



# Review of NIOSH's Program Evaluation Report DCAS-PER-067, "Allegheny Ludlum Appendix Q Revision"

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# DCAS-PER-067 purpose

Address the impacts of issuing revision 1 of Appendix Q to Battelle-TBD-6000 (TBD-6000) for Allegheny Ludlum Steel Plant (AL) on previously completed cases

# AL background

- ◆ AL rolled solid uranium rods for AEC in 1951 and 1952
- ◆ Additional metalworking activities included straightening, lathe work, cutting with shears, and stamping
- ◆ Total of 16 discrete rolling campaigns
- ◆ A salt bath furnace was introduced December 1, 1951
  - reduced oxidation of the uranium
  - reduced the amount of airborne uranium



# AL timeline

- ◆ EEOICPA covered period from 1951 to 1952
- ◆ No residual period after 1952

# Observation 1

## **Incorrect date for end of Atomic Weapons Employer (AWE) operational period**

- ◆ When discussing the lack of a residual period, section Q.6 of Appendix Q, rev. 1, appears to incorrectly give the date of the end of operations as 1951 when it should be 1952.

# Subtask 1: Changes necessitating PER

- ◆ Revision 1 of Appendix Q eliminated job categories so that the same estimate is used for all employees
- ◆ More details about rolling campaigns included in revision 1
- ◆ Inhalation intakes increased for many of the former job categories
- ◆ Ingestion intakes and external dose estimates increased for all former job categories

## Subtask 2: Assess corrective action methods

- ◆ SC&A's review of PER-067 focused on the changes in rev. 1 of Appendix Q
- ◆ The review included an evaluation of Appendix Q guidance on internal and external dose reconstruction
  - Neither version of Appendix Q had been previously evaluated by SC&A

# Additional rolling campaign information

- ◆ NIOSH located additional dates and information for uranium rolling campaigns in 1951 and 1952
  - Rolling campaign information is summarized in table Q.1 of Appendix Q, revision 1

# SC&A comments on rolling campaigns

- ◆ Table Q.1 of Appendix Q states that the first rolling campaign on January 20, 1951, rolled 25 ingots
- ◆ SC&A reviewed SRDB document 10885 and found information to suggest that a total of 40 ingots were rolled on this campaign
- ◆ Dose estimate calculations in Appendix Q are based on air concentration data and are not dependent on the number of ingots rolled on a given workday, so this potential discrepancy does not affect the dose estimates

## Observation 2

### **Discrepancy in the number of ingots rolled during January 20, 1951, campaign**

- ◆ There appears to be a discrepancy in the number of ingots rolled during the first rolling campaign. However, it is SC&A's understanding that this does not affect the intake estimates.

# Uranium air concentration data

## Pre-salt-bath time period

- ◆ Before 12/1/1951
- ◆ Based on air monitoring data from rolling campaigns on 1/21/1951 and 7/22/1951
- ◆ Geometric mean (GM) of 291 dpm/m<sup>3</sup>

## Post-salt-bath time period

- ◆ 12/1/1951 and after
- ◆ Based on air monitoring data from one rolling campaign on 2/9/1952
- ◆ GM of 20.5 dpm/m<sup>3</sup>

# Calculating inhalation intakes

- ◆ Job categories eliminated, inhalation intake rate the same for all workers
- ◆ NIOSH assumed 8.8-hour workday
- ◆ For non-rolling days, NIOSH assumed the higher airborne activity concentration of 291 dpm/m<sup>3</sup> was allowed to deposit for 30 days at a rate of 0.00075 m/s, with a resuspension factor of 1E-05.

# SC&A comments on inhalation intakes

- ◆ Confirmed that inhalation intake rate is not dependent on claimant's job title
- ◆ Unclear how inhalation intakes would have been assigned using rev. 0 of Appendix Q; therefore, it is difficult to determine if the inhalation intakes using rev. 1 are, in fact, higher for most of the former job categories
- ◆ SC&A able to match NIOSH's calculations for the GM uranium air concentrations
- ◆ SC&A also confirmed NIOSH used the guidance from section 3.4.2 of TBD-6000 to calculate deposited surface contamination

# Consistency with air concentration data

SC&A searched for other AWE sites with a similar operational history as AL to determine if uranium air monitoring data are used consistently between similar AWE sites

- ◆ Bliss and Laughlin Steel is a similar site

# Uranium air concentration data – comparison to Bliss and Laughlin

- ◆ Bliss and Laughlin (BL) also performed uranium rod machining and straightening from 1951 to 1952
  - Appendix D of TBD-6000
- ◆ Appendix D analyzed 13 breathing zone (BZ) samples and 7 general area air samples for intake calculations
  - GM of 2,602 dpm/m<sup>3</sup>
- ◆ GM of 2,602 dpm/m<sup>3</sup> much lower than 5,480 dpm/m<sup>3</sup> from TBD-6000, table 7.5
- ◆ Because of the limited number of air samples, NIOSH used the air concentration from TBD-6000 to determine inhalation and ingestion intakes for BL, as it was determined to be more claimant favorable

# Representativeness of AL air monitoring data

- ◆ Smaller proportion of AL air monitoring samples were BZ
  - 5 out of 43 samples in 1951
  - 0 out of 48 samples in 1952
- ◆ Unclear if available samples represent the full range of uranium air concentrations encountered by AL workers
- ◆ AL values of 291 dpm/m<sup>3</sup> and 20.5 dpm/m<sup>3</sup> are significantly lower than values in TBD-6000 and those used for BL

# Observation 3

## **Inconsistency with NIOSH's approach to calculating uranium intakes from air sampling data**

- ◆ The methods to utilize air sampling data for the purpose of reconstructing uranium intakes are different between two uranium rolling sites (AL and BL)
- ◆ SC&A requests clarification on the different approaches

# Calculating ingestion intakes

- ◆ PER-067 states ingestion intakes in rev. 1 increased for all former job categories
- ◆ NIOSH used OCAS-TIB-009 to calculate ingestion intakes
  - Stated that this approach would likely overestimate the actual ingestion intake, as TIB-009 assumes operations occurred often enough for airborne contamination levels to reach a maximum
- ◆ NIOSH calculated an ingestion intake of 39.9 dpm/calendar day
  - Used air concentration of 291 dpm/m<sup>3</sup>, factor of 0.2 from TIB-009, and converted to per calendar day

# SC&A comments on ingestion intakes

- ◆ Confirmed rev. 1 ingestion intakes are higher than those for various job categories in rev. 0
- ◆ 0.2 adjustment factor from TIB-009 assumes an 8-hour work day
  - AL inhalation intake calculations assume an 8.8-hour work day
  - SC&A believes ingestion and inhalation intake assumptions should be consistent
- ◆ Correcting for an 8.8-hour work day results in a 1.7 dpm/calendar day increase in ingestion intake rate

## Observation 4

### **Assumed work day length for ingestion calculations inconsistent with assumed work day length for inhalation calculations**

- ◆ TIB-009 factor is based on an 8-hour day and that it would be appropriate for consistency to modify the TIB-009 factor to the 8.8 hours per day assumed for AL
- ◆ However, the slightly lower calculated intake is offset by the other conservative assumptions in the ingestion model

# External dose estimate

- ◆ PER-067 states external dose estimates increased in rev. 1
- ◆ No external dosimetry records found for AL
- ◆ Rev. 1 uses TBD-6000 to estimate external dose at AL from U metal
  - Assumes operators exposed to TBD-6000 1-foot dose rates 50% of the time
  - Assumes hands and forearms exposed to TBD-6000 contact dose rates 50% of the time
- ◆ Also includes external dose from deposited residual contamination
  - Uses conversion factors from TBD-6000, workers exposed 100% of each work day

# SC&A comments on external dose

- ◆ Confirmed that external dose increased in rev. 1
- ◆ Confirmed NIOSH used the 1-foot photon dose rate from a rectangular ingot from TBD-6000, table 6.1
  - Assumed the beta dose rate is 10 times higher, per section 6.3 of TBD-6000
- ◆ Confirmed the contact beta dose rate came from section 6.3 of TBD-6000
- ◆ Confirmed the assumed fractions of time workers exposed to 1-foot and contact dose rates from metal are consistent with TBD-6000 guidance
- ◆ Confirmed the calculations for exposure to deposited contamination
  - Used factors from table 3.10 of TBD-6000 and assumed workers exposed for 8.8-hour days

# Occupational medical dose

- ◆ No information specific to AL was found in rev. 1 of Appendix Q
- ◆ Unchanged guidance to refer to ORAUT-OTIB-0006, rev. 04, for assigning occupational medical dose in dose reconstructions
- ◆ SC&A agrees with the guidance to use OTIB-0006 in the absence of AL-specific information

## Subtask 3: PER selection criteria

- ◆ All completed claims with verified employment at AL with a probability of causation (POC) less than 50%
  - 26 claims
- ◆ One claim used rev. 1 of Appendix Q already and was removed from further evaluation
  - 25 claims

# NIOSH's evaluation of impacted claims

25 claims reevaluated using rev. 1 of Appendix Q

- ◆ 23 claims POC below 45%
- ◆ 2 claims POC greater than 52%
- ◆ NIOSH requested the return of the 2 claims from U.S. Department of Labor

## Subtask 4: Audit of reevaluated DRs

SC&A recommends that the Board select two cases of the 25 evaluated by NIOSH

1. One case involving a worker whose employment includes rolling campaigns with and without a salt bath
2. One case involving a worker whose previous job category (such as administrative) in the old dose reconstruction (DR) led to a lower intake



# Questions?