NIOSH Response to SC&A Comments on SEC-00250 Evaluation Report

Response Paper

National Institute for Occupational Safety and Health

June 3, 2020

Joe Guido
Paul Demopoulos
Oak Ridge Associated Universities Team

Reviewed By:
Lara Hughes, PhD, CHP
Timothy D. Taulbee, PhD, CHP
Division of Compensation Analysis and Support

INTRODUCTION

In July 2019, the National Institute for Occupational Safety and Health (NIOSH) issued a Special Exposure Cohort (SEC) Petition Evaluation Report for SEC-00250, Y-12 Plant, covering the period from January 1, 1977 through December 31, 1994 [NIOSH 2019]. NIOSH determined that dose reconstruction was feasible for potential uranium, external, and medical X-ray exposures for the entire evaluated period. Utilizing ORAUT-RPRT-0090, *Monitoring Feasibility Evaluation for Exotic Radionuclides Produced by the Oak Ridge National Laboratory Isotopes Division* [ORAUT 2018], NIOSH determined that dose reconstruction was feasible for calutron- and cyclotron-related potential exposures for the entire evaluated period (January 1, 1977 through December 31, 1994). Thorium dose reconstruction was determined to be feasible from August 1, 1979 through December 31, 1986, but not feasible from January 1, 1977 through July 31, 1979 (an SEC class has been added). At the time of this writing, NIOSH is still evaluating thorium dose reconstruction feasibility for the period from January 1, 1987 through December 31, 1994.

SC&A reviewed the SEC-00250 Petition Evaluation Report and documented four findings and twelve observations in *SC&A Review of the SEC-00250 Evaluation Report for the Y-12 Plant*, Rev. 0 Draft [SC&A 2020]. NIOSH presents responses to those findings and observations in this document.

SC&A FINDINGS AND OBSERVATIONS AND NIOSH RESPONSE

SC&A Finding 1: *Available documentation only reports the number of quarterly thorium in vivo measurements up through the third quarter of 1981. For this limited time period, the completeness of in vivo thorium data available for dose reconstruction was approximately 95 percent. Direct evaluation of the completeness and availability of thorium in vivo records after this time is not currently possible.*

NIOSH Response to Finding 1: NIOSH acknowledges SC&A's 1980–1981 completeness analysis and intends to perform a formal completeness analysis as part of the development of the thorium chest-count co-exposure model.

SC&A Finding 2: *Information on the annual processing and throughput of thorium materials at the Y-12 plant is currently unavailable to supplement the thorium monitoring completeness evaluation. Evidence suggests that such throughput information was once tabulated in existing documentation. However, it is likely the information was redacted from the source documentation and thus is not available for analysis at this time.*

NIOSH Response to Finding 2: After completing the SEC-00250 Evaluation Report, the thorium inventory became available and was captured to support the reserved period analysis.

SC&A Finding 3: *Analysis of job title or other characteristics of the monitored population is not possible at this time in the uranium urinalysis dataset used in the Y-12 coworker model. Therefore, neither the evaluation of the representativeness of the dataset nor the evaluation of the potential need for stratification of the uranium coworker model is currently feasible.*

NIOSH Response to Finding 3: NIOSH acknowledges SC&A's review of the representativeness analysis for a job title or other characteristics of the monitored population and intends to perform an evaluation of the representativeness and need for stratification during the future revision of the uranium in urine co-exposure model.

SC&A Finding 4: *Plutonium-241 is not addressed in the Y-12 SEC-00250 evaluation report, though the inability to reconstruct internal exposure to Pu-241 formed part of the basis of SEC-00251, which immediately precedes the SEC-00250 evaluation period.*

NIOSH Response to Finding 4: The availability of Pu-241 monitoring data is discussed in the SEC-00251 Evaluation Report. That evaluation indicated that Pu-241 exposure could not be reconstructed through 1966 due to a lack of Pu-241 monitoring data before 1967. Starting in 1967, a Pu-241 specific bioassay method was available and implemented as demonstrated by the abundance of such analytical results starting in 1967. Based on the availability of Pu-241 monitoring data, NIOSH did not identify any infeasibility specific to Pu-241 during the post-1966 time period.

SC&A Observation 1: *Although SC&A uncovered additional information concerning process departments and areas associated with thorium work, no definitive list was identified to aid in assessing the scope of thorium monitoring at the Y-12 plant. Sought-after documentation might have included those workers classified as thorium workers in addition to department and work area designations. Such information would have aided in evaluating the monitoring program's effectiveness and representativeness.*

NIOSH Response to Observation 1: NIOSH acknowledges SC&A's review of the effectiveness and representativeness concerning process departments and areas associated with thorium work. NIOSH intends to evaluate the adequacy of the thorium-monitoring program as part of the development of the thorium chest-count co-exposure model.

SC&A Observation 2: *The in vivo monitoring program using the stationary count facilities at the Y-12 Plant employed essentially identical methods and equipment as the Mobile In Vivo Radiation Monitoring Laboratory (MIVRML), which was likewise developed at Y-12. The Board has previously evaluated the adequacy of the MIVRML system at the Fernald site and found it to be a reasonable and scientifically accurate monitoring methodology for use in EEOICPA.*

NIOSH Response to Observation 2: NIOSH acknowledges SC&A's verification that Y-12 employed essentially identical methods and equipment as the MIVRML, and that the Board has previously evaluated the MIVRML at Fernald and found it to be a reasonable and scientifically accurate monitoring method.

SC&A Observation 3: *SC&A's evaluation of the potential for bias in the data identified a negative bias in the Ac-228 data for the years 1981–1986 and Pb-212 for 1981–1984. NIOSH should consider developing adjustment factors to assure any negative bias in the reported results is correctly accounted for in a claimant-favorable manner.*

NIOSH Response to Observation 3: NIOSH acknowledges SC&A's evaluation and the identification of a negative bias in the Ac-228 data for 1981–1986, and Pb-212 for 1981–1984. NIOSH intends to perform a formal evaluation of the potential for bias in the data as part of developing a thorium chest-count co-exposure model.

Note: NIOSH did perform this analysis for Fernald Thorium data.

SC&A Observation 4: *Evidence suggests additional Pb/Ac in vivo data may be available that were not considered in the SEC-00250 ER due to their in vivo "type" designation. Limited analysis of omitted data discovered for January 1983 suggests the data are comparable to or in some cases greater than, the current database values under consideration. NIOSH should consider capturing and analyzing any additional data unless sufficient justification exists for omitting such monitoring results.*

NIOSH Response to Observation 4: NIOSH has hardcopy records for all 12 months of 1983 [UCC 1982–1983a,b,c; UCC 1983a,b,c,d,e,f,g,h,i]. These records contain the raw counting results, as recorded on a datasheet, associated with measurements performed in 1983 (including Ac and Pb results for all count type). NIOSH also has similar data for the period 1989–1991. NIOSH has attempted to obtain data for additional years and has requested such data from Y-12. However, Y-12 has not been able to locate any additional datasets containing such information.

The electronic dataset for the entire evaluated time period is available and is the source of the information used in the evaluation report. This electronic dataset contains Ac and Pb results for all measurements, which are identified as thorium related measurements (i.e., analysis Type 6 and 7).

NIOSH intends to perform a formal analysis of the completeness of the thorium dataset during the development of the thorium chest-count co-exposure model.

SC&A Observation 5: *Analysis of available job title information for claimants included in the available thorium in vivo dataset suggests that the monitoring program can be best described as*

"routine, representative sampling." SC&A did not identify any evidence that the monitoring program systematically excluded workers with higher exposure potential that might preclude the use of such data in coworker modeling.

NIOSH Response to Observation 5: NIOSH acknowledges SC&A's analysis of job title information for claimants in the thorium in vivo dataset. NIOSH intends to perform a formal evaluation as part of developing a thorium chest-count co-exposure model.

SC&A Observation 6: *Analysis of available departmental information included in the thorium in vivo dataset suggests the monitoring program is likely best described as "routine, representative sampling." SC&A did not identify any evidence that the monitoring program systematically excluded departments with higher exposure potential that might preclude the use of such data in coworker modeling.*

NIOSH Response to Observation 6: NIOSH acknowledges SC&A's analysis of departmental information included in the thorium in vivo dataset. NIOSH intends to evaluate the representativeness of the thorium monitoring data as part of the development of a thorium chest-count co-exposure model.

SC&A Observation 7: *Completeness analysis of the uranium data from August 1979 through December 1988 showed that quarterly, the percentage of available data in comparison to health physics reports ranged from 75 percent to 121 percent of the reported totals. The average overall evaluated quarters was 98.4 percent. Completeness analysis after this period is not currently feasible.*

NIOSH Response to Observation 7: NIOSH acknowledges SC&A's completeness analysis of the uranium data. NIOSH intends to perform a formal completeness analysis as part of the revision of the existing uranium in urine co-exposure model.

SC&A Observation 8: *The Y-12 coworker model currently uses uranium urinalysis results in developing unmonitored intakes. Urinalysis was the primary method for monitoring for uranium exposure at Y-12, and it appears to have captured the more highly exposed workers as demonstrated by the number of workers exceeding the plant action value. However, there was a substantial amount of in vivo monitoring as well. Such in vivo monitoring should be discussed in the context of developing coworker exposures to assure that the chosen method is claimant favorable.*

NIOSH Response to Observation 8: NIOSH acknowledges SC&A's review of the uranium urinalysis results. NIOSH notes there was a substantial amount of in vivo monitoring that may be discussed in the context of developing a co-exposure model to ensure the method is claimant

favorable. NIOSH intends to perform a formal evaluation as part of the revision of the uranium in urine co-exposure model.

SC&A Observation 9: *Average uranium air concentrations provided for three categories of uranium operations in the quarterly health physics reports indicate that "fabrication" (which is described as machining operations in enriched uranium areas) was consistently bounded by the other two operational categories (both of which are labeled "metal preparation").*

NIOSH Response to Observation 9: NIOSH acknowledges SC&A's review of the average uranium air-concentrations. NIOSH intends to perform a formal analysis of the need for data stratification as part of the revision of the uranium in urine co-exposure model.

SC&A Observation 10: *Evaluation of claimant monitoring records, for workers who are identified only as Machinists and who were monitored externally, found that 40–60 percent were also monitored for uranium by year. When considering whether claimant Machinists would theoretically require the application of a coworker model during dose reconstruction, SC&A found that around 51 percent would not require any coworker assignment, around 24 percent would require partial coworker assignment, and around 25 percent would require coworker assignment for all externally monitored years.*

NIOSH Response to Observation 10: NIOSH acknowledges SC&A's review of claimant monitoring records, for workers who are identified only as machinists. NIOSH intends to perform a formal analysis of the need for data stratification as part of the revision of the uranium in urine co-exposure model.

SC&A Observation 11: *SC&A has several open findings and observations for RPRT-0090 pertinent to the ER. These findings are currently under the purview of the Board for consideration.*

NIOSH Response to Observation 11: NIOSH will address these open findings that relate to ORNL and Y-12 isotope groups as a part of the response and revision of ORAUT-RPRT-90.

SC&A Observation 12: *Post-1983 Isotopes Group radioisotope exposures were not addressed in the Y-12 SEC-00250 evaluation report. In particular, the ER does not address residual exposures to contaminated areas and process equipment.*

NIOSH Response to Observation 12: NIOSH will address these open findings that relate to ORNL and Y-12 isotope groups as a part of the response and revision of ORAUT-RPRT-90.

REFERENCES

NIOSH [2019]. Special exposure cohort petition evaluation report for SEC-00250, Y-12 Plant. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. July 17. [SRDB Ref ID: 180255]

ORAUT [2018]. Monitoring feasibility evaluation for exotic radionuclides produced by the Oak Ridge National Laboratory Isotopes Division. ORAUT-RPRT-0090 Rev. 00. Oak Ridge, TN: Oak Ridge Associated Universities Team. March 29. [SRDB Ref ID: 170258]

SC&A [2020]. SC&A review of the SEC-00250 evaluation report for the Y-12 Plant. SCA-TR-2020-SEC001 Rev. 0 Draft. Arlington, VA: SC&A, Inc. February 21. [SRDB Ref ID: 180217]

UCC [1982–1983a]. In vivo input and output radiation monitoring reports January 1982 and 1983. Y-12 Plant, Oak Ridge, TN: Union Carbide Corporation. January. [SRDB Ref ID: 152358]

UCC [1982–1983b]. In vivo input and output radiation monitoring reports March 1982 and 1983. Y-12 Plant, Oak Ridge, TN: Union Carbide Corporation. March. [SRDB Ref ID: 152365]

UCC [1982–1983c]. In vivo input and output radiation monitoring reports April 1982 and 1983. Y-12 Plant, Oak Ridge, TN: Union Carbide Corporation. April. [SRDB Ref ID: 152367]

UCC [1983a]. In vivo input and output radiation monitoring reports February 1983. Y-12 Plant, Oak Ridge, TN: Union Carbide Corporation. February. [SRDB Ref ID: 152363]

UCC [1983b]. In vivo input and output radiation monitoring reports May 1983. Y-12 Plant, Oak Ridge, TN: Union Carbide Corporation. May. [SRDB Ref ID: 152369]

UCC [1983c]. In vivo input and output radiation monitoring reports June 1983. Y-12 Plant, Oak Ridge, TN: Union Carbide Corporation. June. [SRDB Ref ID: 152372]

UCC [1983d]. In vivo input and output radiation monitoring reports July 1983. Y-12 Plant, Oak Ridge, TN: Union Carbide Corporation. July. [SRDB Ref ID: 152379]

UCC [1983e]. In vivo input and output radiation monitoring reports August 1983. Y-12 Plant, Oak Ridge, TN: Union Carbide Corporation. August. [SRDB Ref ID: 152380]

UCC [1983f]. In vivo input and output radiation monitoring reports September 1983. Y-12 Plant, Oak Ridge, TN: Union Carbide Corporation. September. [SRDB Ref ID: 152381]

UCC [1983g]. In vivo input and output radiation monitoring reports October 1983. Y-12 Plant, Oak Ridge, TN: Union Carbide Corporation. October. [SRDB Ref ID: 152382]

UCC [1983h]. In vivo input and output radiation monitoring reports November 1983. Y-12 Plant, Oak Ridge, TN: Union Carbide Corporation. November. [SRDB Ref ID: 152383]

UCC [1983i]. In vivo input and output radiation monitoring reports December 1983. Y-12 Plant, Oak Ridge, TN: Union Carbide Corporation. December. [SRDB Ref ID: 152384]