



# Review of ORAUT-OTIB-0034, Revision 04

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Subcommittee for Procedure Reviews (SPR)

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# ORAUT-OTIB-0034 (“OTIB-0034”)

- ◆ Title: “Internal Dosimetry Co-Exposure Data for Oak Ridge National Laboratory,” revision 04, issued September 1, 2020
  - Previously titled “Internal Dosimetry Coworker Data for X-10”
- ◆ Provides guidance for calculating and assigning co-exposure intakes for unmonitored Oak Ridge National Laboratory (ORNL) workers based on data from workers with similar exposure potential
- ◆ July 28, 2025, SC&A was tasked to review revision 04
  - Review issued [January 23, 2026](#)

# Review history

- ◆ SC&A reviewed OTIB-0034, revision 00, in 2007 and identified 4 findings
  - These findings were resolved by the SPR and are now closed
- ◆ SC&A reviewed OTIB-0034, revision 01, in 2013 and identified 4 findings
  - Findings 1, 2, and 4 were closed by SPR
  - Finding 3 left in abeyance (also known as OTIB-0034-07)
- ◆ Due to the timing of SC&A's 2013 review and subsequent SPR discussions, some of the changes in revision 02 were evaluated as part of the issues resolution process with the SPR

# Revision 01, finding 3 (finding OTIB-0034-07)

- ◆ Status: In abeyance
  - Wording was agreed upon by SPR but not yet included in an implementation guide
- ◆ DCAS-IG-006, revision 00, was issued March 6, 2020
- ◆ SC&A confirmed that the agreed upon text on using the 95th percentile was included in the revision
- ◆ Recommendation: Close

# Review scope

- ◆ Addresses only changes introduced since prior SC&A reviews of rev. 00 (2007) and rev. 01 (2013) and associated SPR discussions
  - Supplements but does not replace prior reviews
- ◆ Does not address ORAUT-RPRT-0090, revision 01
  - Currently is under discussion by the ORNL Work Group

# Changes to revision 04

- ◆ According to the document publication record, OTIB-0034, revision 04:
  - “Constitutes a total rewrite of the document”
  - Incorporates the “potential and intake rates for type SS plutonium”
- ◆ SC&A’s direct comparison of documents found vast majority of document unchanged
- ◆ SC&A noted changes in the following areas and topics:
  - Type super S (SS) plutonium
  - Additional radionuclides
  - Nomenclature and formatting changes

# Type super S plutonium

- ◆ Historical studies have shown that, in some instances, the rate of removal of plutonium from the lungs was slower than predicted by type S. This phenomenon is known as type SS.
- ◆ The biokinetic model to evaluate the deposition, retention, and removal of inhaled very insoluble type SS is contained in ORAUT-OTIB-0049, revision 02.
- ◆ Previous versions of OTIB-0034 did not include guidance for type SS plutonium.

# Figures and tables added

- ◆ Tables 6-8 and A-12 added to include a co-exposure model for type SS plutonium
- ◆ Figures A-28 through A-31 were also added, which show the fits for type SS material corresponding to each of the subsets of years across the intake period
- ◆ SC&A reviewed these tables and figures and found the modeled fit to be reasonable in all cases

# Additional radionuclides

- ◆ Revisions 00 and 01 used ORNL air monitoring perimeter data to develop the ratios of the isotopic concentration ratios of other radionuclides to the concentration ratio of strontium-90
- ◆ Revision 04 now instructs:
  - Dose reconstructors should use intake mixture ratios in the latest revision of ORAUT-OTIB-0054 (“OTIB-0054”)
  - OTIB-0054 guidance is applicable for workers in the Reactor Division and the Tank Farms areas
  - OTIB-0054 should not be used for workers from the Isotopes Separations Division or Isotope Development Center (Buildings 3030 to 3047)
- ◆ SC&A agrees that it is more appropriate to use OTIB-0054 for fission and activation product mixtures for the Reactor Division than perimeter air monitoring data

# Finding 1: SC&A questions the applicability of OTIB-0054 to the Tank Farms area

- ◆ OTIB-0054, revision 02, explicitly states it does not apply where radionuclides have been **purposely extracted and concentrated** or where waste handling caused **significant alteration to the source term**.
- ◆ Tank Farms accepted and stored waste from chemical separations operations: bismuth-phosphate, reduction-oxidation (REDOX), plutonium-uranium extraction (PUREX), thorium extraction (THOREX), and fluoride chemical processes—all designed to alter the source term.
- ◆ Other research involved isolating americium and curium from irradiated fuels—further calling into question the representativeness of OTIB-0054 data for Tank Farms workers.

# Nomenclature and date clarity changes

- ◆ “Coworker” changed to “co-exposure”
- ◆ Date ranges expanded from generic year ranges to full date ranges
  - Example: 1951–1953 is now January 1, 1951, through December 31, 1953
- ◆ These changes improve clarity but do not have an effect on the doses assigned to workers

# Conclusions and recommended actions

- ◆ Despite being labeled a "total rewrite," most of the guidance was unchanged.
  - No co-exposure model values changed beyond the addition of type SS plutonium.
  - SC&A found the type SS modeling **reasonable and consistent** with methodology used for other radionuclides in OTIB-0034.
- ◆ Close finding OTIB-0034-07 (currently in abeyance).
- ◆ Address finding 1 (open): The National Institute for Occupational Safety and Health should clarify or justify the application of OTIB-0054 to the Tank Farms area.



# Questions?