Texas Instruments, Incorporated Attleboro Industrial Facility, Attleboro, Massachusetts*. Retrieved from SRDB Ref. ID 164755

## References *(continued)*

- Creative Pollution Solutions, Inc. (CPS). (1995). *Radiological surveys of open land areas: Texas Instruments, Incorporated, Attleboro, Massachusetts.* [SRDB Ref ID 176725]
- Creative Pollution Solutions, Inc. (CPS). (n.d.). Appendix D: Radiological survey results. [SRDB Ref. ID 165968]
- Elliott, 2018, Special Exposure Cohort Petition SEC00236, correspondence to National Institute for Occupational Safety and Health; Michael J. Elliott; May 28, 2018. [SRDB Ref ID: 172717]

## References *(continued-1)*

- NIOSH (National Institute for Occupational Safety and Health) 2004, *Estimation of Ingestion Intakes, Technical Information Bulletin, OCAS-TIB-009, Revision 0, Office of Compensation Analysis and Support, Cincinnati, Ohio, April 13.*
- NIOSH, 2008, OCAS-IG-002 *The Use of Data from Other Facilities in the Completion of Dose Reconstructions Under the Energy Employees Occupational Illness Compensation Program Act; August 1, 2008. [SRDB Ref ID 49029]*
- NIOSH, 2018a, Metals and Controls Corp. Maintenance Exposure Model; October 24, 2018. [SRDB Ref ID: 174357]

## References *(continued)*

- NIOSH, 2018b, Metals and Controls Corp. Subsurface Exposure Model; April 23, 2018. [SRDB Ref ID: 174132]
- NIOSH, 2019, Metals and Controls Corp. Thorium and Welding Exposure Model, April 8, 2019. [SRDB Ref ID: 175938]
- ORAUT, 2012, *Dose Reconstruction during Residual Radioactivity Periods at Atomic Weapons Employer Facilities*, March 5, 2012. [SRDB Ref ID: 108851]
- Sowell, L. L., 1985, Radiological Survey of the Texas Instruments Site Attleboro, Massachusetts, January 1985. [SRDB Ref. ID: 94371]