

# NIOSH Response to SC&A Comments on ORAUT-RPRT-0072

Response Paper

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National Institute for Occupational Safety and Health

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## **INTRODUCTION**

In 2017, the ORAU Team issued ORAUT-RPRT-0072, *Locations of Stable Metal Tritide Use at the Savannah River Site* (ORAUT 2017a). This is an assessment of special metal tritides and internal dosimetric considerations at Savannah River Site (SRS) from 1972 through 1989. In response to ORAUT 2017, SC&A issued *Memorandum: SC&A Comments on ORAUT-RPRT-0072, Revision 00, "Locations of Stable Metal Tritide Use at the Savannah River Site"* (SC&A 2018). In this document, the ORAU Team responds to three specific questions raised by SC&A in their review of ORAUT-RPRT-0072.

## **NIOSH RESPONSES TO SC&A COMMENTS**

**SC&A Specific Question 1:** *Section 2.0, Introduction, notes that the "primary objective of this document is to provide information on the potential sources of stable tritium compounds at SRS" (page 6). Assuming that stable tritium compounds are the same as special tritium compounds (STCs), from a terminology standpoint, it is not clear why organically bound tritium (OBTs) are not also addressed in some fashion in this report. As a key component of STCs, they are addressed in OTIB-0066 and were surveyed in detail by SRS along with SMTs in the early 1990s (e.g., in Howard 2000), with potential OBT exposure sources identified for mercury diffusion pumps and mechanical vacuum pumps, in particular. If only SMTs are being addressed in ORAUT-RPRT-0072, that should be clarified in this section, with some rationale provided for excluding OBTs.*

**NIOSH Response:** Although NIOSH considered Howard 2000 in the development of ORAUT-RPRT-0072, some materials were not included in the report's discussion. NIOSH agrees that ORAUT-RPRT-0072 should have listed OBTs. Nonetheless, dosimetric considerations for OBTs are included in the report. Doses from OBT intakes at SRS will be derived using the guidance in ORAUT-OTIB-0066, *Calculation of Dose from Intakes of Special Tritium Compounds* (ORAUT 2007), and ORAUT-OTIB-0011, *Tritium Calculated and Missed Dose Estimates* (ORAUT 2004).

**SC&A Specific Question 2:** *It is not clear if ORAUT-RPRT-0072 addresses the historical use of lithium deuterio-tritide (LiDT) at SRS. According to a 2000 survey conducted for STCs at the Savannah River Technology Center (Howard 2000, page 6):*

*“The two bench scale development projects that were conducted in 773-A in the past had their tritium in the form of tritiated heavy water (DTO), lithium deuterio-tritide (LiDT), uranium tritide, and tritiated mercury. The quantities of these materials ranged from tens of grams up to a few kilograms.”*

*SC&A did not find lithium deuterio-tritide listed in ORAUT-RPRT-0072, although lithium tritide is identified (are they the same SMTs?). If lithium deuterio-tritide is a distinct compound from the others, it should be addressed as such.*

**NIOSH Response:** There is no difference in the kinetics of LiH versus LiD versus LiT that would result in different dissolution rates among the compounds in the lung (ORAUT, 2018). As such, LiDT should be treated the same as LiT.

**SC&A Specific Question 3:** *In terms of potential operational sources of STCs, no discussion is provided for contamination during D&D activities, which were extensive during the 1990s (including the closure of the older tritium facilities). Given the engineering controls in place, the D&D phase would have been an operational phase with some vulnerability for SMT exposure.*

**NIOSH Response:** Co-worker intakes from tritium published in ORAUT-RPRT-0081, Section 4.2, cover all activities and are stratified between operations and trade workers, the latter being involved in D&D tasks (ORAUT 2017b). Construction trade workers (CTW) included both prime contractor and subcontractor workers.

Figure 1 shows a box plot of tritium dose statistics for prime versus subcontractor CTW. Median doses for subcontractor CTW are lower than the median dose for prime CTW in all years. The 95<sup>th</sup> percentile dose for prime CTW is higher than that of subcontractor CTW for all but three years.

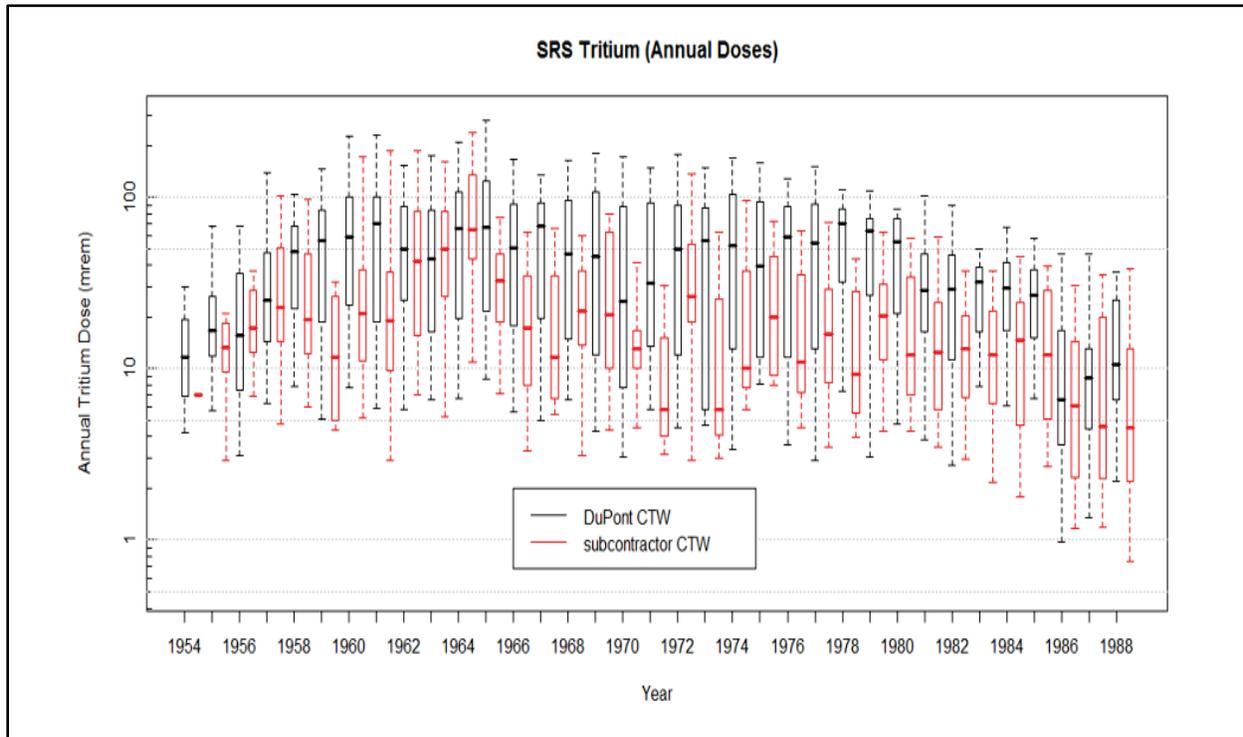
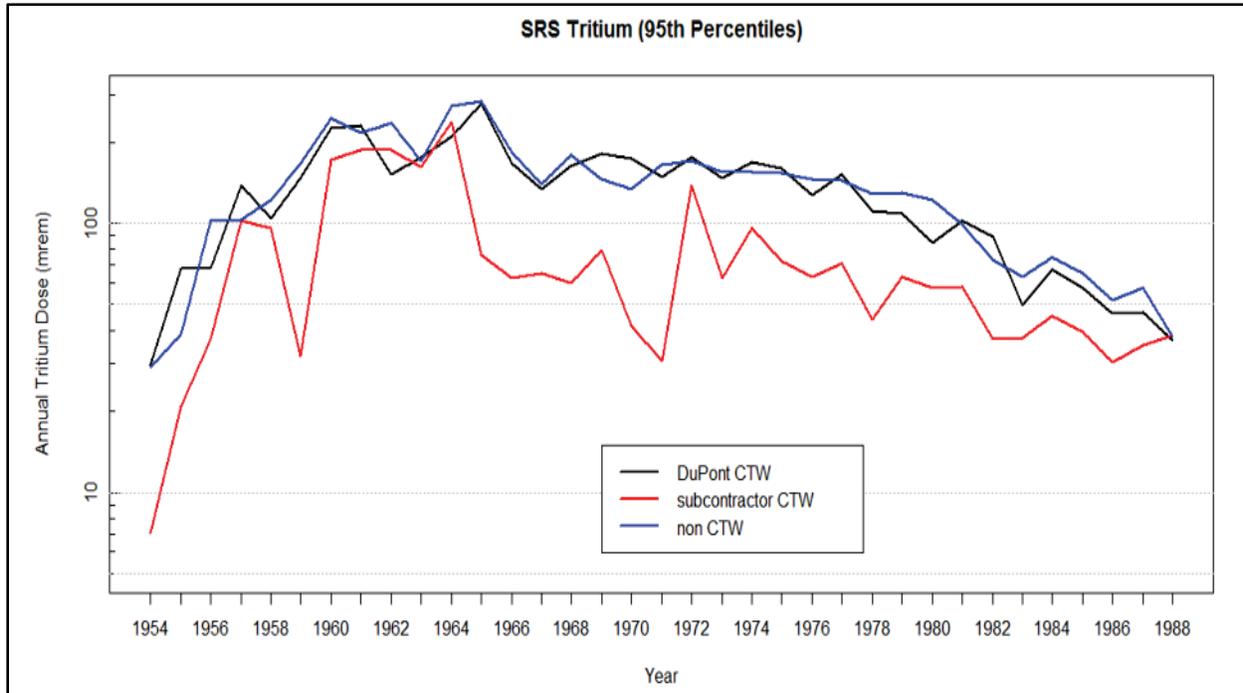


Figure 1. SRS Tritium Annual Doses

Figure 2 shows derived 95<sup>th</sup> percentile doses plotted by year for prime CTW, subcontractor CTW, and non-CTW. The line for the 95<sup>th</sup> percentile dose for subcontractor CTW is always less than that for non-CTW, and generally for prime CTW.



**Figure 2. SRS Tritium Doses, 95<sup>th</sup> Percentiles**

NIOSH concludes that derived co-worker intakes for tritium are sufficiently accurate to bound doses from work in D&D operations for missed and unmonitored doses.

## **REFERENCES**

Howard 2000, *Special Tritium Compounds in the Savannah River Technology Center*, internal memorandum from D. W. Howard to N. D. Johnson, Westinghouse Savannah River Company, Savannah River Site, Aiken, S.C., August 2. [SRDB Ref. ID 94505]

ORAUT (Oak Ridge Associated Universities Team) 2004, *Tritium Calculated and Missed Dose Estimates*, ORAUT-OTIB-0011, Rev 00, June 29. [SRDB Ref ID: 19430]

ORAUT (Oak Ridge Associated Universities Team) 2007, *Calculation of Dose from Intakes of Special Tritium Compounds*, ORAUT-OTIB-0066, Rev 00, April 26. [SRDB Ref ID: 31421]

ORAUT (Oak Ridge Associated Universities Team) 2017a, *Locations of Stable Metal Tritide Use at the Savannah River Site*, ORAUT-RPRT-0072, Rev 00, January 9. [SRDB Ref ID: 165215]

ORAUT (Oak Ridge Associated Universities Team) 2017b, *Appropriateness of Using 1997 Gross Alpha Air Sampling Data as a Method of Bounding Thoron Intakes at the SRS H-Area Tank Farm Between 1972 and 1994*, ORAUT-RPRT-0081, Rev 00, April 7. [SRDB Ref ID: 166258]

ORAUT (Oak Ridge Associated Universities Team) 2018, internal ORAU Team email correspondence regarding contact with SRS staff regarding the kinetics of LiH, LiD, and LiT, December 18. [SRDB Ref ID: 175269]

SC&A (SC&A, Inc.) 2018, *Memorandum: SC&A Comments on ORAUT-RPRT-0072, Revision 00, "Locations of Stable Metal Tritide Use at the Savannah River Site"*, August 3. [SRDB Ref ID: 175266]