



SC&A's Review of DCAS-PER-092 for the Weldon Spring Plant, Weldon Spring, MO

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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 operation

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 processed beginning in 1961
- ◆ Radon (Rn)-222 and radium (Ra)-228 considered to be potentially significant for dose reconstruction (DR)

Internal monitoring

- ◆ **Operational period, 1957–1966:** Uranium urine bioassays, no records of thorium monitoring.
- ◆ **DoD 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.
- ◆ **DoD period, 1967–1985:** No record of external monitoring for DOE contract personnel. No site surveys until 1982, except for a 1975 aerial radiological survey.
- ◆ **Remediation period, 1985–2002:** Personnel external monitoring was provided during this period. Site external ambient exposure monitoring began in 1982.

Weldon Spring environmental dose site profile

- ◆ ORAUT-TKBS-0028-4, revision 00, issued June 28, 2005
- ◆ ORAUT-TKBS-0028-4, revision 01, issued May 17, 2013
- ◆ ORAUT-TKBS-0028-4, revision 02, issued March 29, 2017
- ◆ ORAUT-TKBS-0028-4, revision 03, issued September 8, 2017
- ◆ DCAS-PER-083, issued January 7, 2019, to address changes in DR procedures using ORAUT-TKBS-0028-4, revision 03
- ◆ ORAUT-TKBS-0028-4 revision 04, issued March 27, 2020 (“TBD-4”)

DCAS-PER-092 for Weldon Spring TBD-4

- ◆ Issued on March 29, 2021.
- ◆ Addressed changes in DR procedures for Weldon Spring facilities as a result of the issuance of ORAUT-TKBS-0028-4, rev. 04.

TBD-4 rev. 04 changes that could increase assigned doses

- ◆ Environmental intakes of Rn-222 and Ra-228 were added for 1963 through 1966.
- ◆ Uranium (U)-234 intakes were added for the Weldon Spring Quarry for the years 1990, 1991, 1993–1996, and 1998–2001.
- ◆ Onsite ambient gamma doses from 1957 to 1966 were previously applied as a constant value, but rev. 04 included geometric standard deviation values that are to be applied to the lognormal distribution for ambient gamma doses.

SC&A's review of PER-092

- ◆ On February 15, 2022, the Advisory Board on Radiation and Worker Health Subcommittee for Procedure Reviews (SCPR) tasked SC&A to review DCAS-PER-092, “Weldon Spring Plant”
- ◆ On June 9, 2022, SC&A issued “A Review of NIOSH’s Program Evaluation Report DCAS-PER-092, ‘Weldon Spring Plant’”

Subtask 1: Identify the circumstances that necessitated PER-092

- ◆ PER-092 addressed the changes in revision 04 of the site profile that could potentially result in increases in internal and external dose assignments.
- ◆ These changes included:
 - Addition of Rn-222 and Ra-228 for 1963–1966
 - U-234 intakes added for WSQ for certain years during 1990–2001
 - Use of lognormal distribution for external ambient doses for 1957–1966

Subtask 1: SC&A evaluation of changes that necessitated PER-092

- ◆ SC&A reviewed TBD-4 rev. 04 and PER-092.
- ◆ SC&A found that PER-092 addressed the changes in rev. 04 that could potentially result in increases in internal and external dose assignments.
- ◆ Additional changes in rev. 04 were for other purposes and did not result in a potential increase in assigned dose.
- ◆ SC&A had no findings or observations pertaining to subtask 1.

Subtask 2: Assess NIOSH's revision of site profile

- ◆ NIOSH revised ORAUT-TKBS-0028-4 from rev. 03 to rev. 04 to modify the DR methodology to reflect best estimate DR methods and to update radionuclide intake values and intake years.
- ◆ SC&A reviewed TBD-4 rev. 04 and found:
 - The radionuclide intake values were correct and appropriate as a function of the years listed in tables 4-3 and 4-4.
 - The external onsite ambient dose values recommended in tables 4-6 and 4-7 were correctly converted from a continuous exposure of 8,760 hours/year (rev. 03) to 2,500 hours/year (rev. 04).
- ◆ SC&A had no findings about rev. 04 of ORAUT-TKBS-0028-4.

Subtask 2, observation 1: Documentation in site profile

- ◆ SC&A did identify two documentation errors in rev. 04 of ORAUT-TKBS-0028-4:
 - Figure 4-2: This figure is referred to in the next-to-last paragraph on page 14, but it appears that it was omitted in rev. 04 of TBD-4.
 - Table 4-7: Footnote “a” of this table refers to “Table 4-5,” when it should read “Table 4-6.”
- ◆ SC&A’s review of rev. 04 has not previously been presented to the work group or NIOSH. Therefore, this observation remains to be addressed.

Subtask 2: Assess NIOSH's specific methods for corrective action in PER-092

- ◆ SC&A found that PER-092 addressed the changes in rev. 04 that could potentially result in increases in internal and external dose assignments.
- ◆ SC&A had no findings or observations about PER-092.

Subtask 3: Evaluate PER approach for identifying the number of DRs requiring reevaluation of dose

- ◆ NIOSH performed:
 - Search of the NIOSH Claims Tracking System (NOCTS) database for employment at any of the three Weldon Spring sites.
 - Text query using the keyword “Weldon Spring” in DR reports of previously completed claims.
- ◆ The combined search identified a total of 338 cases.

Subtask 3: Removal of DRs not requiring reevaluation of dose

- ◆ NIOSH removed 284 cases from this list for the following reasons:
 - **51 cases:** because they had been “pulled” from DR primarily due to inclusion in the Special Exposure Cohort.
 - **135 cases:** because the previous evaluation of the cases yielded probability of causation (POC) values ≥ 50 percent.
 - **1 case:** because it was returned for other reasons and would be processed using revision 04 of TBD-4.
 - **7 cases:** because they had no Weldon Spring employment or visits during the covered period.
 - **90 cases:** because they were not affected by the changes in the revised TBD primarily; those were monitored individuals for which no environmental dose was assigned.

Subtask 3: Evaluation of remaining cases

- ◆ Dose for the remaining 54 cases was recalculated using revision 04 of ORAUT-TKBS-0028-4 and all other applicable procedures.
- ◆ The resulting POC for all 54 claims was less than 45%.

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

- ◆ SC&A found the selection criteria used by NIOSH for identifying previously completed DRs that required reevaluation under PER-092 are appropriate.
- ◆ SC&A had no findings or observations associated with subtask 3.

Subtask 4: Conduct audits of a sample set of reevaluated DRs mandated by PER-092

- ◆ SC&A suggest that DR cases be selected for review from the WSP site during the covered period. The combination of selected DRs needs to include the requirement of assigning:
 - Environmental intakes of Rn-222 and Ra-228 during all or part of 1963–1966
 - Environmental intake of U-234 at the WSQ during all or part of 1990, 1991, 1993–1996, and/or 1998–2001
 - Onsite external ambient gamma dose during all or part of 1957–1966
- ◆ One, two, or three cases can be selected depending on how many are needed to address the required three dose assignments.

Summary of SC&A's evaluation of site profile

- ◆ SC&A's review of ORAUT-TKBS-0028-4, rev. 04, identified no findings.
- ◆ SC&A did have an observation concerning documentation in the site profile:
 - Figure 4-2 is missing.
 - Table 4-7: footnote “a” needs to be revised.

Summary of SC&A's evaluation of PER-092

- ◆ SC&A's review of PER-092 identified no findings or observations.
- ◆ SC&A does request that NIOSH select appropriate cases for review under subtask 4 and that the SCPR task SC&A with the evaluation of selected cases.



Questions?