



MEMORANDUM

TO: Savannah River Site Work Group
FROM: SC&A, Inc.
DATE: August 3, 2018
SUBJECT: SC&A Comments on ORAUT-RPRT-0072, Revision 00, "Locations of Stable Metal Tritide Use at the Savannah River Site"

The National Institute for Occupational Safety and Health (NIOSH) issued ORAUT-RPRT-0072, Revision 00, *Locations of Stable Metal Tritide use at the Savannah River Site*, on January 9, 2017 (NIOSH 2017), and it was transmitted to the Advisory Board on Radiation and Worker Health's Savannah River Site Work Group for review on January 19, 2017. It was subsequently pended from further review because of higher Work Group priorities, until tasked to SC&A for review in March 2018.

Introduction

As noted by this report, *"the material presented in this paper, and the classified notes associated with this paper, describes the types of SMTs used at SRS, the locations at which these materials could be encountered, and the time frames during which these materials were handled"* (NIOSH 2017, page 26). The report further observes that this information – stable metal tritide (SMT) type and facility location – is sufficient when coupled with personnel bioassay information and the methodology of ORAUT-OTIB-0066, Revision 00 (NIOSH 2007; hereafter "OTIB-0066"), to enable a bounding dose estimate for exposures to bound metal hydride ("tritide") doses at the Savannah River Site (SRS).

SC&A concurs with this premise and focused its review on (1) the completeness of the SMT types cited for SRS historical operations and (2) whether all operational uses have been accounted for. As NIOSH relied exclusively on a document review process to compile its information, SC&A reviewed both the relevant documents referenced, as well as additional documents found in Site Research Database (SRDB) searches, particularly interviews with key SRS personnel. SC&A also reviewed a classified document file located at the U.S. Department of Energy (DOE) Germantown (Maryland) facility.

SC&A Comment

General

SC&A finds ORAUT-RPRT-0072, when coupled with related classified information, to be a comprehensive summary of the types of SMTs and their location at SRS. As noted in this report,

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SRS conducted a survey of historical SMT use at the site in the early 2000s timeframe when the issue became of DOE-wide significance due to monitoring concerns (██████████ 2010, SC&A 2012). This and other reviews, as well as interviews with key personnel involved, provide no evidence of hafnium tritide or other “S” class SMTs in operational use (██████████ 2010). However, to be conservative, the site treated any SMTs of an unknown solubility as “S” class for internal dosimetry purposes (██████████ 2007, 2010). For the SMTs identified – uranium, palladium, titanium, lanthanum-aluminum-nickel tritide (LANA), lithium tritide, tritiated mercury, mischmetal, and zirconium – NIOSH characterizes them as “*readily soluble metal tritides*”¹ (NIOSH 2017). Accordingly, OTIB-0066 methods would assign an absorption Type F or M based on available SMT-specific solubility data. While SC&A agrees that tritium inventories were tracked and that engineering controls confined metal hydrides to sealed process and product tanks and beds (with the exception of bench scale samples examined at Savannah River Technology Center), there was a historical potential at SRS for occupational and environmental tritium contamination from processing. The then-new Replacement Tritium Facility and use of Hybrid Storage Vessels beginning in the mid to late 1990s were designed to reduce potential airborne exposures. However, the decontamination and decommissioning (D&D) of the older tritium facilities and equipment would have presented an exposure potential at the time.

Specific

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.
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.

¹ For uranium and palladium, NIOSH notes, “*Evaluations of the physical and chemical properties of these tritium compounds have shown that [they] do not bind tritium in a manner significantly different from tritium oxide. Therefore, they are not considered STCs*” (NIOSH 2017, page 26).

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.

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.

References

Howard 2000. Internal memorandum from David W. Howard to Norris D. Johnson, Westinghouse Savannah River Company, Savannah River Site, Subject: *Special Tritium Compounds in the Savannah River Technology Center*, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC. August 2, 2000. [SRDB Ref. ID 94505]

Moxley 2007. Internal memorandum from S.J. Moxley, Defense Programs Radiological Technical Support, Washington Savannah River Company, to D.P. Potocik, Defense Programs Radiological & Industrial Safety Manager, Subject: *Radiological Controls for Handling Legacy Tritium Exposure Samples from the Metal Hydride Test Cell*, Washington Savannah River Company, Savannah River Site. May 15, 2007. [SRDB Ref. ID 84856]

██████████ 2010. Documented interview with ██████████, Savannah River Site, on August 31, 2010, SEC Petition-00103 Evaluation Report review. [SRDB Ref. ID 126981]

NIOSH 2007. *Calculation of Dose from Intakes of Special Tritium Compounds*, ORAUT-OTIB-0066, Revision 00, National Institute for Occupational Safety and Health, Cincinnati, OH. April 26, 2007.

NIOSH 2017. *Locations of Stable Metal Tritide Use at the Savannah River Site*, ORAUT-RPRT-0072, Revision 00, National Institute for Occupational Safety and Health, Cincinnati, OH. January 9, 2017.

██████████ 2010. Documented interview with ██████████, Savannah River Site, on August 31, 2010, SEC Petition-00103 Evaluation Report review. [SRDB Ref. ID 126982]

SC&A 2012. *Master Interview Summary for the Savannah River Site Construction Trades Workers Special Exposure Cohort Review*, Revision 1, SC&A, Inc., Vienna, VA, and Saliant, Inc., Jefferson, MD. April 4, 2012.