



Additional Information in Response to SEC-00247 Evaluation Report Review Finding #1

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TBD-6000 Work Group Meeting

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Overview

- Summary of SC&A Evaluation Report Review and Work Group Discussion of Finding #1
- NIOSH Response to Request for Additional Information for Finding #1

Summary of SC&A ER Review and Work Group Discussion of Finding #1

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

- Internal 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
 - ER proposed using 500 hours for rolling exposure
- SC&A questioned the selection of Vulcan Crucible billing rate
 - No rationale for why the billing rate is a reasonable substitute
 - Joslyn Manufacturing Company mill rate of \$88 per hour
 - Results in 621 hours

NIOSH October 24, 2019 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)
 - **Source Term:** Both rolled uranium billets
 - **Facility and Process Similarities:** Both similar processes and timing
 - **Temporal Considerations:** Vulcan billing rate from 1948

NIOSH October 24, 2019 Response (cont.)

– 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

NIOSH October 24, 2019 Response (cont.)

– Review of Bounding Scenario:

- Compilation of Rolling Information in Table 7-1 of the ER 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

SC&A January 14, 2020 Response

- Billing rate provided in the Superior Steel Co. Modification #5 of the contract takes precedence over all surrogate site billing rates
- Provided the following assumptions for calculating the milling hours:
 - Billing rate: \$1.01/lb
 - Slab weight: 216 lbs (smallest known weight)
 - Slabs processed per day: 25
 - Milling hours per day: 10
 - Highest billing year: 1956 – \$138,246

SC&A January 14, 2020 Response (cont.)

- Calculated billing rate using these assumptions:

- $\frac{\$138,246 \text{ per year}}{\$1.01 \text{ per lb}} = 136,877 \frac{\text{lbs}}{\text{year}}$ (maximum)

- $216 \frac{\text{lbs}}{\text{slab}} \times 25 \frac{\text{slabs}}{\text{day}} = 5,400 \frac{\text{lbs}}{\text{day}}$

- $\frac{136,877 \text{ lbs per year}}{5,400 \text{ lbs per day}} = 25.3 \frac{\text{days}}{\text{year}} = 253 \frac{\text{hours}}{\text{year}}$

- Assumptions are believed to place a plausible upper bound on the number of rolling hours

Work Group Discussion February 4, 2020

- Work group agreed that intakes can be bounded and closed the SEC aspect of the issue (transcript p. 35)
- Focused on the variability of the input numbers used in the rolling calculation
- NIOSH agreed to provide a summary of the available data for the rolling hours calculation

NIOSH Response to Request for Additional Information for Finding #1

NIOSH Response Paper- Additional Information in Response to SEC-00247 ER Review Finding #1

- Sent to the Work Group on March 27, 2020
- Reviews the history of the Finding
- Provides summary of the available Superior Steel Co. information to support the uranium rolling hours calculation
- Provides an approach that uses all the available data in the uranium rolling hours calculation

Formula for Rolling Time

$$\frac{\text{Annual Payment} \left(\frac{\$}{\text{year}} \right)}{\left[\text{Billing Rate} \left(\frac{\$}{\text{lb}} \right) \right] \times \left[\text{Slab Weight} \left(\frac{\text{lb}}{\text{slab}} \right) \right] \times \left[\text{Slabs rolled} \left(\frac{\#}{\text{day}} \right) \right]} \times \left[\text{Time} \left(\frac{\text{h}}{\text{day}} \right) \right]$$

Calculation Type	Annual Payment (\$/year)	Billing Rate (\$/lbs)	Slab Weight (lbs)	Slabs Rolled (#/day)	Time (h/day)	Rolling Hours (h/year)
Maximize	\$138,246	\$1.01	198	10	10	691
Minimize	\$38,677	\$1.01	533	50	10	14

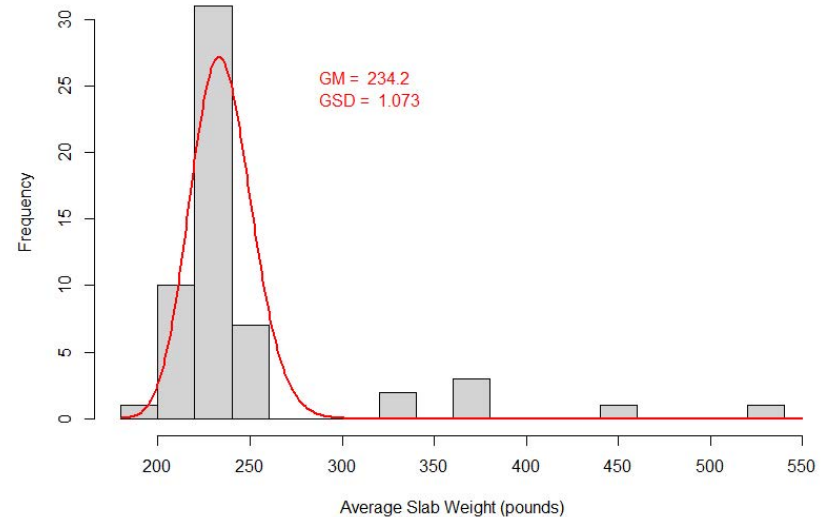
Annual Payment

- SRDB Ref ID 161092 (p. 24) provides the payments made to Superior Steel Co as of 6/30/1957
- Simulation input = randomly sample the 4 annual payment values

Fiscal Year	Amount
1954	\$46,294
1955	\$38,677
1956	\$138,246
1957	\$54,632

Slab Weight

- Table 2 provides 56 average slab weights based on information in several SRDB documents
- Simulation input = **lognormal distribution** of the average slab weights
 - **GM = 234.2**
 - **GSD = 1.073**



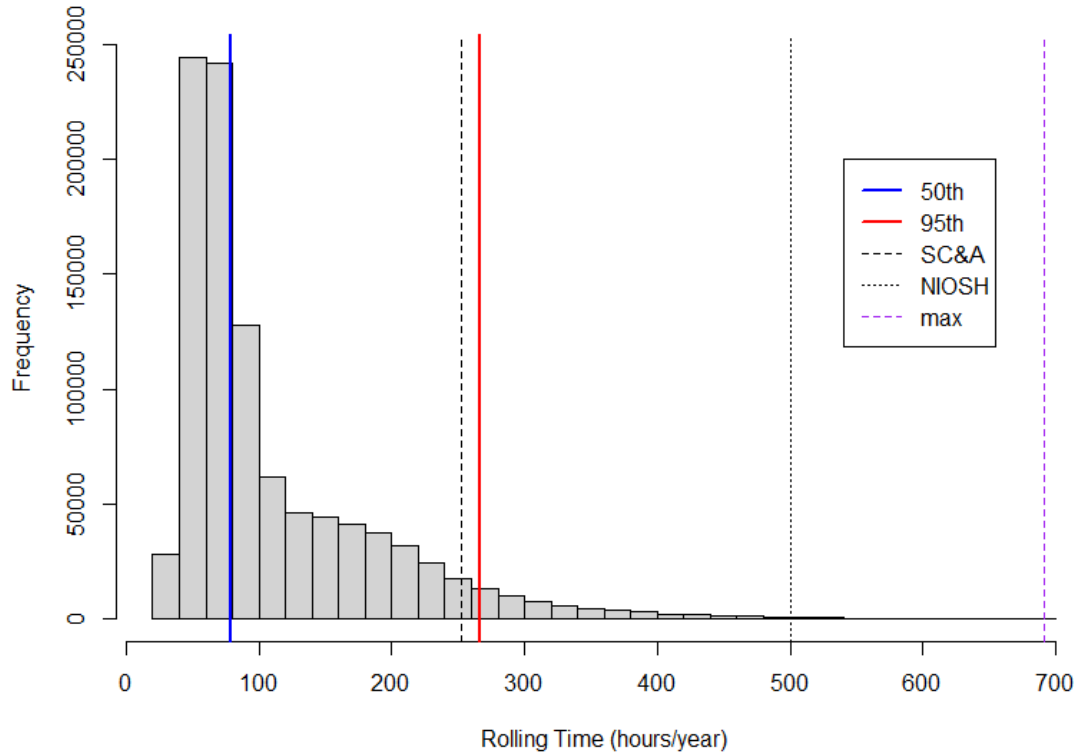
Slabs Rolled

- Table 1 in response paper provides a compilation of data from 6 different SRDB documents
- Simulation input = triangular distribution
 - Lower limit = **minimum** average # of slabs rolled in a day = **10**
 - Upper limit = **maximum** average # of slabs rolled in a day = **50**
 - Mode = **weighted average** # of slabs rolled in a day = **28.14**

Simulation for Rolling Time Distribution

- Randomly sample from each of the input variables
 - 4 known annual payments
 - Triangular distribution for the # of slabs
 - Lognormal distribution for the slab weights
- Calculate the number of rolling hours
- Repeat 10^6 times

Distribution for Rolling Time



Percentile	Rolling Time (h/year)
50 th	78
95 th	267

Conclusion

- Variability in input values leads to a large range for the possible calculated rolling time in hours per year
- Simulation used all available data to determine a distribution for the rolling time
- NIOSH proposes using the 95th percentile of the rolling time distribution **267 h per year** as the rolling exposure time