



# Discussion of Metals and Controls Petitioner Comments

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Metals and Controls Work Group Meeting

July 13, 2023

# Overview

- Introduction
- Comparability of drain cleaning: D&D vs M&C maintenance workers
- Subsurface outside – use of blended D&D characterization survey data
  - Inside data
  - Outside blended survey data
  - Use of Mound dust loading data
- Conclusions

# Introduction

# Introduction – Petitioner Comments

- The petitioner for SEC 236 submitted written comments dated 2023-05-27
- This presentation provides NIOSH responses to these comments
- The petitioner's comments concerned two main points:
  - Comparability of drain cleaning: D&D vs M&C maintenance workers, and
  - Subsurface outside – use of blended D&D characterization survey data

# Introduction – NIOSH bounding methods (1 of 2)

- NIOSH's method to bound internal doses from subsurface contamination during the residual period:
  - Indoor source term estimated from 1996 sediment survey (targeted to areas of likely contamination)
    - Includes soil data around a fuel rod in a drain line
    - Intakes based on 95<sup>th</sup> percentile sediment concentration 6887 pCi/g (~1% of the specific activity of natural uranium)

## Introduction - NIOSH bounding methods (2 of 2)

- NIOSH's method to bound internal doses from subsurface contamination during the residual period:
  - Outdoor source term based on surveys targeted to areas of likely contamination
  - Intakes also based on 95<sup>th</sup> percentile Mound dust loading
  - NIOSH assumes all subsurface soil and piping are at 95<sup>th</sup> percentile concentration, even though >80% of operational source term (Naval Reactors, High Flux Isotope Reactor), and none of the source term added during residual period (HFIR) was covered

# **Comparability of Drain Cleaning: D&D vs M&C Maintenance Workers**

# Training and Monitoring

- *“...the health physics awareness training and monitoring provided for the D&D workers did not exist for the AWE Residual Period maintenance workers...”*
- NIOSH is not basing our internal dose bounding method on an assumption that training and monitoring was the same for maintenance and D&D workers
  - Our bounding method is based on a source term calculation that bounds both Maintenance and D&D workers. It is not affected by worker training assumptions

# Different Methods / Different Tasks

- *“...the methods and means of performing the tasks were completely different ...”*
- NIOSH is not basing our internal dose bounding method on an assumption that tasks were the same for maintenance and D&D workers
  - Our bounding method is consistent with intrusive activities performed by both Maintenance and D&D workers

## Contact with Source Term

- *“...tasks were completely different and placed the Residual Period maintenance workers in much more intimate contact with the residual contamination...”*
- NIOSH is not basing our internal dose bounding method on an assumption that exposure potential was the same for maintenance and D&D workers
  - Our bounding method assumes intimate contact with the source term for Maintenance workers
  - We are not assuming use of PPE, respiratory protection, or engineering controls

# Risk of Exposure

- *“...tasks were completely different and placed the Residual Period maintenance workers...at higher risk of elevated exposure to residual radiation...”*
- NIOSH is not basing our internal dose bounding method on an assumption that exposure potential was the same for maintenance and D&D workers
  - Our models reflect the work Maintenance workers performed, e.g. welding/grinding work, HVAC filter changes

# Maintenance Worker Internal Exposure > D&D

- NIOSH has air monitoring and bioassay data from the D&D activities at M&C
- NIOSH's bounding internal dose method results in internal doses that are larger than the D&D monitoring data suggest. Therefore, the maintenance workers are assigned higher doses than the D&D workers, as the petitioner asserts they should be

# **Subsurface Outside – Use of Blended D&D Characterization Survey Data**

# Inside vs. Outside

- Petitioner quoted SC&A Finding 1 (8/22/22): *“The back application of a high 1995 sediment survey result to bound **inside subsurface activities** is not adequately supported by information for M&C worker activities from the earlier residual time period” (emphasis added)*
- There was no data blending for the inside subsurface model. The inside data is separate from the outside data
- Regarding inside data...

# Bounding Scenario

- The presence of the fuel pin in the pipe indicates that we have captured the worst case scenario with the 95<sup>th</sup> percentile
  - We are unaware of a plausible scenario that would result in a higher source term estimate
- The survey data targeted contaminated areas. It is not a random data set. Therefore we are even more confident that the 95<sup>th</sup> percentile is favorable
- We assume all the subsurface soil and piping are at 95<sup>th</sup> percentile concentration, even though >80% of original source term and none of the source term added during residual period was covered

# Precedent for Back Application of Data

- We propose to use survey data from 1996 throughout the residual period (1968-1997). Similar to:
  - Chapman Valve (soil data from 1987, and 1992 applied back to 1949)
    - Diverse, intrusive work, similar to the situation at M&C
  - Linde (data from 2001 applied to 1970-2006)
    - Subsurface maintenance utility work, confined spaces
  - Vitro (air data from 1977 applied to 1965 – 1985)

## Hot Spots (1 of 2)

- Petitioner quoted SC&A Observation 1 (8/22/22): *“The use of blended D&D characterization survey data from 1984 and 1992 to support a bounding dose from outside subsurface activities may not be necessarily bounding for work in nonuniform soil contamination, given the presence of **hot spots** that existed during the residual period at M&C” (emphasis added)*

## Hot Spots (2 of 2)

- We are modeling representative exposures and hot spots are included in the data set.
- Basing modeling only on hot spots would result in implausibly high doses
- We use the 95<sup>th</sup> percentile (data includes hot spots), a claimant-favorable method consistent with precedents from numerous other similar sites

# Application of Mound Dust Loading (1 of 2)

- Petitioner quoted SC&A Finding 2 (8/22/22): *“The application of surrogate data from the Mound project to provide a dust-loading factor for M&C subsurface activities does not satisfy the Board’s surrogate data policy”*

## Application of Mound Dust Loading (2 of 2)

- SC&A conducted an independent evaluation and came up with a similar dust loading estimate. SC&A previously agreed that Mound data could be applied to M&C
- NIOSH agreed with SC&A that Mound dust loading data would not necessarily apply at every site
- The application of outdoor dust loading data to inside environments (including confined spaces) is a TBD issue, not an SEC issue

# Conservatism of 95<sup>th</sup> Percentile Soil Contamination (1 of 2)

- Petitioner quoted SC&A Observation 2 (8/22/22): *References to the M&C safety and health manual, NRC inspection results, operator training, and other programmatic considerations do not necessarily substantiate the conservatism of the 95th percentile soil contamination value being applied.”*

# Conservatism of 95<sup>th</sup> Percentile Soil Contamination (2 of 2)

- NIOSH is not substantiating the 95<sup>th</sup> percentile soil contamination value by relying on those documents. The conservatism of the 95<sup>th</sup> percentile soil contamination value is based on sampling data targeted to contaminated areas
- The conservatism of the 95<sup>th</sup> percentile intake value does not take credit for work practices, PPE, training, or the robustness of the radiation protection program

**Conclusion**

# Conclusions (1 of 3)

- NIOSH modeled intake is a function of:
  - Source term
  - Resuspension factor/dust loading
  - Occupancy/time
- NIOSH modeled intake is NOT impacted by:
  - Training/knowledge of hazards (assumes none)
  - PPE (assumes none)
  - Monitoring (assumes none)

## Conclusions (2 of 3)

- NIOSH's method to bound internal doses from subsurface contamination during the residual period:
  - NIOSH assumes all of the subsurface soil and piping are at 95<sup>th</sup> percentile concentration, even though >80% of original source term (Naval Reactors, HFIR), and none of the source term added during residual period was covered (HFIR)
  - NIOSH assumes all workers are occupationally exposed or in close contact with the 95<sup>th</sup> percentile concentration.
  - The petitioner's comments do not affect NIOSH's internal dose bounding estimate

## Conclusions (3 of 3)

- Data have been back extrapolated to cover residual periods at other sites with Board concurrence, as we propose to do at M&C
- No plausible bounding scenario higher than the fuel pin in the pipe has been identified or proposed by the Working Group
- NIOSH's bounding internal dose estimate makes multiple favorable assumptions. It is not plausible that workers' exposures were higher than these assumptions suggest
  - NIOSH's bounding estimate is sufficiently accurate – it is based on source term data from M&C

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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