

Summary of Weldon Spring Site Profile Finding and Observation Resolutions

Advisory Board on Radiation and Worker Health

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Work Group Members

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Weldon Spring Plant Activity

- 220-acre site near St. Louis, MO
- Processed uranium compounds 1957–1966
- Plant in standby 1967–1985
 - Remediation period 1985–2002. Removed all radioactive materials and components for offsite disposal.
 - Buried/entombed low-level waste on site with concrete and rock cover.
- Presently a wildlife preserve with monitoring

Highlights of Weldon Spring Site Profile Activity

- Site profile ORAUT-TKBS-0028-1, -2, -3, -4, -5, and -6 (TBD-1 through TBD-6) issued in 2005.
- SC&A initial site profile review issued February 2010 with 28 findings and 9 observations.
- 8 Work Group (WG) meetings during 2010–2012.
- Many revisions to site profile documents through September 2017.
- Advisory Board meeting May 22, 2017:
 - Weldon Spring site discussed.
 - SC&A assigned task to review current TBDs.

Recent Weldon Spring Site Profile Activity

- Summer and Fall 2017:
 - NIOSH issued further revisions of several TBDs.
 - SC&A reviewed NIOSH papers/responses, revised TBDs, and appropriate WG transcripts to determine if the original findings and observations had been resolved.
 - November 2017 – SC&A updated the finding and observation matrices and entered the 28 findings and 9 observations, and their resolution and current status, on the BRS.
- At the February 1, 2018, WG meeting, all 28 findings were closed and 9 observations resolved.

Weldon Spring Findings 1–3

- **Finding 1: Lack of Personnel Contamination and Egress Monitoring** – This will be addressed on an individual basis using DCAS-TIB-0013. Closed by WG May 9, 2011.
- **Finding 2: Inadequate Information Concerning Workers' Status and Exposures for 1967–1984** – This will be addressed on an individual basis; to date, no such cases have arisen. Closed by WG May 9, 2011.
- **Finding 3: Individual Exposures versus Average Exposures** – Concerns with enriched uranium (EU), recycled uranium (RU), etc., addressed in other findings and resolved. Closed by WG February 1, 2018.

Weldon Spring Findings 4–5

- **Finding 4: Recycled Uranium Not Adequately Recognized in the TBDs** – TBDs revised to include RU and associated radionuclides and correct dates of usage. Closed by WG February 1, 2018.
- **Finding 5: Accident/Incident Documentation Not Sufficiently Addressed** – Discussed and clarification provided at September 13, 2011, WG meeting. Closed by WG February 1, 2018.

Weldon Spring Findings 6–9

- **Finding 6: Inconsistence in Frequency of X-ray Exams**
- **Finding 7: Photofluorography Exams Not Adequately Addressed**
- **Finding 8: Lumbar Spine Exams Not Addressed**
- **Finding 9: Use of ICRP 34 Instead of ICRP 74**
- **Resolution of These Findings:**
 - All four of these findings were resolved by use of ORAUT-OTIB-0006 and ORAUT-OTIB-0079.
 - Appropriate revisions were made in TBD-3, Revision 01 of January 30, 2013.
 - All four finding closed by WG February 1, 2018.

Weldon Spring Findings 10–13

- **Finding 10: Lack of Atmospheric Monitoring Data for Operational Period**
- **Finding 11: Insufficient Data for Unmonitored Workers' Internal Environmental Dose**
- **Finding 12: Lack of Validation for Maximum Environmental Dose**
- **Finding 13: The TBD Lacks Sufficient Effluent Data Prior to 1967**
- **Resolution of These Findings:**
 - All four of these findings were resolved by revisions in TBD-4, Rev. 01 of May 17, 2013, which added data for assigning environmental intakes with accompanying text for dose reconstruction.
 - All four findings closed by WG February 1, 2018.

Weldon Spring Findings 14–17

- **Finding 14: Stated Uranium/Thorium/Radium/Lead Ratios Should Be Used with Caution** – Revised TBD-4, Rev. 01 of May 17, 2013, added tables and data on pages 19–22 to resolve this issue. Closed by WG February 1, 2018.
- **Finding 15: Natural Thorium-232 Not Always Negligible** – Revised TBD-4, Rev. 01 of May 17, 2013, page 10, added information that resolved this issue. Closed by WG February 1, 2018.
- **Finding 16: Use of External Environmental Dose from Protracted Fernald Estimated Data** – TBD-4, Rev. 01 of May 17, 2013, Section 4.3, used Weldon Spring data instead of Fernald data to resolve this issue. Closed by WG February 1, 2018.
- **Finding 17: Episodic Releases** – Issue discussed at the September 13, 2011, WG meeting. NIOSH provided information and clarification to resolve this issue. Closed by WG February 1, 2018.

Weldon Spring Findings 18–21

- **Finding 18: Incomplete Assessment of Uranium Decay Products** – TBD-5, Rev. 02 of May 21, 2013, Section 5.2.2, provided data to resolve this issue. Closed by WG February 1, 2018.
- **Finding 19: Incomplete Assessment of Radon Exposure** – NIOSH changed to indoor model with no ventilation with maximum process modeled intake; discussed at June 7, 2012, WG meeting. Equilibrium factor of 0.5 was of concern; sequentially, NIOSH increased it to 0.7 to be conservative. Closed by WG February 1, 2018.
- **Finding 20: Different Solubility Classes Listed for the Same Element** – NIOSH stated that the most claimant-favorable solubility type will be used. Issue was discussed in the January 25, 2011, WG meeting and closed. Revised text in TBD-5, Rev. 02 of May 21, 2013, page 18.
- **Finding 21: Missed Dose and Coworker Data Not Adequately Addressed** – Issue was discussed, resolved, and closed at the May 9, 2011, WG meeting.

Weldon Spring Findings 22–23

- **Finding 22: Cost-Center Codes May Not Be Reliable for Dose Reconstruction** – NIOSH stated at the January 25, 2011, WG meeting that the cost-center code would not be used for dose reconstruction (DR). This issue was resolved and closed at the January 25, 2011, WG meeting.
- **Finding 23: Negative In-vivo Results Do Not Necessarily Indicate Lack of Thorium Uptake** – NIOSH stated at the January 25, 2011, WG meeting that these results would not be used for DR. This issue was resolved and closed at the January 25, 2011, WG meeting.

Weldon Spring Findings 24–25

- **Finding 24: Enriched Uranium Not Sufficiently Addressed –** The use of 1% EU has since been documented in the SRDB, and TBD-5, Rev. 03 of March 14, 2017, uses an EU of 1%. Therefore, the issue has been resolved. NIOSH recently increased the concentration from 0.783 pCi/μg to 0.973 pCi/μg. Therefore, a PER is in progress. Closed by WG February 1, 2018.
- **Finding 25: Shallow and Extremity Doses Not Sufficiently Characterized –** Revised TBD-6, Rev. 01, of February 6, 2013, added Section 6.3.11, which discusses geometry factors and references DCAS-TIB-0013. Closed by WG February 1, 2018.

Weldon Spring Findings 26–28

- **Finding 26: Badging Policy Not Consistent** – This issue was addressed in detail on page 17 of NIOSH’s November 9, 2011, reply to Weldon Spring site profile/SEC issues, and followed by revised text in TBD-6, Rev. 01 of February 6, 2013, Section 6.3.7. Closed by WG February 1, 2018.
- **Finding 27: Lack of Sufficient Coworker Data Development for External Dose** – TBD-6, Rev. 01 of February 6, 2013, revised Table 6-7 and added Table 6-8 to resolve the issue. Closed by WG February 1, 2018.
- **Finding 28: Lack of Documentation and Details for Neutron Doses** – Issue discussed at September 13, 2011, WG meeting. SC&A evaluated results and other DOE site n/p values and found $n/p = 0.1$ reasonable. Closed by WG February 1, 2018.

Weldon Spring Observations 1–4

- **Observation 1: Lack of Coverage of Offsite Activities** – Resolution: Exposures occurring off site are not covered. Resolved per WG February 1, 2018.
- **Observation 2: TBD-3 Equation 3-1** – Symbols in equation may be incorrect. Resolution: NIOSH removed Equation 3-1 from Rev. 01 of January 30, 2013. Resolved per WG February 1, 2018.
- **Observation 3: Application of Environmental Doses** – Clarity needed with wording of when to assign environmental dose. Resolution: TBD-4, Rev. 01 of May 17, 2013, Section 4.1.1, provides correct wording. Resolved per WG February 1, 2018.
- **Observation 4: Special Uranium Curie** – SC&A had questions concerning the equation. Resolution: SC&A analyzed this issue in view of the different TBDs and the associated wording, and agrees with NIOSH and finds the observation resolved. Resolved per WG February 1, 2018.

Weldon Spring Observations 5–7

- **Observation 5: Corrections to Text of TBD-4** – Unit and wording typos. Resolution: TBD-4, Rev. 01 of May 17, 2013, corrected these typos. Resolved per WG February 1, 2018.
- **Observation 6: Years of Thorium Use** – TBD-5, Table 5-2, needed clarification for years of use of thorium. Resolution: Details of thorium exposures have been addressed in other resolved Weldon Spring site profile findings. Resolved per WG February 1, 2018.
- **Observation 7: Changes in Text of TBD-5** –
 - a) Second paragraph on page 10 seems out of place. Resolution: Does not affect DR. Resolved per WG February 1, 2018.
 - b) Incorrect reference on page 12. Resolution: Corrected text in TBD-5, Rev. 02 of May 21, 2013. Resolved per WG February 1, 2018.
 - c) Appears to be incorrect statement concerning MAC-hr on page 36 of TBD-5. Resolution: Different method used in TBD-5, Rev. 02 of May 21, 2013. No longer applicable. Resolved per WG February 1, 2018.

Weldon Spring Observations 8–9

- **Observation 8: Changes in Text of TBD-6 –**
 - a) Table 6-6 contains incorrect symbol for gamma. Resolution: TBD-6, Rev. 01 of February 6, 2013, corrected this text. Resolved per WG February 1, 2018.
 - b) Table 6-6 is not clear when referring to associated figures. Resolution: This does not affect DR. Resolved per WG February 1, 2018.
- **Observation 9: Missing Data in TBD-6 –**
 - a) Table 6-2 contains some blanks for historically recorded dose practices. Resolution: This does not affect DR. Resolved per WG February 1, 2018.
 - b) Table 6-16 beta dose does not provide information for all years of concern. Resolution: Missing data using LOD values will be used for DR. This does not affect DR. Resolved per WG February 1, 2018.

Summary

- All 28 findings have been addressed, resolved, and closed by the WG as of February 1, 2018. The BRS findings for Weldon Spring have been updated.
- All 9 observations have been addressed and resolved by the WG as of February 1, 2018. The BRS observations for Weldon Spring have been updated.