Carborundum Work Group Site Profile Issues

ABRWH Meeting

Redondo Beach, California

December 2018

Work Group Members

- Genevieve S. Roessler, Chair
- Bradley P. Clawson
- R. William Field

Carborundum Company

- Located in Niagara Falls, New York
- Atomic Weapons Employer: June –Sept. 1943, 1959–1967
- Residual Radiation: 1943–1958, 1968–1992

SEC Petition 00223

- Petition to add a class from 1943 through 1976. NIOSH recommended the petition be denied.
- During the March 22, 2017, Advisory Board meeting the Carborundum Work Group recommended the SEC petition be denied.
- The Board voted and agreed with the recommendation.
- The Work Group reported that some site profile issues remain unresolved.
- The Work Group was convened on December 4, 2018, to discuss the open site profile issues.

Additional Reviews

- On August 3, 2018, NIOSH issued a whitepaper that provided updated external dose estimates from plutonium work.
- On August 16, 2018, NIOSH issued a whitepaper that provided the status on all previous review comments and proposed resolutions for open comments. Nine open site profile issues were identified.
- SC&A issued memoranda of their review of the whitepapers on November 27 and 28, 2018.
- The Work Group was convened on December 4, 2018, to discuss the open site profile issues.

Site Profile Issues 1 & 2

- Dose from X Ray Diffraction
  - SC&A recommended adjustments to the NIOSH exposure model.
  - NIOSH revised the model and provided additional calculations.
  - The Work Group concurred with the changes.
- Use of Surrogate Data
  - SC&A commented that the beta dose rates for the 2nd AWE operational period may be overestimated on contact and underestimated at one foot.
  - NIOSH reviewed additional estimates from SC&A and made adjustments to the beta doses for the site profile.
  - The Work Group concurred with the changes.

Site Profile Issues 3 & 4

- Work-Hours in the Residual Period
  - SC&A commented that NIOSH did not use consistent work-hours in calculations of dose in the residual period.
  - NIOSH revised the exposure model calculations to agree with work-hours used in TBD-6000.
  - The Work Group concurred with the changes.
- External Dose Distribution Type
  - SC&A commented that a NIOSH example dose reconstruction had the wrong dose distribution type for 1959 and 1960.
  - NIOSH corrected an error in the spreadsheet used to estimate dose.
  - The Work Group concurred with the change.

Site Profile Issues 5 & 7

- Internal Dose for Glovebox Workers
  - SC&A commented that NIOSH should assign intakes of both uranium and plutonium, not one or the other.
  - NIOSH provided the rationale for how gross alpha data are to be interpreted as either plutonium or uranium.
  - The Work Group agreed with the NIOSH rationale.
- Incorrect Intake Used in Example Dose Reconstruction
  - SC&A commented that one of the NIOSH example dose reconstructions used the wrong intake category.
  - NIOSH acknowledged the error in the example dose reconstruction and noted that no change to the proposed site profile is needed.
  - The Work Group concurred.

Site Profile Issues 8 & 9

- Photon Energy Assumptions for the Residual Period
  - SC&A commented that NIOSH had a small overestimate of photon dose due to using a single energy band for the residual external doses.
  - NIOSH agreed to revise the site profile using the photon energies provided in TBD-6000.
  - The Work Group agreed with the resolution.
- Ingestion Intakes
  - SC&A commented that NIOSH calculations slightly underestimated dose from ingestion.
  - NIOSH agreed and made changes to the calculations.
  - The Work Group concurred with the resolution.

Open Site Profile Issue 6

- External Dose from Plutonium
  - During the SEC Evaluation Report review, SC&A provided comments on the MCNP model used by NIOSH and the source term used in the calculations.
  - NIOSH revised the source term and exposure model to address the SC&A comments.
  - SC&A's November 27, 2018, review of the updated NIOSH exposure model and dose rates resulted in three Findings that require additional review by NIOSH.

Issue 6, Finding 1 and 2

- External Dose from Plutonium, cont.
  - Finding 1: SC&A commented that the factors NIOSH used to convert photon fluence to ambient dose equivalent from ICRP 74 should be changed.

    Issue: ICRP Report 74 provides two sets of factors that provide relatively small differences in dose estimates. NIOSH is reviewing the issue.

  - Finding 2: Source bias settings in MCNP resulted in errors.

    Issue: NIOSH used MCNP version 6.1, which has a calculation bug that was not corrected in the simulation set up by NIOSH. NIOSH plans to rerun the simulations using MCNP version 6.2, which corrects the bug.

Issue 6, Finding 3

- External Dose from Plutonium, cont.
  - Finding 3: The geometry settings in the MCNP simulation was set such that the dosimeter used to estimate dose was partially shielded.

    Issue: The NIOSH MCNP model had geometry settings such that the plutonium pellets were located in the most likely location, the glovebox work surface. The dosimeter location was one foot away outside the glovebox, as desired. Those MCNP settings were such that the dosimeter was partially shielded by the floor of the glovebox. SC&A provided results of a calculation indicating that if the source and dosimeter was changed to a higher location, in front of the glovebox access ports, the dose estimates are higher because the dosimeter is not partially shielded by the floor of the glovebox. NIOSH is reviewing this issue.

Work Group Conclusions

- NIOSH and SC&A need to settle on the appropriate MCNP settings for issue 6. This is largely technical, related to model mechanics and variables, and there is agreement in general.

- The Work Group agrees with all other resolutions and recommends the Board conclude this site profile review, although it will remain involved until a new site profile is issued.

Questions?