



## Memorandum

**To:** Mr. Brad Clawson, Chair, SRS Work Group

**From:** John Cardarelli II

**Subject:** Response to “SC&A Evaluation of Feasibility and Utility of Subcontractor Exposure Potential Comparison”

**Date:** March 29, 2024

### Introduction

At the meeting of the Savannah River Site (SRS) Work Group on March 23, 2023, Dr. James Lockey proposed that a comparison be made of the exposure potential between subcontractor construction trade workers and other workers. The Work Group tasked SC&A with evaluating this request [NIOSH 2023]. SC&A presented their analysis in a Response Paper titled *SC&A Evaluation of Feasibility and Utility of Subcontractor Exposure Potential Comparison* [SC&A 2023], hereafter referred to as the SC&A Response Paper.

NIOSH independently conducted data analysis and prepared a White Paper titled *Analysis of Subcontractor CTW Data at SRS 1991 to 2007* [NIOSH 2024], hereafter referred to as the White Paper. The NIOSH data analysis was complete when the SC&A Response Paper was made available; consequently, the White Paper only briefly mentions the SC&A Response Paper and offers no comment on its content.

In the sections that follow, this memorandum discusses specific differences in the way the two papers address Definitions, Data, and Analysis. The final section comments on SC&A Response Paper Section 5 which addresses “Utility.”

### Definitions

The two papers use somewhat different definitions for the types of workers being compared. The SC&A Response Paper tallies results as either “subcontractor” or “prime contractors” (Tables 2 through 5 of SC&A [2023]). The NIOSH definition classifies a worker as either “subCTW” (subcontractor construction trade worker) or “Other Worker.”

The NIOSH White Paper [NIOSH 2024] contains the following:

- the explicit NIOSH definition of subCTW used in the analysis (Attachment B),
- the analysis using that definition, with scatterplots for the various types of available dosimetry and bioassay data (Figures 1 through 22), and
- SC&A's definition of subcontractor, along with scatterplots for the various types of available dosimetry and bioassay data, prepared using the SC&A definition (Attachment C with Figures C-1 through C-22).

Using either definition, the conclusion of the NIOSH White Paper is the same.

## **Data**

The SC&A analysis appears to exclude some data that the NIOSH analysis does not exclude:

- **Baseline Samples**: SC&A excluded baseline samples from their tallies in Tables 2 through 5 in the Response Paper. NIOSH did not exclude baseline samples in the White Paper. The non-tritium legacy file that SC&A considered contains 4,800 baseline samples in the 434,061 unfiltered rows of the file (1.1% of the rows). Whether baseline samples are included does not affect the conclusion of the NIOSH White Paper.
- **Samples With Units "ugm/L"**: Although not mentioned in the Response Paper text, SC&A appears to have excluded results with units of "ugm/L" (see very small tallies for depleted uranium from 1991 to 1994 in Tables 2 through 5). NIOSH did not exclude results with units of "ugm/L" and used a 0.826 dpm/ugm conversion, assuming depleted uranium [NIOSH 2024, Table 16]. These results are urine bioassay with units that indicate mass measurements, so there is no need to exclude them.
- **Time Period**: SC&A ends their tallies (Tables 2 through 5) in 1997, the year of the Notice of Violation (NOV) [Brush 1998]. NIOSH ends their analysis in 2007, which is the end of the SEC petition period. Extending the analysis to 2007 allows the reader to see what happens past the NOV.

## **Analysis**

The two papers use/recommend different approaches to the data analysis:

- **TWOPOS**: SC&A begins their discussion of the potential analysis by mentioning ORAUT-RPRT-0102 [ORAUT 2021]. SC&A notes that RPRT-0102 does not deal with data dominance by using time-weighted one-person-one-statistic (TWOPOS) results [SC&A 2023, PDF p. 10], and suggests that a TWOPOS approach could be used in analyzing the SRS data. When Dr. Lockey was describing what he envisioned, he mentioned bioassay data, not TWOPOS results. TWOPOS is an averaging technique, so its use would only make the groups look more similar. The NIOSH white paper focuses on the bioassay results.

- Plutonium Data Only: SC&A also mentions that RPRT-0102 only considers plutonium and does not consider the data on an annual basis. The NIOSH white paper analyzes results annually for all available data (external dose, tritium, and non-tritium).
- Multiple Imputation: SC&A suggests the use of multiple imputation because many of the results are less than or equal to zero. NIOSH notes that from 1991 to 1994, most of the results SC&A considers less than zero are actually censored values, according to the SRS data dictionary [SRS 2022]. In the NIOSH White Paper, censored and less-than or equal-to zero results are handled the same way for both groups of workers, so there is no need to impute these values. When co-exposure models are eventually created, multiple imputation will be necessary.

## Utility

Section 5 of the Response Paper echoes sentiments SC&A voiced previously during the March 2023 Work Group meeting [NIOSH 2023]. Section 5 states that SC&A has “reservations concerning the utility of such a subcontractor comparison because it may not fully illuminate the primary SEC issue being discussed” [SC&A 2023, PDF p. 11]. The commentary focuses on job-specific samples and the perceived implications of the 1997 NOV [Brush 1998]. Referring to the job-specific bioassay program, SC&A emphasizes “only 21 percent compliance” and concludes that “a comparison may not sufficiently inform the work group” [SC&A 2023, PDF p. 11].

NIOSH notes that job-specific samples account for only 5 percent of the program’s total samples [DOE 1997–1998, PDF p. 3]. All job-specific samples that were not collected were followed up, and there were no intakes detected in those follow-up samples [Brush 1998, PDF p. 8]. Job-specific samples were not required by 10 CFR 835, which means that those workers were not likely under typical conditions to exceed 100 mrem. Therefore, the NOV was changed from a health and safety violation to a procedural violation after the enforcement meeting [Brush 1998]. Given that the job-specific samples represent a relatively small amount of the total samples, NIOSH considers that a comparison of subcontractor bioassay data can and does provide useful information.

In the March 2023 Work Group meeting, SC&A voiced their concerns about “data that was never actually collected” and trying to do an analysis. However, Dr. Lockey expressed that there was benefit in doing the comparison [NIOSH 2023, PDF p. 130].

*MEMBER LOCKEY: I understand that. That’s not the point. The point is, I don’t know if there’s 100 data points in the base. I don’t know if there’s 1000. I don’t know there’s 2000. It may be 90 percent incomplete, but I want to look at the actual short-term worker database that exists in relationship to bioassay data and see where that falls. What kind of distribution does it have? I’m not looking for missing data. I’m looking for data already – it’s in the database, as far as I know.*

## **Conclusion**

This memorandum addressed differences between the SC&A Response Paper and the NIOSH White Paper. Despite the information presented in the “Utility” section of the SC&A Response Paper, the comparison Dr. Lockey requested helps determine whether there is evidence in the data showing that subCTWs were the most highly exposed workers at SRS. Our NIOSH analyses showed that the data for subCTWs do not tend to be higher exposed than other workers.

## **References**

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