



Review of DCAS PER-083 for the Weldon Spring Plant, Weldon Spring, MO

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Advisory Board on Radiation and Worker Health,
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Weldon Spring site profile, 2013

- ◆ ORAUT-TKBS-0028-3 (TBD-3), occupational medical dose, rev. 01, issued January 30, 2013
- ◆ ORAUT-TKBS-0028-4 (TBD-4), occupational environmental dose, rev. 01, issued May 17, 2013
- ◆ ORAUT-TKBS-0028-5 (TBD-5), Occupational internal dose, rev. 02, issued May 21, 2013
- ◆ ORAUT-TKBS-0028-6 (TBD-6), occupational external dose, rev. 01, issued February 6, 2013
- ◆ DCAS-PER-051, “Weldon Spring Plant,” issued March 4, 2015, to address changes in dose reconstruction (DR) procedures using the revised site profile documents

Weldon Spring site profile, 2017

- ◆ ORAUT-TKBS-0028-4 (TBD-4), occupational environmental dose, rev. 02, issued March 29, 2017
- ◆ ORAUT-TKBS-0028-4 (TBD-4), occupational environmental dose, rev. 03, issued September 8, 2017
- ◆ ORAUT-TKBS-0028-5 (TBD-5), occupational internal dose, rev. 03, issued March 14, 2017
- ◆ ORAUT-TKBS-0028-5 (TBD-5), occupational internal dose, rev. 04, issued August 31, 2017
- ◆ DCAS-PER-083, “Weldon Spring Plant TBD Revision,” issued January 7, 2019, to address changes in DR procedures using the revised site profile documents

Weldon Spring facilities

- ◆ Weldon Spring Plant (WSP), Weldon Spring Quarry (WSQ), and the Weldon Spring Raffinate Pits (WSRP)
- ◆ Referred to as the “Weldon Spring Plant” in general
- ◆ Operated by the U.S. Atomic Energy Commission as a feed materials plant to process uranium and thorium ore by the Uranium Division of Mallinckrodt Chemical Works

Four periods of WSP site operations

1. **Site acquisition and development:** 1954–1957
2. **Operational:** 1957–1966
3. **Post-operational:** 1967–1985. U.S. Department of Defense (DOD), not the U.S. Department of Energy (DOE), controlled:
 - WSP during the post-operational period 1967–1985
 - WSRP and WSQ during 1967–1974
4. **Remediation:** 1985–2002

EEOICPA coverage

- ◆ WSP employment is covered:
 - Operational period (1957–1966)
 - Remediation period (1985–2002)
- ◆ WSQ and WSRP employment is covered:
 - Operational period (1957–1966)
 - Post-operational period (1975–1984)
 - Remediation period (1985–2002)

Radionuclides of dose significance

- ◆ Natural uranium processed 1957–1962
- ◆ After 1962, all uranium is assumed to be enriched to 1%
- ◆ Natural thorium
- ◆ Recycled uranium (RU) was processed beginning in 1961
- ◆ Radon-222 and radium-228 considered to be potentially significant for DR

Internal monitoring

- ◆ **Operational period (1957–1966):** uranium urine bioassays, no records of thorium monitoring
- ◆ **Post-operational period (1967–1985):** no DOE contract personnel bioassay monitoring appears to have been conducted during this period
- ◆ **Remediation period (1985–2002):** extensive bioassay monitoring program was conducted from 1991 to 2001

External monitoring

- ◆ **Operational period (1957–1966):** Employees in radiological areas were monitored. No ambient exposure rates recorded during the operational period.
- ◆ **Post-operational period (1967–1985):** No record of external monitoring for DOE contract personnel. No site surveys until 1982, except for a 1975 aerial radiological survey. Site external ambient exposure monitoring began in 1982.
- ◆ **Remediation period (1985–2002):** Personnel external monitoring was provided during the remediation period.

DCAS-PER-083 for Weldon Spring TBD-4 and TBD-5

- ◆ NIOSH issued rev. 02 and 03 of TBD-4 and rev. 03 and 04 of TBD-5 in 2017.
- ◆ Several technical basis document (TBD) changes could increase the assignment of environmental and internal intakes and resulting doses.
- ◆ Changes include:
 - Consistent use of RU intakes started in 1961, not after 1961
 - Contribution of RU contaminants to internal dose
 - Specific activity of 1% enriched uranium (EU)

SC&A's review of PER-083

- ◆ **February 16, 2023:** The Subcommittee for Procedure Reviews (SPR) tasked SC&A to review DCAS-PER-083, “Weldon Spring Plant TBD Revision”
- ◆ **August 10, 2023:** SC&A issued “A Review of NIOSH’s Program Evaluation Report DCAS PER-083, ‘Weldon Spring Plant TBD Revision’”
- ◆ **September 22, 2023:** SC&A issued rev. 1 of “A Review of NIOSH’s Program Evaluation Report DCAS PER-083, ‘Weldon Spring Plant’”

SC&A's subtask 1 review of PER-083

- ◆ **Subtask 1:** Evaluate changes that necessitated PER-083.
- ◆ SC&A reviewed TBD-4 rev. 02 and 03, TBD-5 rev. 03 and 04, and PER-083.
- ◆ SC&A found that PER-083 addressed the changes in these TBD revisions that could potentially result in increases in internal and external dose assignments.
- ◆ Additional changes in the TBD revisions were for other purposes and did not result in a potential increase in assigned dose.
- ◆ SC&A had no findings or observations for TBD-4 and TBD-5 pertaining to subtask 1.

NIOSH's review of claims under PER-083 for RU in 1961

- ◆ In considering the last TBD revisions, NIOSH reviewed all Weldon Spring Plant claims completed between March and September 2017 concerning RU starting in 1961 versus RU starting after 1961.
- ◆ Only one claim had employment in 1961. NIOSH reviewed the DR for that claim and found that RU intakes were assigned in 1961. Therefore, no further consideration for this issue was necessary.

NIOSH's review of claims under PER-083 for RU and EU

- ◆ NIOSH reevaluated all applicable Weldon Spring claims and reworked the appropriate claims using the revised TBDs.

SC&A's subtask 2 review of PER-083

- ◆ **Subtask 2:** Assess NIOSH's specific methods for corrective action of site profile.
- ◆ SC&A had [previously reviewed](#) rev. 00 of TBD-4 and TBD-5 in 2009.
- ◆ SC&A reviewed rev. 01 of TBD-4 and rev. 01 and 02 of TBD-5 in subtask 2 of their 2023 review of DCAS-PER-051.
- ◆ Rev. 02 and 03 of TBD-4 and rev. 03 and 04 of TBD-5 had not been reviewed by SC&A.
- ◆ SC&A's review of Weldon Spring TBD-4 and TBD-5 included a review of the scientific basis and/or sources of information to ensure the credibility of the corrective action and its consistency with current/consensus science.

SC&A's review of 2017 TBD-4 and TBD-5

- ◆ Determined if the revisions contained technically correct methodology and information.
- ◆ Evaluated appropriate references as needed.
- ◆ Analyzed changes that could decrease or increase assigned dose.
- ◆ Summarized the changes that have the potential to increase assigned dose for TBD-4 (section 3.2.1 of SC&A's report) and for TBD-5 (section 3.2.2).

SC&A's comments on subtask 2

- ◆ SC&A confirmed that the revisions incorporated in the Weldon Spring TBD-4 and TBD-5 were scientifically sound.
- ◆ SC&A finds NIOSH corrective actions to be appropriate since NIOSH reevaluated all applicable Weldon Spring claims and reworked the appropriate claims using the revised TBDs.
- ◆ There are no findings associated with subtask 2.

SC&A's subtask 3 review of PER-083

- ◆ **Subtask 3:** Evaluate the PER's stated approach for identifying the number of DRs requiring reevaluation of dose.
- ◆ NIOSH conducted a search for all claims with employment at any one of the three Weldon Spring facilities in the NIOSH claims tracking system (NOCTS).
- ◆ NIOSH conducted a keyword search of DR reports for the word "Weldon."
- ◆ These searches identified 330 unique claims.

Subtask 3: Removal of DRs not requiring reevaluation of dose

- ◆ NIOSH removed 190 claims for the following reasons:
 - 3 claims: Completed with the current TBDs
 - 126 claims: Had a POC equal to or greater than 50%
 - 51 claims: Pulled from DR, primarily due to inclusion in the Mallinckrodt Special Exposure Cohort (SEC)
 - 7 claims: Active at NIOSH at the time of the search and would be completed using the current TBDs
 - 2 claims: No employment at Weldon Spring. They had been identified because the DR report mentioned Weldon Spring but there was actually no employment there, and the Weldon Spring TBDs were not used to estimate the dose.
 - 1 claim: Met the criteria for the Mallinckrodt SEC and the DR was done prior to the designation of that SEC class. Therefore, it was removed from evaluation under PER-083.

Subtask 3: Evaluation of remaining 140 claims

- ◆ The remaining 140 claims were to be reevaluated under this PER as follows:
 - 2 claims were returned to NIOSH for a new DR (for other reasons) before the evaluation occurred. A new DR for these two claims would be completed using the current revisions of the TBDs. Therefore, the two claims were removed from further consideration under PER-083.
 - 138 claims were reevaluated using the current revisions of the TBDs and all other applicable procedures.

Subtask 3: Results of reevaluation of 138 claims

- ◆ The reevaluation of remaining 138 claims under PER-083 resulted as follows:
 - 129 claims had POC values that remained below 45%.
 - 4 claims resulted in a POC between 45% and 52%. For those claims, the Interactive RadioEpidemiological Program (IREP) was run 30 times at 10,000 iterations per NIOSH procedures. The resulting POC was less than 50% for all four claims.
 - 5 claims resulted in a POC greater than 50%.
- ◆ NIOSH will provide the U.S. Department of Labor (DOL) with the list of all the claims evaluated under this PER. Further, NIOSH will request that DOL return the five claims that would now result in a POC greater than 50%.

Subtask 3: SC&A's evaluation of selection process

- ◆ SC&A found that the selection criteria used by NIOSH for previously completed DRs that required reevaluation under PER-083 are reasonable.
- ◆ SC&A had no findings or observations associated with subtask 3.

SC&A's subtask 4 review of PER-083

- ◆ **Subtask 4:** Conduct audits of a sample set of reevaluated DRs mandated by PER-083.
- ◆ SC&A suggests that 2–3 DR claims from the WSP site during the covered period be selected for a focused review.
- ◆ SC&A suggests that the claims selected should attempt to include the following criteria:
 - Environmental intakes consisting of exposure to EU (1963–1966) and RU (1961–2001) contaminants
 - Internal intakes consisting of exposure to EU (1963–1966) and RU contaminants (1961–2002)

Summary of SC&A's evaluation of site profile

- ◆ SC&A's review of ORAUT-TKBS-0028-4, rev. 02 and 03, identified no findings or observations.
- ◆ SC&A's review of ORAUT-TKBS-0028-5, rev. 03 and 04, identified no findings or observations.

Summary of SC&A's evaluation of PER-083

- ◆ SC&A's review of PER-083 identified no findings or observations.
- ◆ SC&A requests:
 - NIOSH select appropriate claims for review under subtask 4.
 - The SPR task SC&A with the evaluation of selected claims.



Questions?