Savannah River Site SEC (1991–2007): Response to NIOSH Reviews

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Savannah River Site (SRS) status: SEC-00103 review 1 of 2

- **July 12, 2021:** Board recommendation of SEC class for subcontractors, 1972–1990 (Oct. 12, 2021: *Federal Register* designation date) (ABRWH, 2021)
- **April 22, 2022:** SC&A issued "Focused Review of ORAUT-RPRT-0092, Revision 00, and Remaining Petition SEC-00103 Evaluation Report Period: 1991–2007" (SC&A, 2022)
- **Jan. 5, 2023:** NIOSH issued response to SC&A's focused review (ORAUT, 2022) in January 2023 to the Board
- **March 22, 2023:** SRS Work Group met via teleconference (ABRWH, 2023)

Savannah River Site (SRS) status: SEC-00103 review 2 of 2

- **Dec. 2023–June 2024:** NIOSH and SC&A exchange reviews:
  - NIOSH (2023): “Analysis of SRS TRACK database”
  - NIOSH (2024a): “Analysis of Subcontractor CTW Data at SRS 1991 to 2007”
  - NIOSH (2024b): “Response to ‘SC&A Evaluation of Feasibility and utility of Subcontractor Exposure Potential”
  - NIOSH (2024c): Response to “Review of NIOSH’s Response to SC&A’s Focused Review of ORAUT-0092, 1991-2007”
  - SC&A (2023a): “Review of NIOSH’s response to SC&A’s focused review of ORAUT-RPRT-0092, 1991–2007”
  - SC&A (2023b): “SC&A Evaluation of Feasibility and Utility of Subcontractor Exposure Potential Comparison”

Designated SEC, 1972–1990

- ABRWH recommendation letter, July 12, 2021 (ABRWH, 2021):
  - "All construction trade employees of Department of Energy subcontractors [excluding employees of the following prime contractors who worked at the Savannah River Site in Aiken, South Carolina, during the specified time periods: E. I. du Pont de Nemours and Company, October 1, 1972, through March 31, 1989; and Westinghouse Savannah River Company [WSRC], April 1, 1989 through December 31, 1990], who worked at the Savannah River Site from October 1, 1972 through December 31, 1990, for a number of work days aggregating at least 250 work days, occurring either solely under this employment or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort."

ABRWH SEC basis (1972–1990)

- ABRWH recommendation letter, July 12, 2021 (ABRWH, 2021):
  - "Subcontractor construction trades workers [CTWs] conducted a broad range of work activities… They may have worked in high-contamination and high-airborne radioactivity areas and may have been utilized for short-term high-exposure work tasks."
  - "Subcontractor [CTWs] may have been 'transient' and not have worked for long periods at SRS and also may have been intermittently tasked with nonroutine radiological jobs under work permits, and thus were not likely enrolled in the routine (including termination) bioassay monitoring program."

ABRWH SEC finding (1972–1990)

- ABRWH recommendation letter, July 12, 2021 (ABRWH, 2021):
  - "The Board finds there to be **insufficient information, including a lack of job-specific radio-bioassay monitoring data for subcontractor construction trades workers, and assurance of workplace monitoring and source term data**, to enable NIOSH to estimate with sufficient accuracy all potential internal doses from radionuclides associated with fuel handling, reactor operations, fuel reprocessing, and/or research activities, to which the proposed class may have been exposed during the time period in question." *(emphasis added)*

When did information become "sufficient" to enable DR with sufficient accuracy?

- Remaining SEC period for subcontractor CTWs: 1991–2007
- In its 2022 focused review (SC&A, 2022), SC&A examined the following information for sufficiency based on prior SEC designation:
  - WSRC Radiological Work Permit (RWP) and job-specific bioassay policies, procedures, and practices, and their implementation (trending numbers, percentages)
  - Assurance of workplace monitoring (data completeness: degree to which job-specific bioassays were submitted)
  - Representativeness of scope and "matching" of radionuclides in RPRT-0092 sampling

NIOSH 2024 updated position: Data completeness

- NIOSH notes that “original intent” of ORAU-RPRT-0092 was not to determine compliance or completeness, but representativeness. (NIOSH 2024c, p. 2)
- “Compliance” cited taken out of context – SC&A (2023) refers to bioassay monitoring data compliance, as noted in follow on statement: “SC&A analysis was only to indicate areas of compliance, or noncompliance, of subCTW bioassay data to provide markers to aid in an evaluation of the adequacy of the subCTW bioassay data.” (SC&A, 2023, p. 10 of 33)
- Data completeness and representativeness are two sides of same coin in IG-006. Board review of RPRT-0092 has addressed **both** given RPRT-0092 original “chief conclusion” that “a large percentage of subCTWs were monitored for potential intakes while working under a Job Plan, SWP or RWP.” (ORAUT, 2019, p. 59). The incompleteness of job-specific bioassays required under job plans and RWPs, and lack of RWPs, undermined representativeness of dose reconstruction for subCTWs in 1972–1990.
- This issue already adjudicated by Board in its review of subCTW bioassay monitoring data for 1972–1990 and issuance of SEC class for that period.

NIOSH 2024 updated position: Job-specific sampling

- NIOSH maintains 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." (NIOSH 2024c, p. 2 of 7). That SRS procedures for job-specific bioassay monitoring in 1995–1996 were "confusing." (NIOSH 2024c, p. 5)
- SC&A finds SRS requirements explicit and clear. SRS 5Q1.1-506 directed at potential "non-routine" radiological hazards, not already covered by the prescheduled routine program. "Special" samples covered in a different SRS requirement.
- "Job-specific bioassay is a program prescribed in response to a specific event (the job) but is not a special bioassay." (ORAUT, 2017, p. 9 of 32)
- This issue already adjudicated by Board in its review of subCTW bioassay monitoring data for 1972–1990 and issuance of SEC class for that period.

NIOSH 2024 updated position: SRS self-assessments

- NIOSH diminishes significance of 1997 self-assessment finding of 79% non-compliance for returned job-specific bioassays given relatively small proportion represented by those bioassays compared with overall routine bioassay program. Claims it is "often used by SC&A as evidence of widespread non-compliance…" (NIOSH, 2024c, p. 5 of 7)
- SC&A continues to disagree with NIOSH's characterization. The 1997 self-assessment and related Notice of Violation were originally cited in SC&A's 2017 review as a compelling reason to conduct further assessment regarding the completeness and representativeness of such data, which led to RPRT-0092, an SEC class for 1972–1990, and this ongoing Board review.
- This issue already adjudicated by Board in its review of subCTW bioassay monitoring data for 1972–1990 and issuance of SEC class for that period.

NIOSH 2024 updated position: TRACK database

- NIOSH interview with lead internal dosimetrist indicated that a computer program termed “TRACK” was created in 1991 to better document incident-related internal monitoring
  - Document results of special bioassay samples
  - Generate reminders to assure follow-up bioassay performed as appropriate
  - Eventually incorporated into the ProRad database in 2002
- TRACK database obtained from SRS and provided to the work group in June 2023

Summary of information in TRACK database

- Energy employee information (name and social security number) which allows for identification of subcontractors
  - Approximately 14% of entries were associated with subcontractors
  - Largest proportion (~59%) associated with SRS Nuclear Solutions and Westinghouse
- Date, location, and brief description of incident (generally less than a dozen words)
- Bioassay information: type and contaminant of interest
- Document any calculated intake (~12% of incidents documented an intake)

SC&A conclusions regarding TRACK database

- Follow-up internal monitoring (i.e., bioassay) was specified in approximately two-thirds of the incident entries
- Notable downward trend in TRACK entries from 1994–1996, though a significant spike in 1997
- Comparison of TRACK database entries with electronic bioassay database showed between 94.5% (trivalent actinides) and 99.7% (plutonium) monitored within a year
- Majority positive bioassay results identified in the electronic bioassay database were reflected in a TRACK entry (refer to table C-3 in SC&A, 2023)
- TRACK database would not reflect internal exposure potential to subcontractors who were not routinely monitored or did not submit required job-specific bioassay

Conclusion 1: Sampling premise is not sufficiently grounded in historical SRS practices

SC&A 2022 review

- Measured against the review criteria used by SC&A's review of RPRT-0092, the sampling premise is not sufficiently grounded in actual WSRC policies, procedures, and practices within the time period 1991–1998.

NIOSH 2022 response

- Transition between SRS operating contractors led to increasing RWP job-specific bioassays, due to reliance on procedures, vs. RWP forms. Use of RWP forms with bioassay checklists lagged behind procedure-based bioassay collections in early 1990s; no evidence of RWP or bioassay inadequacy.
- Absence of bioassay requirements on RWPs "**irrelevant**." *(emphasis added)*

Conclusion 1: SC&A 2023 response

- RWPs were not implemented by WSRC procedure until late 1992.
- "Demonstrable implementation" of RWP/job-specific bioassay requirements was not apparent in the workplace until 1994–1995.
- RWP requirements for bioassay are the only evaluative marker for job-specific bioassay performance, in the face of SRS's history of nonconformance with its own RWP and job-specific bioassay procedures.
- At what point in SRS internal dosimetry program's history was the RWP program defined and implemented adequately such that required job-specific bioassays were being identified, collected, and recorded reliably so that these data can be considered sufficiently complete, and therefore, representative, to support a co-exposure model for subcontractor workers after 1990?

Conclusion 2: Results for direct and effective monitoring may be overstated

SC&A 2022 review

- NIOSH did not address all the radionuclides listed in the RWPs when determining data completeness for job-specific bioassay monitoring.
- Therefore, the percentage of matching results for direct and effective monitoring appear to be overstated in the RPRT-0092 summary in section 6.3.

NIOSH 2022 response

- NIOSH agrees that they did not address all radionuclides but has updated those tallies in this response.
- NIOSH contends that their conclusion has not changed: A co-exposure model can still be constructed.

Conclusion 2: SC&A 2023 initial response

- NIOSH's 2022 response summarizes their updated tallies and weighted point estimates in table 5.
- The values in table 5 are very similar to SC&A's values in tables 3 and 4 of SC&A's 2022 review.

Conclusion 3: Generalized matching is not sufficient

SC&A 2022 review

- SC&A found that during the 1991–1998 period, plutonium coworker matches were nearly 96% on the same RWPs, but inclusion of additional criteria (e.g., the same date, time, and craft) decreases this percentage significantly (down to 45%).

NIOSH 2022 response

- While not documented in RPRT-0092, the criteria used for a coworker match was a subcontractor CTW on the same RWP, same date, and same time. Additionally, a laborer could not be used as a coworker for another craft.
- In summary, coworkers used for effective monitoring matching need only have the same or higher exposure potential than the unmonitored worker. SC&A's criteria of same RWP, same date, same time, and same craft are far too restrictive and do not need to be considered when creating a co-exposure model.

Conclusion 3: SC&A 2023 response

- SC&A's 2019 review of RWP monitoring completeness in RPRT-0092 found instances of the same date and/or same time criteria not met.
- NIOSH (2022) updated tallies have improved upon that condition.
- To use a coworker's data from another craft for effective monitoring matching requires that coworker's craft to have ***the same or higher exposure potential than the unmonitored worker***.

Conclusion 4: RWP-specified, job-specific bioassay data are incomplete

SC&A 2022 review

- RWP-required, job-specific bioassay data should be assumed to be substantially incomplete for purposes of demonstrating monitoring data completeness and representativeness for use in a co-exposure model until the end of 1996.
- A 100% resampling of all workers on job-specific bioassays was performed for 1997; enhanced accountability and tracking of job-specific bioassays were implemented in 1998.

NIOSH 2022 response

- NIOSH disagrees that SRS self-assessments in response to regulatory issues in 1998 indicate monitoring data incompleteness from a statistical standpoint or that finding bioassay program inadequacy is relevant to constructing a bounding co-exposure model.
- If the TRACK database samples prescribed by the site internal dosimetrist when a suspected intake occurred are part of NIOSH's co-exposure database, this is evidence that a bounding co-exposure model could be constructed, despite the SC&A conclusion that "RWP-specified, job-specific bioassay data are incomplete."

Conclusion 4: SC&A 2023 response

- For-cause bioassays are to follow up suspected intakes via field indicators and would not necessarily be representative for all missed intakes.
- Only firm verification of job-specific bioassay completeness was performed in 1997 (79% incomplete) – key basis for further inquiry into data completeness and representativeness.
- For 1991–1996, SC&A applies available fractional markers to gauge RWP and job-specific bioassay implementation and sees this as the best measure of program implementation.

Conclusion 5: Feasibility of co-exposure model needs balance

SC&A 2022 review

- In order to establish feasibility, the co-exposure model needs to balance RWP implementation with completeness of coworker data.

NIOSH 2022 response

- Accepts SC&A's position that if SC&A conclusions 1–4 are addressed, then SC&A "would consider NIOSH's conclusion valid… to support development of a co-exposure model…."

Conclusion 5: SC&A 2023 response

- Conclusion 5 also included the following:
  - "A conclusion about the feasibility of a co-exposure model for workers lacking bioassay results for nonroutine work may be reached by balancing the programmatic limitations of the RWPs and job-specific bioassays with the availability of suitable coworker bioassay data (as given in RPRT-0092)." (SC&A, 2023; p. 17 of 33)
- SC&A believes a co-exposure model for subcontractor CTWs cannot be shown to be feasible **unless** and **until** data completeness and representativeness are demonstrated by both RWP-related bioassay performance and SRS procedural implementation.
- The lack of **both** figured in the designated SEC for 1972–1990.

Summary status of SEC issues

- Based on SEC designation for prior years (1972–1990), SC&A's position remains that acceptable co-exposure models for subcontractor CTWs can be developed for post-1990 when both:
  1. RWP-required, job-specific bioassay data are shown to be sufficiently complete and representative for subcontractor CTWs.
  2. Evidence of program adequacy is available to show WSRC assured required bioassays were performed and submitted.
- SC&A conclusion 5 acknowledges that an SEC cutoff date for "sufficiency of information" to support co-exposure model development needs to balance the two above considerations upon which the existing SEC designation is based for 1972–1990.

SC&A conclusions

- Most recent NIOSH findings (NIOSH 2024) have either been already adjudicated by the Board in previous SEC review (data completeness vs representativeness, 1997 self-assessment, job-specific bioassays) or are not relevant to judgment on cutoff timeframe for SEC (TRACK).
- Judgment needed regarding cutoff date on issue of completeness and representativeness of RWP-directed job-specific bioassay data for 1990–1997 — can be based on RWP bioassay data completeness/representativeness and program implementation.

Questions?

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