



SEC-00247

Superior Steel Co.

Megan Lobaugh, PhD, CHP
Health Physicist

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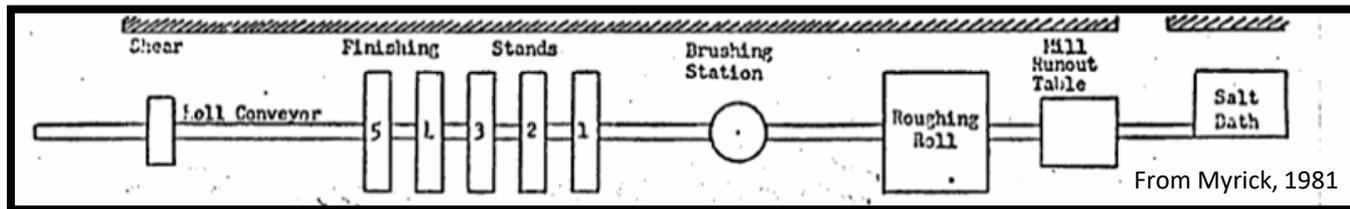
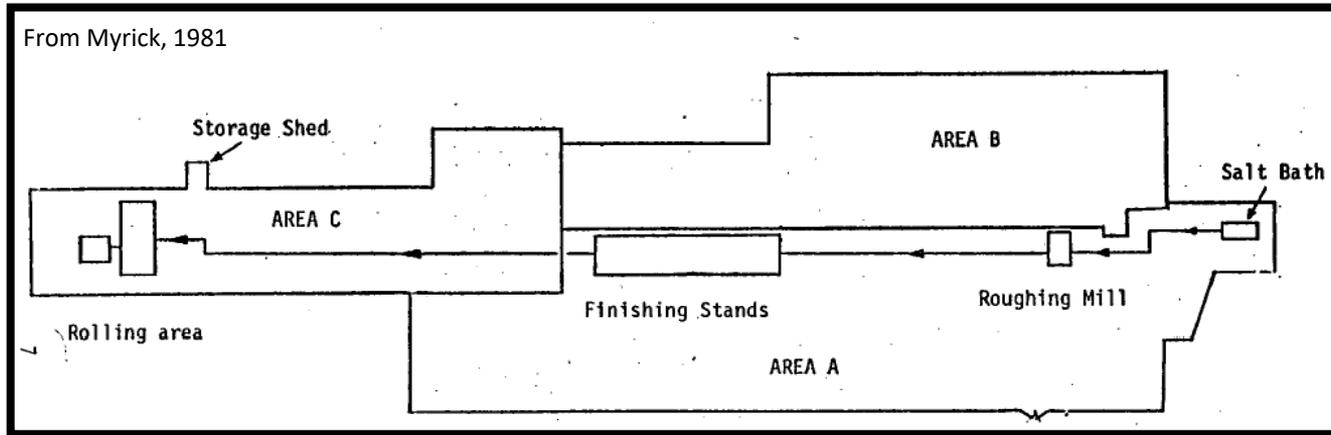
About Superior Steel Co. Site

- Carnegie, PA
 - 5 inter-connected 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



SEC-00247 Petition for Superior Steel Co.

- 83.13 (Form B) Petition Received May 1, 2018
 - Petitioner-requested class: *All workers who worked in any area at the Superior Steel Co. facility in Carnegie, PA, during the period from January 1, 1952 through December 31, 1957.*
 - (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 on July 19, 2018
 - Qualified class: *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.*

Number of Superior Steel Co. Claims

(as of October 2, 2018)

Description	Totals
Total number of claims submitted for dose reconstruction	35
Total number of claims submitted for energy employees who worked during the period under evaluation (January 1, 1952 through December 31, 1957)	35
Number of dose reconstructions completed for energy employees who worked during the period under evaluation	35
Number of claims for which internal dosimetry records were obtained for the time period under evaluation	0
Number of claims for which internal dosimetry records were obtained for the time period under evaluation	0

Superior Steel Co. Exposure Time

- AEC contract [AT(30-1)-1412] effective date is June 27, 1952
- AEC contract end date is September 30, 1957
 - Evidence that the fission material accounting station authority was withdrawn on November 27, 1957
- AEC cost-plus-fixed-fee contract was for intermittent, on-demand rolling
- Payments to Superior Steel Co. through fiscal year 1957 totaled \$356,849
- CATI information tells us overtime work was common

Radiological Sources at Superior Steel Co.

- Majority of AEC rolling campaigns were with natural uranium metal
- 1 AEC rolling campaign included 6 slabs of 1.5% enriched uranium metal
- *Since the Superior Steel Co. operations were after 1952, uranium metal could be recycled*
- 1 commercial, small-scale rolling campaign with 700 pounds of thorium metal

AEC Licensing for Thorium at Superior Steel Co.

- March 27, 1956: AEC license “to receive, possess, use, and transfer” 700 pounds of thorium metal from Babcock and Wilcox (B&W) to perform studies similar to work done for AEC
- April 20, 1956 and April 23, 1956: Superior Steel Co. request for license amendment for unlimited quantities of thorium metal owned by Consolidated Edison to be used by B&W in critical experiments; mentions data from test rollings
- April 30, 1956: Licensed by AEC for unlimited quantities of thorium metal with expiration on April 30, 1958

Thorium Rolling at Superior Steel Co.

- No evidence of shipping, receiving, or rolling of thorium in document reviews
- 5 radiological surveys done in support of more recent clean-up efforts
 - Gamma spectroscopy of soil and other samples taken from inside buildings
 - Uranium contamination found, as expected
 - No evidence of thorium contamination
 - Gamma scan survey of land surrounding facility
 - Uranium contamination found in spatial distribution around buildings
 - Background levels and spatial distribution typical of naturally-occurring thorium
- *NIOSH concludes no large-scale use of thorium at Superior Steel Co.*

Internal Exposure Routes at Superior Steel Co.

- Inhalation and ingestion of uranium and thorium metal and oxidized material via:
 - Dispersion during rolling and related processes
 - Dust-settling of contamination
 - Resuspension of contamination

External Exposure Scenarios at Superior Steel Co.

- Photon and beta radiation from uranium and thorium metal ingots and slabs via:
 - Direct exposure
 - Exposure from the contaminated surfaces within the facility
 - Submersion in contaminated air within the facility
- Occupational Medical X-rays

Monitoring Data Available- Internal Exposure at Superior Steel Co.

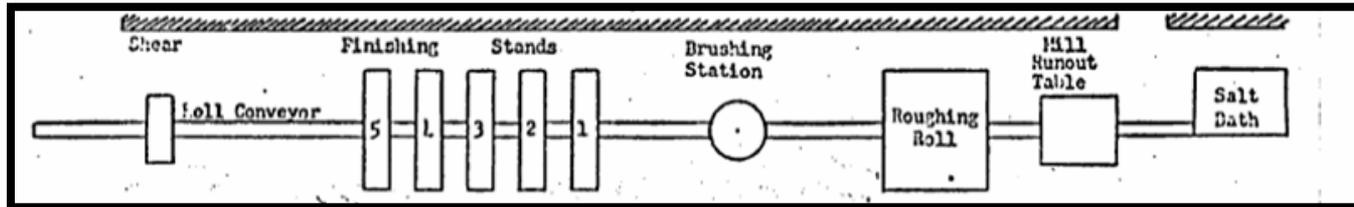
- Personal Monitoring: No in vitro or in vivo results and there is no indication of internal dosimetry monitoring program.
- Area Monitoring: Four campaigns of air monitoring (e.g., BZ and area) performed by AEC Health and Safety Laboratory (HASL) during uranium rolling:
 - May 13, 1953
 - August 3, 1953
 - May 9, 1955
 - September 19, 1955

Summary of Breathing Zone Air Monitoring Data- Uranium Rollings

Date	# of Samples	Highest Alpha Recorded ($\frac{dpm}{m^3}$)	Location of Highest Value	Reference
May 9, 1955	9	38,500	Stamping Plate (manual operation)	AEC, 1955a
September 19, 1955	6	18,000	Stamping 3 sections of plate	AEC, 1955b

Summary of Area Air Monitoring Data- Uranium Rollings

Date	# of Samples	Highest Alpha Recorded ($\frac{dpm}{m^3}$)	Location of Highest Value	Reference
May 13, 1953	28	13,200	A	Klevin, 1953a
August 3, 1953	33	49,110	B	Klevin, 1953b
May 9, 1955	61	1,800	C	AEC, 1955a
September 19, 1955	38	3,320	D	AEC, 1955b



Monitoring Data and Information Available- External Exposure at Superior Steel Co.

- Personal Monitoring: No external dosimetry results and there is no indication of external dosimetry monitoring program.
- Area Monitoring: No indication of area external dose monitoring program.

- Information is available to NIOSH about the Superior Steel Co.'s AEC contract, radiological material licensing, processes, and the material processed.

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	500 h per year U air concentration results	10 h during March – April 1956 Th air concentration calculated using a mass loading approach
Resuspension	2000 h per year U resuspension	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

Dose Reconstruction Feasibility Conclusion

- NIOSH has sufficient air data and process information to bound internal and external dose from AEC uranium metal rolling operations.
- NIOSH has sufficient process information to bound internal and external dose from the small-scale, commercial thorium metal rolling operation.
- The NIOSH Site Profile for Superior Steel Co. (effective date 2005) will be updated with the additional information captured and reviewed in this evaluation.

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*.
 - Sufficient site-specific air monitoring data and process data to calculate estimates of worker internal uranium doses with sufficient accuracy
 - Airborne mass loading calculations using available uranium process air monitoring data to estimate worker 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*.
 - Sufficient applicable site-specific information, using the methods of Battelle-TBD-6000, to model potential external uranium exposures
 - Model thorium metal related exposures in accordance with the methods presented in Battelle-TBD-6000 using MCNP

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

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

References

- AEC, 1955a, *Superior Steel Company Air Dust Monitoring of Hot Strip Rolling of Uranium*; U.S. Atomic Energy Commission (AEC) Health and Safety Laboratory (HASL); issued July 1, 1955; SRDB Ref ID: 6877
- AEC, 1955b, *Superior Steel Company Air Dust Monitoring of Hot Strip Rolling of Uranium*; U.S. Atomic Energy Commission (AEC) Health and Safety Laboratory (HASL); issued November 15, 1955; SRDB Ref ID: 6888
- Klevin, 1953a, *Superior Steel Company Air Dust Monitoring of Hot Strip Rolling of Uranium*; Paul B. Klevin, Industrial Hygiene Branch Health and Safety Division; issued May 22, 1953; SRDB Ref ID: 6898
- Klevin, 1953b, *Superior Steel Company Air Dust Monitoring of Hot Strip Rolling of Uranium*; Paul B. Klevin, Industrial Hygiene Branch Health and Safety Division; issued September 8, 1953; SRDB Ref ID: 6899, PDF pp. 2-12

References- continued

- Myrick, 1981, *Preliminary Site Survey Report for the Former Superior Steel Mill at Carnegie, Pennsylvania*; T. E. Myrick and C. Clark, Oak Ridge National Laboratory; April 1981; SRDB Ref ID: 14657
- USACE, 2018, *Superior Steel Site Fact Sheet (January 2018)*, U.S. Army Corps of Engineers- Buffalo District, Environmental Project Management Team; January 2018; SRDB Ref ID: 173724