



Review of NIOSH's Program Evaluation Report DCAS-PER-072, "Seymour Specialty Wiring Company"

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Subcommittee for Procedure Reviews

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DCAS-PER-072 purpose

Address the impacts on previously completed cases of issuing in 2015 revision 01 to Appendix CD of Battelle-TBD-6000 (TBD-6000), the technical basis document (TBD) for Seymour Specialty Wire Company.

Seymour background

- ◆ Bridgeport Brass Company performed radiological work in two locations:
 - Adrian Plant (Adrian, MI) and Havens Laboratory (Bridgeport, CT)
- ◆ In May 1962, Atomic Energy Commission (AEC) approved the relocation of Havens Laboratory operations to Seymour, CT
 - Seymour Specialty Wire Company
- ◆ In 1964, all Bridgeport Brass work consolidated and moved to Ashtabula, OH, as Reactive Metals, Inc. (Extrusion Plant)
- ◆ AEC work at Seymour included extrusion, machining, and metallurgical laboratory analysis of uranium rods



Seymour timeline

- ◆ EEOICPA covered period from May 15, 1962, to October 21, 1964
- ◆ Residual period from October 22, 1964, through 1993

Subtask 1: Changes necessitating program evaluation report (PER)

Revision 01 of Appendix CD included changes based on revisions to TBD-6000

- ◆ Changes to the prescriptive dose estimate, which include the use of additional bioassay data for occupational internal dose and the use of external dosimetry data from Havens Laboratory for occupational external dose
- ◆ Changes to the residual period dose estimates

Subtask 2: Assess corrective action methods

- ◆ SC&A's 2024 review of PER-072 includes an evaluation of Appendix CD, revision 01, for its guidance on dose reconstruction
- ◆ Appendix CD has not been previously evaluated by SC&A

DCAS-PER-061: Bridgeport Brass Company

- ◆ [SC&A reviewed DCAS-PER-061](#) for Bridgeport Brass Company in 2017, which included a TBD review
- ◆ Resolution of issues from this review may impact dose estimates for Seymour

Occupational external dose

- ◆ NIOSH did not find any dosimetry data for Seymour
- ◆ Because Havens Laboratory operations moved to Seymour, NIOSH used the 95th percentile external dose estimates from Havens Laboratory
 - 1.225 rem/year gamma; 2.932 rem/year beta
- ◆ SC&A agrees with NIOSH's reasoning for assigning the 95th percentile external dose from Havens Laboratory to Seymour

Observation 1

Missing guidance on the energy ranges for assigned doses

- ◆ Appendix CD does not provide guidance on the energy ranges to use for assigning doses
- ◆ SC&A assumes photons assigned as 30–250 keV
- ◆ SC&A believes the document would benefit from the addition of this information

Observation 2

Discussion needed on the presence of industrial radiography at the site, and potential dose to workers

- ◆ References made in the Bridgeport Brass TBD (2013), the Extrusion Plant TBD (2017), and the Seymour 1963 monthly progress reports in SRDB 26768 indicate that industrial radiography was used at the site
- ◆ Use of radiography at the Havens Laboratory was discussed in the September 28, 2017, Subcommittee for Dose Reconstruction Reviews meeting
- ◆ SC&A believes that Appendix CD would benefit from a discussion of the potential external extremity dose to workers

Residual period external: Beta/gamma

- ◆ Maximum contact beta/gamma measurement from long, thin crack on the concrete floor in 1977 survey, confirmed in 1980 survey
 - NIOSH assumed line source, 1-meter corrected dose rates of 0.0175 and 0.011 mrad/hour
- ◆ Contact beta/gamma measurements from 1964 surveys were more extensive, NIOSH assumed a circular source
 - Used average measurement from each of the 1964 surveys and the average area of the rooms surveyed to calculate 1-meter corrected dose rates of 0.0174 and 0.0214 mrad/hour
- ◆ NIOSH used the highest of the four calculated 1-meter beta/gamma dose rates, rounded up to 0.022 mrad/hour

Residual period external dose estimate

- ◆ 1980 survey's maximum 1-meter gamma-only dose rate was 0.010 mR/hour
 - 1-meter beta dose rate assumed to be 0.012 mrad/hour
- ◆ Assumed 2,000 hours per year
 - 20 mR/year gamma; 24 mR/year beta

SC&A comments on residual period external dose

- ◆ Matched NIOSH's calculated maximum 1-meter beta/gamma dose rates from 1977 and 1980 surveys
- ◆ Closely matched NIOSH's calculated 1-meter beta/gamma dose rates from 1964 surveys
- ◆ Data from 1992 Formerly Utilized Sites Remedial Action Program (FUSRAP) survey should also be considered
 - Discussed in observation 6

Observation 3

The method used to calculate the residual period external dose may not be bounding

- ◆ Unclear why NIOSH used maximum measurements from 1977 and 1980 surveys, yet used an averaged dose rate measurement and average room size from the 1964 surveys
- ◆ Revision 01 of Appendix CD says the 0.022 mrad/hour estimate is bounding, but this value was calculated using averages
- ◆ May be more claimant favorable to use maximum measurements from 1964 surveys
- ◆ If potential for overtime exists at the site, may need to adjust calculations

Occupational medical dose

- ◆ No site-specific guidance for Seymour occupational medical dose
- ◆ Use ORAUT-OTIB-0006 to assign occupational medical dose
- ◆ SC&A agrees with the guidance of using ORAUT-OTIB-0006 in the absence of site-specific information

Internal dose estimate

- ◆ Uranium urinalysis samples collected 14 times from 25 employees
- ◆ NIOSH calculated uranium intakes for 21 employees for types M and S uranium
 - Four employees excluded who had no or one positive urinalysis result
 - Excluded one high measurement
 - NIOSH then calculated geometric mean and geometric standard deviation of the intakes for each solubility type

SC&A comments on internal dose estimate

- ◆ Reviewed urinalysis results from 1962 to 1964 in SRDB 9885 and 9895
 - Agrees with NIOSH’s determination to exclude 4 employees with one or no positive results
 - Agrees with NIOSH’s determination to exclude the erroneously high result
 - Subsequent bioassay did not confirm a high intake
- ◆ SC&A able to verify most of the urinalysis data in Appendix CD, table 1
 - Refer to finding 1

Finding 1

Urinalysis results duplicated in analyses of occupational internal dose

- ◆ Unable to locate urinalysis record from 2/11/64
 - 1/10/64 record has “date sent” of 2/11/64
 - Data in Appendix CD same for these two dates except for one entry
- ◆ SC&A believes the 1/10/64 data were included twice
 - Calculated uranium intakes may need revision
- ◆ Revision 0 of appendix CD (2007):
 - “The number of sampling occasions that occurred in the approximately two-year period of operation were **13 sets of urine samples**” (emphasis added)

Observation 4

Discussion needed on the potential presence of recycled uranium and internal dose estimates from contaminants

- ◆ Bridgeport Brass TBD states that recycled uranium might have been processed at Havens Lab after 1952
 - Recycled uranium likely was handled at Seymour
- ◆ TBD-6000 states that in the absence of definitive information about the origin of processed uranium, assume uranium contains contaminants from recycled uranium
- ◆ SC&A believes appendix CD should discuss the possibility of recycled uranium, and if necessary, include internal dose estimates for those radionuclides

Observation 5

Discussion needed on the presence of thorium onsite

- ◆ SRDB document 9895 contains two liquid waste samples alluding to thorium processing at Seymour
 - “thorium coolant from Do-All” and “thorium chips and coolant from Do-All”
- ◆ A November 1963 telegram in SRDB 26494 appears to be a telegram from Seymour employee confirming dimensions for the extrusion of a thorium rod
- ◆ SC&A believes Appendix CD would benefit from a discussion of the presence of thorium and its impact on dose reconstruction estimates and feasibility

Residual period internal dose estimate: Inhalation

- ◆ NIOSH used maximum removable contamination level of 112 dpm/100 cm² from survey after operations left Seymour, CT
 - Highest value of four surveys from 1964 through 1980
- ◆ Assumed exposure for 2,000 hours/year, and a resuspension factor of 1 E-05
- ◆ Inhalation rate of 0.736 dpm/calendar day

Residual period internal dose estimate: Ingestion

- ◆ NIOSH used the 112 dpm/100 cm² from survey after operations left Seymour, CT
- ◆ Assumed exposure for 2,000 hours/year, and an ingestion factor of 1.1 E-04 m²/hour
- ◆ Ingestion rate of 6.75 dpm/calendar day

SC&A comments on internal dose estimates

- ◆ Reviewed a 1965 “Follow-up Survey” (SRDB 10851) and confirmed that 112 dpm/100 cm² was highest removable contamination measurement of surveys from 1964 through 1980
- ◆ SC&A was able to match NIOSH’s calculated inhalation and ingestion rates
- ◆ Reviewed a 1993 survey report of the site (SRDB 10847), which contains 1992 FUSRAP survey results from the site
 - Survey not discussed in revision 01 of Appendix CD
 - Some results are higher than 112 dpm/100 cm²

Observation 6

1992 FUSRAP survey and results not discussed in revision 01 of Appendix CD

- ◆ Survey results included measurements higher than the maximum removable contamination value reported in Appendix CD, revision 01
- ◆ It is unclear why this survey was not discussed in revision 01, and SC&A believes NIOSH should take this survey into consideration for the residual period dose calculations

Subtask 3: PER selection criteria

- ◆ All completed claims with verified employment at Seymour with a probability of causation (POC) less than 50%
 - 8 claims
- ◆ Two claims used revision 01 of Appendix CD already and were removed from further evaluation
- ◆ One claim had employment at another site, and changes to Appendix CD were evaluated under the PER for the other site
- ◆ Five claims remaining for reevaluation

NIOSH's evaluation of impacted claims

- ◆ Five claims reevaluated using revision 01 of Appendix CD
 - All claims had POC below 45%
- ◆ SC&A agrees with NIOSH's selection criteria and that all potentially affected claims were captured
- ◆ PER was conducted in a timely manner
 - Revision 01 of Appendix CD issued in April 2015
 - PER-072 issued in July 2016

Subtask 4: Audit of reevaluated DRs

SC&A recommends that the Board select one of the five cases evaluated by NIOSH

- ◆ Ideally with employment in the operational period and residual period, if possible



Questions?