TBD-6000 Work Group

Report on
SEC Petition 00105 for
General Steel Industries

Paul L. Ziemer, WG Chair

December 11, 2012

Time Line for Sources at GSI

- Jan. 1, 1953: Beginning of Operational Period
- Mar. 7, 1962: Original AEC license application (Co-60 Sources procured May 21, 1962)
- June 30, 1966: End of Operational Period
- July 1, 1966 – December 31, 1992: Residual Period
- Jan. 1, 1993 – Dec. 31, 1993: DOE Clean-up Period

Action at September 2012 Board Meeting

- It was reported that both NIOSH and SC&A felt that it would make sense to review other data sets involving uranium metal handling to ascertain whether there was “better” surrogate data for the GSI situation.
- The Board asked NIOSH to examine possible alternate surrogate data sets (followed by SC&A review) for determination of the internal dose component for both the operational and residual periods.
- The Board did not take action on SEC Petition 00105, but rather deferred action until the next full Board meeting (December 2012)

Work Group Meeting Nov. 28, 2012

- WG reviewed NIOSH proposal for air sampling at AWE sites that represented the handling of uranium in various forms.
- WG reviewed SC&A evaluation of the NIOSH proposal.
- WG received additional comments from site expert and the petitioner; also had written comments from co-petitioner.
- NIOSH agreed to some modifications suggested by SC&A.
- WG acted on the proposed use of the air sampling data for the operational and residual periods.
- WG voted on the overall NIOSH recommendation on SEC Petition 00105.
- WG confirmed that all SC&A findings on Petition 00105 had either been closed or transferred to Appendix BB as non-SEC issues.

Recommendations from Work Group Meeting Nov. 28, 2012

- WG recommends that the Board accept the NIOSH proposal that it can reconstruct internal dose for the operation and residual periods and that the surrogate data criteria have been met. (Vote: 4 Ayes, 0 Nays)
- WG recommends that the Board accept the NIOSH proposal that it can reconstruct dose for the “earlier” part of the operational period, January 1, 1953 to April 18, 1962. (Vote: 3 Ayes, 1 Nay)
- WG recommends that the Board accept the NIOSH proposal that it can reconstruct dose for the “later” operational period, April 19, 1962 to June 30, 1966 (Vote: 3 Ayes, 0 Nays, 1 Abstention)
- WG recommends that the Board accept the NIOSH proposal that it can reconstruct dose for the residual period, July 1, 1966 to December 31, 1992. (Vote: 4 Ayes, 0 Nays)

Reminders from Presentation at Santa Fe Meeting
June 20, 2012

Background information on SEC Petition 00105

- **Submitted February 25, 2008**
- **Qualified for evaluation May 15, 2008**
- **Evaluation Report issued by NIOSH on October 3, 2008**
- **SC&A Review of NIOSH Evaluation Report of SEC Petition 00105 issued July 24, 2009**

Proposed and Evaluated SEC Class

- **Petitioner proposed class definition:**

  "All individuals who worked in any location at the General Steel Industries site, located at 1417 State Street, Granite City, Illinois, from January 1, 1953 through December 31, 1966, and/or during the residual period from January 1, 1967, through December 31, 1992."

- **Class evaluated by NIOSH:**

  "All individuals who worked in any location at the General Steel Industries site, located at 1417 State Street, Granite City, Illinois, from January 1, 1953 through June 30, 1966, and/or during the residual period from July 1, 1966, through December 31, 1992."

Issues Resolution

- **Issue 1: Lack of radiation monitoring data for 1953 – 1963**
  - Concern about specific incidents
  - Concern about assumptions for reconstructing doses from radium sources
  - Concern about training, monitoring, and other controls during the early period
  - **NIOSH and SC&A agreed that doses could be bounded based on source size information and reasonable assumptions concerning work practices.**
  - **WG voted 2-1 not to recommend SEC status for early period on the basis of this issue.**

Issues Resolution

- **Issue 2: Incomplete Monitoring of Workers, 1964 -1966**
  - Film badges provided only for betatron workers and radiographers
  - No FB's used outside the betatron building

  - **NIOSH developed model for bounding doses to individuals working outside betatron room. SC&A agreed that doses could be reconstructed during this period.**

Issues Resolution

- **Issue 3: Lack of Documentation**
  - Original concern dealt with lack of information on isotopic radiography sources, lack of information on monitoring data, and lack of evidence of an effective radiation safety program

  - **After identification of sources and additional information on practices, SC&A agreed with NIOSH that bounding can be done**

Issues Resolution

- **Issue 4: Film Badge Dosimetry Dependence on Photon Energy and Exposure Geometry**
  - Concern that FBs under-respond for certain geometries and energies

  - **The modeled doses for betatron workers exceed the maximum FB values, even for the energies and geometries that produce the highest FB readings. SC&A concurred. The WG closed this issue.**

Issues Resolution

- **Issue 5: Lack of Validation of Models of Radiation Exposure to Betatron Operators**
  - Concern that for period when FB reports were available, measured and modeled exposures did not agree

  - **Later models, normalized to the FB data, provided reasonable agreement. Both NIOSH and SC&A agreed that external doses could be bounded with sufficient accuracy through the use of MCNPX simulations. WG closed this issue.**

Issues Resolution

- **Issue 6: Underestimate of External Exposure to Unmonitored Workers**
  - Concern based on early models that focused only on radiographers vs. “non-exposed” plant and office personnel

  ➢ **Current models assign exposures to all workers and include exposures originating from betatron and isotopic sources as well as support activities.**

Issues Resolution

- **Issue 7: Dose Reconstructions Not Based on Best Available Science**
  - Concern was actually an error in calculation plus a difference in model codes used by NIOSH and SC&A

  ➢ **Not an SEC issue. Resolved in later models used by NIOSH and SC&A**

Issues Resolution

- **Issue 8: Incomplete Model Used for Exposure Assessments**
  - Concern was similar to Issue 7 and involved omission of neutron doses in the NIOSH model

  ➢ **Resolution similar to Issue 7**

Issues Resolution

- **Issue 8: Incomplete Model Used for Exposure Assessments**
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  ➢ **Resolution similar to Issue 7**

Issues Resolution

- **Issue 9: Underestimate of Beta Dose**
  - Concern based on neglecting what is known as the Putzier Effect as well as omitting skin dose to those who were not betatron operators.

  ➢ **Putzier effect addressed and to be included in Appendix BB. Skin doses to other workers addressed in most recent NIOSH models**

Issues Resolution

- **Issue 10: Lack of consistency in Assigning External Exposures**
  - Concern focused on an error in NIOSH calculations in its early model.

  ➢ **Not an SEC issue. This item was moved by the WG to Appendix BB in 2010 and subsequently closed.**

Summary of SEC 00105 Issues

- **Issue 1: Closed**
- **Issue 2: Transferred to Appendix BB**
- **Issue 3: Transferred to Appendix BB**
- **Issue 4: Closed**
- **Issue 5: Closed**
- **Issue 6: Transferred to Appendix BB**
- **Issue 7: Transferred to Appendix BB**
- **Issue 8: Transferred to Appendix BB**
- **Issue 9: Transferred to Appendix BB**
- **Issue 10: Closed**