



# SEC-00236 Metals and Controls Corp. NIOSH Response to Working Group Comments

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## April 13, 2020 M&C Working Group meeting

- SC&A presented the Issues Resolution Roadmap and provided updates.
- The WG and petitioners discussed the issues, expressed some concerns, and made comments.
- This response addresses those comments.

# WG COMMENT 1

A general concern was expressed that maintenance work performed at M&C is unique, and therefore, standard modeling procedures do not apply. The WG requested a summary of bounding methods used for sites with residual radiation periods added to the SEC to compare to M&C.

# WG COMMENT 1 Response

- 16 petitions for 15 sites were evaluated in which part, or the entire evaluated class, falls within the residual period.
- Uranium was present at all sites and thorium at the following 7 sites:
  - Simonds Saw and Steel Co.; Norton Co.; Blockson Chemical Co.; Dow Chemical Corporation (Madison Site); Metals and Controls Corp.; Wah Chang; and United Nuclear Corp.

# WG COMMENT 1 Response (cont.)

Three evaluations resulted in additions to the SEC:

- For two of these (SEC-00107 Linde Ceramics Plant and SEC-00173 Norton Co), **some** of the evaluated period was added to the SEC.
- For the third (SEC-00177 Vitro Manufacturing), the **entire** evaluated period was added.

# WG COMMENT 1 Response (cont.)

SEC-00107, Linde Ceramics Plant (January 1, 1954 through July 31, 2006):

- Advisory Board split the evaluated period into two periods: the renovation period from January 1, 1954 through December 31, 1969; and the balance of the residual period from January 1, 1970 through July 31, 2006.
- The Board felt the renovation period dose (5,479 mrem/yr) could be bounded with air monitoring data captured during jackhammering from earlier renovations but were not plausible for site wide application for non D&D workers.

## WG COMMENT 1 Response (cont.)

SEC-00173, Norton Co. (January 1, 1958 through October 31, 2009):

- From January 1, 1958 to October 1962, teardown and clean-up significantly altered the materials present and placed employees close to the disturbed materials.
- Bioassay and air sampling data were identified for the periods both before and after this time, but no data were identified during teardown and clean-up operations (Added to the SEC).
- From October 1962 through October 31, 2009, NIOSH determined that available data were sufficient to calculate worker exposures (Not added).

# WG COMMENT 1 Response (cont.)

SEC-00177, Vitro Manufacturing (Canonsburg) (January 1, 1960 through September 30, 1965):

- During the previous operational period, the site processed uranium ores and generated waste piles containing uranium and progeny no longer in equilibrium due to processing.
- Between 1960 and 1965, the site performed remediation, transfer, and burial of the residue waste piles.
- There was no personal monitoring, workplace monitoring, or source term data to estimate exposures to residue storage, site decommissioning, and burial operations.

## WG COMMENT 1 Response (cont.)

- **NIOSH Conclusion:** It is clear these three residual periods added to the SEC were for sites with unusual work activities with high dose potential for which NIOSH was unable to evaluate the source term; this is not the case at M&C.
- The distinction between the potential for a high dose and for a lower dose is important because according to a former Board Chair:
  - *“In circumstances where the absolute value of the exposure may be much higher, we're much more concerned with how accurate these dose estimates may be.”* [Melius: 2013, SRDB Ref ID: 181029 PDF p. 18]

# WG COMMENT 1 Response (cont.)

## 11 AWE sites did not have residual period classes added to the SEC:

- **SEC-00223, Carborundum Company** (October 1, 1943 through December 31, 1958; January 1, 1968 through December 31, 1992)
- **SEC-00204, Baker Brothers** (January 1, 1945 through December 31, 1994; January 1, 1996 through December 31, 1996)
- **SEC-00141, Hooker Electrochemical** (January 1, 1949 through December 31, 1976)
- **SEC-00043, Chapman Valve** (January 1, 1950 through December 31, 1993)
- **SEC-00131, Bliss & Laughlin Steel** (January 1, 1953 through December 31, 1998)

## **WG COMMENT 1 Response (cont.)**

- **SEC-00230, Bliss & Laughlin Steel** (January 1, 1999 through December 31, 1999)
- **SEC-00157, Simonds Saw and Steel Co.** (January 1, 1958 through December 31, 2006)
- **SEC-00225, Blockson Chemical Co.** (July 1, 1960 through December 31, 1991)
- **SEC-00079, Dow Chemical Corporation (Madison Site)** (January 1, 1961 through November 30, 2007)
- **SEC-00105, General Steel Industries** (January 1, 1967 through December 31, 1992)

# WG COMMENT 1 Response (cont.)

- SEC-00174, Wah Chang (January 1, 1973 through July 31, 2006)
- SEC-00116, United Nuclear Corp. (January 1, 1974 through December 31, 2006)
- **NIOSH Conclusion:**
  - M&C operations were similar to operations at these other sites.
  - The methods proposed for M&C by NIOSH and SC&A are similar and consistent with those previously approved by the Board.
  - The types of radioactive material, the crafts personnel who worked with the material, and the tasks performed at M&C are found across all of the AWE sites.

## WG COMMENT 2

A general concern was expressed that although NIOSH used the same procedures to bound doses at M&C as were used at other AWE sites, the WG was not convinced the supporting data was sufficiently accurate or adequate

## WG COMMENT 2 Response

- The Board's position and the guidance NIOSH has been following is that the uncertainty around the work performed or the complete understanding of the work performed (e.g., one person doing all the maintenance work) is NOT an issue when the bounding doses are very low, and specifically, during AWE residual periods such as at M&C.

## WG COMMENT 2 Response (cont.)

In the words of the former Board Chair:

- *“...with the residual period, we are going to have lots of situations where we don't have very much information on the activities; usually very little sampling data. We are going to be using OTIB-70 a lot in these situations without knowing much about what individuals did on the site.”* [Melius: 2011, SRDB Ref ID: 181253, PDF p. 145]
- *“...if you look back at all of our decisions, if the absolute value of the exposure is relatively low, then we're willing to accept more variability in the dose, and if the exposure's absolute values are higher, then we're looking for a more accurate dose reconstruction method.”* [Melius: 2013, SRDB Ref ID: 181029, PDF p. 20]

## WG COMMENT 2 Response (cont.)

Summary of annual uranium dose estimates (mrem)

Model	Internal	External	Occupancy
Subsurface	31	8	2 months
HVAC	1.77	N/A	1-hour
Roof & Ceiling	3.65	4	1-month
Welding	5.88	N/A	48 hours
Remaining	2	36	~9 months
<b>Total</b>	<b>44.3</b>	<b>48</b>	<b>12 months</b>

## WG COMMENT 2 Response (cont.)

NIOSH believes it has estimated the maximum radiation dose that could have been incurred under plausible circumstances. Even under these maximizing conditions the estimated doses to workers are quite small.

- 95<sup>th</sup> percentile (Subsurface, HVAC, Roof & Ceiling, Welding)
- $10^{-3}$  resuspension (Welding)
- 200 mg/m<sup>3</sup> dust load (HVAC)
- the same person doing all the work
- most claimant-favorable solubility type

## WG COMMENT 3

Although doses are small, the WG questioned the adequacy of survey data from the 90s to bound doses incurred in the 70s and 80s.

*“The work they were doing was to characterize in order to dig up and remove contamination, not to assess dose to workers. So, I’m not in agreement there”*

## WG COMMENT 3 Response

- Surface- and mass-based contamination surveys are almost never performed by radiological facilities for the sole purpose of assessing doses. However, they are routinely used to assess exposure potential.
- The application of resuspension factors and dust-load estimates to surface- and mass-based contamination surveys is a very common and accepted approach used today to meet the requirements in 10 CFR 20 and 10 CFR 835.
- The Board has routinely approved the use of such data to bound doses when the data selected creates a claimant-favorable and plausible dose estimate.

## WG COMMENT 3 Response (cont.)

- As described in the response to Comment 1, NIOSH developed bounding scenarios from contamination survey data intended by the site to characterize an area, for 15 of the 16 AWE sites evaluated.
- The ER that did not use such data was SEC-00107 Linde, where NIOSH interpolated air concentration measurements from before and during the residual period.

## WG COMMENT 3 Response (cont.)

- In an attempt to corroborate the drain-line data, NIOSH examined similar data obtained at other AWE sites.
- Six sites were identified that documented drain-line sediment sample results.
- These data were used to determine the likelihood that the 95<sup>th</sup> percentile specific activity for Metals and Controls could be considered bounding.

## WG COMMENT 3 Response (cont.)

- NIOSH reviewed data from Vitro, Bridgeport, Horizons, Peek Street, Mallinckrodt, and DeSoto. In each of the cases, the maximum specific activity was at least an order of magnitude larger than the majority of the other samples.
- This indicates that although there could be sporadic hot spots (i.e., at the 95<sup>th</sup> percentile), one is unlikely to encounter systemic exposures to drain-line sediment at the 95<sup>th</sup> percentile.
- The M&C drain-line data are consistent with this conclusion:
  - Of the 20 sediment results, 16 are at least an order of magnitude less than the 95<sup>th</sup> percentile (6,887 pCi/g).

## WG COMMENT 3 Response (cont.)

- Although the WG expressed skepticism the 95<sup>th</sup> percentile bounds contamination levels before the 1983–1995 surveys, M&C's area monitoring provides assurance this value is conservative.
- During the first 14 years of the residual period (1968-1981), M&C performed routine alpha contamination surveys in Building 10.
- If widespread removable alpha contamination existed at levels higher than the 95<sup>th</sup> percentile in areas where maintenance was performed, then routine surveys would have eventually identified tracking throughout the plant during this 14-year period.

## WG COMMENT 4

A WG member took exception to NIOSH's use of surrogate data obtained during an outdoor excavation to bound indoor exposures even though SC&A's independent method came to a similar result

## WG COMMENT 4 Response

- Although outdoor work provides more air-changes and a greater volume of air for dilution, during the Mound study the high-volume air samplers were positioned close to the excavation, which reduces the impact of the larger outside air volume.
- With the use of the 95<sup>th</sup> percentile case from that study, the smaller air volume available for work inside a large industrial facility is offset by the limited airborne-generating capacity of snakes and shovels (1-4 lbs. dropped 1-3 feet) on wet soil inside, compared to backhoes used outside (100-1000s lbs. dug, pushed, and dropped 6-14 feet).
- SC&A (NUREG/CR-5512) value 200  $\mu\text{g}/\text{m}^3$ ; NIOSH value 220  $\mu\text{g}/\text{m}^3$

## WG COMMENT 4 Response (cont.)

- An analysis of the General Laborer's daily weighted average air concentration used in Battelle-TBD-6000 was converted to a dust load assuming the specific activity of natural uranium
- For processes such as Extrusion, Rolling, Forging, Slug Production, and Scrap recovery, the calculated dust load for General Laborers would range from about 65 to 556  $\mu\text{g}/\text{m}^3$
- These types of activities are considered more aggressive and should result in higher dust loads. However, NIOSH's suggested dust load is within this range and therefore should be considered bounding.

# WG COMMENT 5

A WG member commented that explosions and fires are not considered in bounding methods especially the HVAC model.

## WG COMMENT 5 Response

- NIOSH conducted an SRDB search for records of events and did not find any references to fires or explosions at M&C post-1967.
- NIOSH inquired with the Director of the State of Massachusetts Department of Public Health, Radiation Control Program, and the state's Director of the Department of Fire Services to find records of events or incident inspection reports; they have not identified any records of fires or explosions.
- NIOSH agrees with SC&A's assertion that additional dust created by a fire or explosion would dilute the specific activity concentrated in the HVAC system, thus making NIOSH's HVAC model more claimant favorable during these rare events.

## WG COMMENT 6

A former worker has a concern regarding exposures to Ra-226 glass beads, and other exposures during maintenance work, including excavation, roof, ceiling area, and HVAC work.

## WG COMMENT 6 Response

- This Ra-226 commercial work was limited to a single process in Building 1 and was kept separate from M&C's AWE Facility weapons-related work.
- M&C's Ra-226 work is not considered an EEOICPA-covered exposure during the subsequent residual radiation period addressed by the SEC-00236 ER.
- The other exposure scenarios described by this former worker are addressed by the models NIOSH and SC&A developed for maintenance work.

# CONCLUSION

- NIOSH researched maintenance work at M&C and worked with all stakeholders, including the petitioners and the M&C Working Group, to create and develop bounding exposure models.
- NIOSH believes these exposure models adequately bound maintenance exposures experienced by M&C workers during the residual radiation period.

For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

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