Memorandum

To: Mr. Brad Clawson, Chair of the SRS Work Group

From: John Cardarelli

Subject: Response to "Review of NIOSH's Response to SC&A's Focused Review of ORAUT-RPRT-0092, 1991–2007"

Date: June 11, 2024

Introduction

On December 15, 2023, SC&A issued *Review of NIOSH's Response to SC&A's Focused Review of ORAUT-RPRT-0092, 1991–2007* [SC&A 2023]. SC&A [2023] addresses NIOSH's *Response to SC&A's "Focused Review of ORAUT-RPRT-0092, Revision 00, and Remaining Petition SEC-00103 Evaluation Report Period: 1991–2007"* [NIOSH 2022]. SC&A [2023] provides each of SC&A's focused review conclusions with an overall position on each NIOSH response. In response to statements in SC&A [2023], NIOSH briefly addresses items related to (1) the intent of ORAUT-RPRT-0092, *Evaluation of Bioassay Data for Subcontracted Construction Trade Workers at SRS* [ORAUT 2019]; (2) the purpose of job-specific sampling during the 1990s; (3) Savannah River Site (SRS) self-assessments conducted for 1997 regarding the lack of compliance associated with job-specific sampling; and (4) the purpose and use of the TRACK database for developing co-exposure models.

Intent of ORAUT-RPRT-0092

SC&A states that the purpose of ORAUT-RPRT-0092 was to address compliance

> "The purpose of RPRT-0092 was to assess the compliance of bioassay monitoring for subCTWs…" [SC&A 2023, PDF p. 11]

and completeness

> "…it was clear that the sampling exercise performed by NIOSH in RPRT-0092 was to provide an indication of data completeness…" [SC&A 2023, PDF p. 9].

The original intent of ORAUT-RPRT-0092 was not to determine compliance or completeness, but representativeness (i.e., Did unmonitored workers work in the same environment as monitored workers?). NIOSH demonstrated, through the random review of radiological work permits (RWPs), that unmonitored subcontractor construction trade workers (subCTWs) worked alongside monitored subCTWs in the same radiological environment for the period 1991–1998.

Purpose of Job-Specific Sampling

NIOSH maintains the position that job-specific samples were used for normal operations as part of the routine sampling program (i.e., not special samples) and were utilized primarily as a means of efficiency to add workers to the routine bioassay program in the field. This helped to avoid delays in work that would result from going through the prospective routine bioassay enrollment process. This stance is corroborated in interviews with former SRS internal dosimetrists [redacted] [ORAUT 2017, 2022] and [redacted] [ORAUT 2023a]. An interview with [redacted], who was an SRS Health Physicist at the time, also confirms that job-specific samples were not considered to be special samples [ORAUT 2023b].

Following the 1997 Notice of Violation (NOV), an SRS communication further corroborates that job-specific samples were considered part of the routine program. At the time, SRS stated:

> *Job-specific sampling has been implemented because currently there is not a way of modifying the prospective bioassay program and RQB* [radiological qualification badge] *in the field. A worker must come to the IVC* [in vivo counting] *Facility to have the bioassay program and RQB modified. This is an inefficient use of time and thus the current job-specific sampling program was created.*
>
> *A routine bioassay program can be established after the fact based on where the individual actually worked and what he/she actually did. This is referred to as retrospective scheduling.* [WSRC 1997–1999, PDF p. 32]

SRS also states in that same document that:

> *The purpose of the job-specific bioassay sampling program is to collect bioassay samples from workers whose routine bioassay program does not include some or all of the radionuclides present at the work site or who are not on a routine program. For example, a mechanic who may be routinely sampled for plutonium and enriched uranium may be assigned to work on a neptunium system. A job-specific bioassay sample for neptunium would be required to be submitted at the end of the task.* [WSRC 1997–1999, PDF p. 15]

In their final evaluation of the 1997 NOV, the Department of Energy (DOE) agreed with SRS that the **job-specific samples were not special samples** and, coupled with the information on SRS's robust routine program, downgraded the violation from a health

and safety violation to a procedural violation [Brush 1998]. A cautionary note found in early versions of SRS 5Q1.1-506 manual procedure (discussed in detail at the March 2023 SRS Work Group Meeting [NIOSH 2023a, PDF pp. 60–133]) that implied that job-specific samples were not considered to be routine was removed from the procedure beginning with revision 6 [WSRC 1997] and did not return in later revisions. Additionally, in revision 5 [WSRC 1996], the term "Non-Routine" was removed from the title "Non-Routine, Job-Specific Sampling." Beginning with revision 6, the "Non-Routine Sampling" section was removed entirely.

SRS Self-Assessments Conducted for 1997

As discussed in previous responses by NIOSH and SC&A, SRS conducted three self-assessments covering different periods in 1997. The first, conducted in May 1997, was a limited assessment of facilities that used job-specific RWPs requiring bioassay samples [DOE 1997–1998, PDF pp. 3–4], which found that 3040 of 3200 bioassays reviewed (95%) were covered by the routine bioassay program and that all samples had been submitted as required. Of those not on the routine program, 160 (5%) were requested to submit job-specific samples. Of those job-specific samples requested, 53 (33% of job-specific bioassays requested, 1.65% of total bioassays reviewed) were submitted, for a total of 3093 (96.65%) received samples. The remaining 107 job-specific samples (67% of job-specific bioassays requested, 3.35% of total bioassays reviewed) were not received.

In September 1997, an assessment covering all facilities that used either standing RWPs or job-specific RWPs requiring submittal of bioassay samples was conducted for the second quarter of 1997 [DOE 1997–1998, PDF p. 4]. This assessment yielded the often-cited 79% non-compliance result (sometimes stated as 21% compliance) for job-specific samples. Of those bioassays reviewed, 95% were covered by the routine bioassay program, and 5% were requested job-specific samples. The 79% non-compliance value is from the group of workers who were requested to submit job-specific samples (the 5%) and represents a small percentage of the overall bioassay samples reviewed (i.e., 79% of 5%). As reiterated below, SRS followed up with all workers who did not submit the required samples, and follow-up results showed no uptakes [Brush 1998].

A final assessment compared all 1997 RWPs and sign-in sheets to the bioassay laboratory sample database [Christopher 1998]. The results showed that 256 individuals who were required to comply with job-specific bioassay requirements had not done so [Christopher 1998, PDF p. 8]. Each of these individuals was resampled, "the results of which indicated that none of these workers had had an identifiable uptake of radioactive material" [Brush 1998, PDF p. 9]. As mentioned in the section above, DOE downgraded the resulting NOV from a health and safety violation to a procedural violation.

TRACK Database

The TRACK database was created to track samples related to an incident or suspected uptake. A field indicator would cause RadCon to call the internal dosimetrist, and an entry would be made in the TRACK database. Prospectively, incidents recorded in TRACK should include workers with the highest exposure potential[1]. Therefore, an analysis to determine whether rows of TRACK have positive bioassay results associated with them checks to see whether workers with the highest potential for exposure are included in the co-exposure dataset, supporting the conclusion that a bounding co-exposure model could be constructed. SC&A conducted this analysis and found that between 95% and 100% of TRACK entries, depending on nuclide, have a corresponding bioassay result [SC&A 2023, Table C-6 PDF p. 32]. NIOSH also did their own analysis and found over 97% of TRACK entries have corresponding bioassays (both positive and non-detects) [NIOSH 2023b].

SC&A also did a "reverse" check to determine whether positive samples in the co-exposure dataset resulted from a TRACK entry [SC&A 2023]. Since TRACK was a prospective program, one would not expect all positive bioassay samples (retrospectively) to be included in TRACK. This "reverse" check is similar to what was done with WebDose for Sandia, a retrospective check (after bioassay is collected and results are known) to determine whether the most highly exposed workers are in the database. The Sandia equivalent of TRACK (if it exists) was documentation from Sandia health physics personnel when they decided, based on elevated exposure potential (prospectively), to place a lapel on a worker. TRACK is a prospective program that responds to potential, whereas WebDose and the SC&A "reverse" check are retrospective checks that respond to known numerical results. Therefore, the results of SC&A's retrospective "reverse" analysis are not appropriate for a prospective program like TRACK.

Conclusions

NIOSH reiterates that:

- ORAUT-RPRT-0092 demonstrated that unmonitored subCTWs worked alongside monitored subCTWs in the same radiological environment, meeting the original intent to determine representativeness.

- Job-specific samples served the same purpose and were implemented as part of the routine sampling program. This has been corroborated in (1) interviews with former SRS staff, (2) SRS communications, and (3) internal SRS procedures. Confusing language in the early versions (1995–1996) of SRS procedures was

[1] Prospectively (before bioassay is collected), it is only appropriate to discuss "exposure potential." Retrospectively (after bioassay is collected and the results are known), one can discuss "most highly exposed."

later (1997) revised to clarify that job-specific samples were part of the routine monitoring program and not special samples.

- Unreturned job-specific samples from the second quarter of 1997, often used by SC&A as evidence of widespread non-compliance, were shown in SRS self-assessments to represent a very small percentage (less than 4%) of the overall bioassays required during that period. All workers from 1997 (N=256) with unreturned bioassays were resampled and showed no evidence of intake.

The purpose of the TRACK analysis was to determine whether special samples included in the TRACK database were included in the co-exposure files to create co-exposure models. The NIOSH analysis concluded that 97% of TRACK entries have a corresponding entry in the co-exposure dataset. Additionally, in response to SC&A's review of the TRACK database, NIOSH noted that any attempt to perform a retrospective analysis of the TRACK database was not inappropriate given its purpose as a prospective tracking system.

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