



NIOSH Responses to SC&A Review of the Evaluation Report for SEC-00247- Superior Steel Co.

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Overview

- Review of the Superior Steel Co.
- Review of the SEC-00247 Evaluation Report
- NIOSH Responses to the SC&A Review of the SEC-00247 ER

Review of the Superior Steel Co.

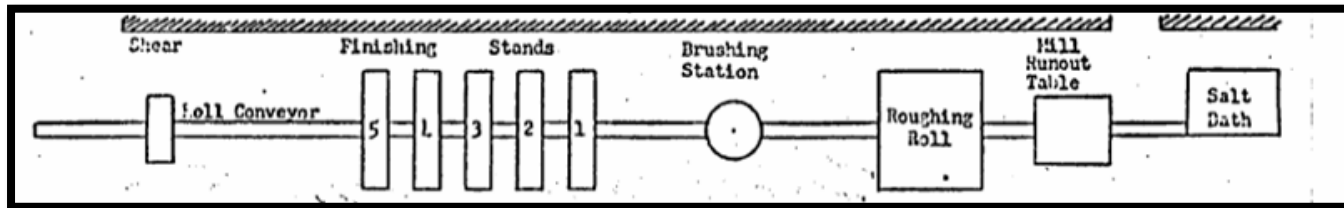
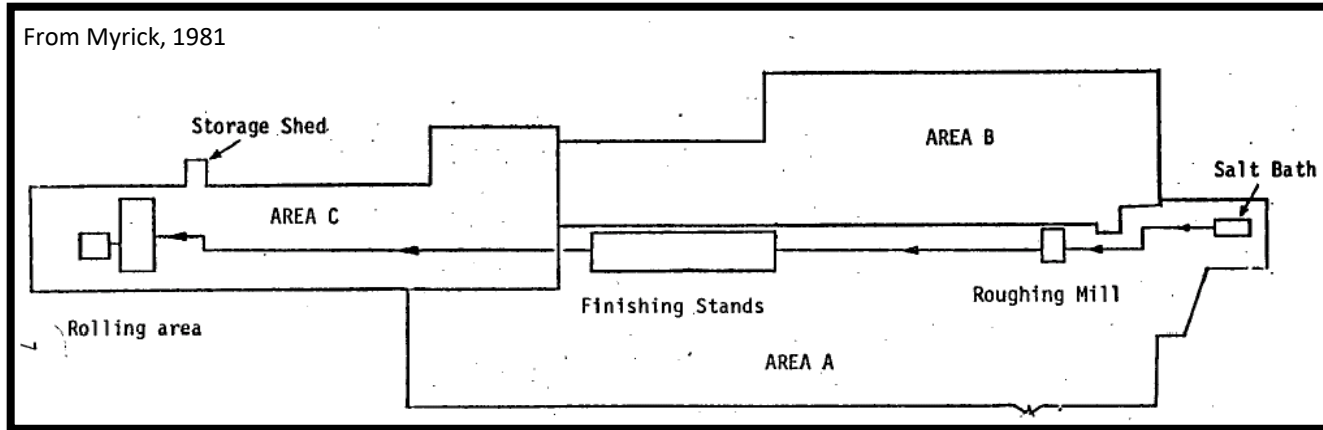
About Superior Steel Co. Site

- Carnegie, PA
 - 5 interconnected buildings
- Uranium rolling for AEC
- Covered Period
 - AWE: January 1, 1952 through December 31, 1957
 - Residual Radiation: January 1, 1958 through present



Photo from USACE, 2018

Superior Steel Co. Processing Areas



Review of the SEC-00247 Evaluation Report

SEC-00247 Petition for Superior Steel Co.

- 83.13 (Form B) Petition received May 1, 2018
 - (F.1) Basis: *Radiation exposures potentially incurred by members of the proposed class were not monitored either through personal monitoring or through area monitoring.*
- Petition qualified for review on July 19, 2018
 - Class under Review: *All atomic weapons employees who worked in any area at Superior Steel Co. in Carnegie, PA during the period from January 1, 1952 through December 31, 1957.*

Evaluation of Petition Basis - Internal Monitoring

- “Individual uranium urinalysis data are unavailable for Superior Steel workers and none are known to exist.” (ORAUT-TKBS-0034)
 - When personal internal monitoring data are unavailable, NIOSH uses air monitoring data from worker breathing zones and work areas, in accordance with NIOSH’s OCAS-IG-002, *Internal Dose Reconstruction Implementation Guideline*
 - Site-specific air monitoring data and process data available to estimate internal uranium doses
 - Airborne mass loading calculations from air monitoring data to estimate internal thorium doses

Evaluation of Petition Basis - External Monitoring

- “No external dosimetry results are available for Superior Steel employees.” (ORAUT-TKBS-0034)
 - When personal and area external monitoring data are unavailable, NIOSH uses workplace information (e.g., source term, process) to estimate dose, in accordance with NIOSH’s OCAS-IG-001, *External Dose Reconstruction Implementation Guideline*
 - Site-specific information, in conjunction with Battelle-TBD-6000, to model external uranium exposures
 - Site-specific information, in conjunction with Battelle-TBD-6000, to model external thorium exposures

Feasibility Findings for SEC-00247 Superior Steel Co. January 1, 1952 to December 31, 1957

Source of Exposure	Dose Reconstruction Feasible
Internal	Yes
Uranium Internal	Yes
Thorium Internal	Yes
External	Yes
Uranium External	Yes
Thorium External	Yes
Occupational Medical X-rays	Yes

NIOSH Proposed Dose Reconstruction Methods - Applicable Years

▪ Uranium

- Operations:
 - June 27, 1952 through December 31, 1957
- Residual Contamination:
 - January 1, 1958 through present

▪ Thorium

- Operations:
 - March 27, 1956 through April 20, 1956
- Post-Ops Contamination:
 - April 21, 1956 through December 31, 1957
 - *Commercial, non-AEC work*

NIOSH Proposed Dose Reconstruction Methods - Internal Exposures (1952-1957)

Intake Information	Uranium	Thorium
Rolling	<div style="border: 1px solid cyan; padding: 2px; display: inline-block;">500 h per year</div> U air concentration results	10 h during March – April 1956 Th air concentration calculated using a mass loading approach
Resuspension	<div style="border: 1px solid cyan; padding: 2px; display: inline-block;">2000 h per year U resuspension</div>	Remainder of 1956 and all of 1957 Th resuspension
Material Assessed as	U-234 including recycled U contaminants	Th-232 including Th daughter products in secular equilibrium

NIOSH Proposed Dose Reconstruction Methods - External Exposures (1952-1957)

Exposure Type	Uranium	Thorium
Direct Rolling	500 h per year Battelle-TBD-6000 rolling operations dose	10 h in March – April 1956 MCNP modeling and distance guidance in Battelle-TBD-6000
Submersion Rolling	500 h per year submersion using DCF from EPA-FGR-12	10 h in March – April 1956 submersion using DCF from EPA-FGR-12
Direct Storage	500 h per year Battelle-TBD-6000 1m dose rate	190 h in March – April 1956 MCNP modeling for dose rate at 1m
Post-rolling	2000 h per year submersion and direct exposure using DCF from EPA-FGR-12	Remainder of 1956 and all of 1957 submersion and direct exposure using DCF from EPA-FGR-12

NIOSH Responses to the SC&A Review of the SEC-00247 ER

Finding 1: Failure to justify process similarities that support the use of the Vulcan Crucible billing rate

- Internal Dose (and External Dose)
- Exposure Time, specific to rolling hours
 - Vulcan Crucible billing rate of \$132 per mill-hour
 - Superior Steel Co. contract payment for 1957 of \$54,632
 - 414 mill-hours → 500 hours rolling exposure
- **NIOSH Response**
 - Evaluated the billing rate via the 5 criteria in the NIOSH Implementation Guide “The Use of Data from Other Facilities in the Completion of Dose Reconstructions Under the Energy Employees Occupational Illness Compensation Program Act” (OCAS-IG-004)

Finding 1: Vulcan Crucible billing rate (cont.)

- NIOSH Response (cont.)
 - **Source Term:** Both rolled uranium billets
 - **Facility and Process Similarities:** Both similar processes and timing
 - **Temporal Considerations:** Vulcan billing rate from 1948
 - **Data Evaluation:**
 - Simonds Saw and Steel- \$110.53 per rolling hour
 - Joslyn- \$450 per rolling hour for different process
 - Joslyn- \$88.03 per hour (\$0.11 per pound) never implemented
 - Superior Steel Co.- \$1.01 per pound

Finding 1: Vulcan Crucible billing rate (cont.)

- NIOSH Response (cont.)
 - Review of Bounding Scenario:
 - Compilation of Rolling Information in Table 7-1 yields about 60h per year rolling exposure
 - Modification #5 to the Superior Steel Co. contract yields about 510h for the entire contract
 - » additional assumptions of (1) weight of slabs and (2) # of slabs rolled per day or year
 - NIOSH stands by the use of the Vulcan Crucible billing rate to determine the number of rolling hours

Finding 2: 1955 survey distributions may not bound air concentrations

- Internal Dose
- Intake Rate based on results of the 4 HASL air sampling campaigns
 - 2 intake rates: 1953 data and 1955 data
- NIOSH Response
 - Performed hypothesis testing on datasets
 - May 1955 data not from the same distribution as the other three datasets (visually it is lower)
 - Remove May 1955 data and use the other 3 datasets to determine the intake rate for the entire exposure period

Observation 1: New approach to bounding source term based on contract billing in combination with another site's billing rate

- Internal Dose (and External Dose)
- Exposure Time, specific to rolling hours
 - Vulcan Crucible billing rate used to calculate number of uranium rolling hours
- **NIOSH Response**
 - Clarified the billing rate isn't used for source term assumptions
 - Source term is Uranium slabs (natural and enriched)
 - Based on the AEC contract and AEC process documents

Observation 2: One-to-one Thorium-to-Uranium ratio for calculation of Thorium air concentration inconsistent with precedent of 10% used in past ERs

- Internal Dose
- Thorium Intake Rate based on uranium air sample mass loading
- **NIOSH Response**
 - Bridgeport Brass
 - Thorium intake rates equal 10% of the Uranium intake rates
 - Uranium and Thorium rolled concurrently
 - Air sampling results include contributions from both Uranium and Thorium
 - Superior Steel air sampling only performed during Uranium work

Observation 3: Uranium storage time assumption is inadequate to capture length of time material was likely on-site

- External Dose
- Exposure Time, specific to storage of material on-site
 - 500 hours per year of exposure from material storage
- **NIOSH Response**
 - Given petitioners' comments and review of applicable reference documents, change to year-round minus rolling time for the entire operational period

Observation 4: Annual medical examination assumption in spite of evidence may be inconsistent

- Occupational Medical Dose
- Assign pre-employment, annual, and termination PA chest X-ray doses
- **NIOSH Response**
 - Default assumption from ORAUT-OTIB-0006 when evidence is lacking
 - Default assumption from ORAUT-OTIB-0079 when evidence is lacking