

ORAUT-OTIB-0034

Internal Dosimetry Coworker Data for X-10

Report from the Subcommittee for Procedure Reviews (SCPR)

Presented to the
Advisory Board on Radiation and Worker Health
Oak Ridge, Tennessee
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ORAUT-OTIB-0034, “Internal Dosimetry Coworker Data for X-10”

- ORAUT-OTIB-0034 provides guidance for assignment of X-10 internal doses based on coworker bioassay data.
- Revision 00 issued December 13, 2005.
- SC&A’s review of Rev. 00, issued October 29, 2007, contained 4 findings.
- SCPR, NIOSH, & SC&A worked on resolution of Rev. 00 findings 2009–2014.
- Revision 01 issued April 23, 2013.
- SC&A’s review of Rev. 01 submitted November 20, 2013, contained 4 findings.
- SCPR, NIOSH, & SC&A worked on resolution 2013–2014.
- 3 findings closed, 1 finding in abeyance.

Rev. 00 – Finding 1: The procedure is not complete in terms of required data.

- SC&A explained that the document references and uses data and procedures from other documents that need to be known in order to understand the described procedures in OTIB-0034.
- NIOSH responded that it is not possible for every NIOSH document to cross-reference every other potentially applicable document, since many of them are works in progress. Additionally, NIOSH/ORAUT has a training program, and all members of their team know the most current protocol and what protocol should be used in a given situation.
- SC&A agreed with NIOSH's response and recommended the finding be closed.
- *Resolution as of June 9, 2009: The SCPR accepted SC&A's recommendation and closed this finding.*

Rev. 00 – Finding 2: The chronic exposure pattern assumed in the OTIB may not be claimant favorable at ORNL (X-10), considering the existence of numerous buildings where exact dates of operations are not known, and the dependence on area health physicists to determine if in-vivo monitoring should be done.

- NIOSH explained that chronic exposures are assumed for all coworker studies in order to account for many small, acute intakes that might have occurred and so that all time periods of site operation are covered. Additionally, the dose reconstructor's review of a worker's file, including work history, job title, CATI, and external dose history, is used to make an informed professional judgment as to whether a particular nuclide should be assigned from the coworker study.
- SC&A agreed with NIOSH's response and recommended the finding be closed.
- *Resolution as of June 9, 2009: The SCPR accepted SC&A's recommendation and closed this finding.*

Rev. 00 – Finding 3: For plutonium Type S, the chronic intake for the entire set of years was fitted to the bioassay data for the last 3 years (1986 through 1988), and all the previous years of much higher values were ignored.

- NIOSH responded that Type S intake rate is assumed to be an underestimate and only applied to compensable cases. If an overestimate or best estimate is needed for non-systemic organs, an individualized fit to the bioassay data, assuming Type S material, for the specific work period being evaluated must be performed. Table A-3 provides the bioassay data to be used to perform the individualized fit.
- However, in OTIB-0034, Rev. 01, plutonium modeling was updated to include best estimate intakes for Type S material; 95th-percentile intakes were added for all nuclides; and Attachment A data tables were expanded to include information on the number of samples and employees used in the statistical analysis.
- Based on data incorporated into Rev. 01, SC&A recommended that the finding be closed.
- *Resolution as of February 13, 2014: The SCPR accepted SC&A's recommendation and closed this finding.*

Rev. 00 – Finding 4: The assumed and predicted intake fits versus the values in the first 5 years are much less.

- NIOSH was unclear as to what was meant by this finding. In the fit to the early data, there were 8 results above the line of fit and 8 points about equally below, which would seem to indicate an adequate fit.
- SC&A reevaluated the data and agreed with NIOSH's response. SC&A recommended the finding be closed.
- *Resolution as of August 28, 2014: The SCPR accepted SC&A's recommendation and closed this finding.*

Rev. 01 – Finding 1: ORAUT-OTIB-0034 fails to mention or address potential exposure to Pu-239 Type SS in its coworker model.

- NIOSH responded that the need to consider Type Super S solubility for plutonium was addressed in Section 5.2 of OTIB-0034, Rev. 02, which was published 1/21/2014, shortly after SC&A submitted their review of OTIB-0034, Rev. 01.
- SC&A was tasked with the review of Section 5.2 of OTIB-0034, Rev. 02, and found that NIOSH adequately addressed the issue of considering the potential for Type Super S solubility for plutonium. SC&A recommended the finding be closed.
- *Resolution as of April 16, 2014: The SCPR accepted SC&A's recommendation and closed this finding.*

Rev. 01 – Finding 2: Three of the six values for the 95th percentile intake of Pu-239 Type S in Table 5-5 of OTIB-0034 are significantly lower than values derived by SC&A.

- NIOSH responded by stating that the values in Table 5-5 have been corrected and updated as indicated by SC&A in OTIB-0034, Rev. 02.
- SC&A was tasked with the review of Table 5-5 of OTIB-0034, Rev. 02, and found that NIOSH corrected the 95th percentile values to be consistent with values calculated by SC&A. SC&A recommended the finding be closed.
- *Resolution as of April 16, 2014: The SCPR accepted SC&A's recommendation and closed this finding.*

Rev. 01 – Finding 3: Guidance for the assignment of the 95th percentile intake values to unmonitored workers is currently inadequate.

- SC&A's primary concern is that the guidance is too vague for consistent interpretation by dose reconstructors to categorize an unmonitored worker as eligible for a 95th percentile intake rate.
- NIOSH indicated that updated guidance on assignment of 95th percentile intake rates has been added to Section 5.0 of OTIB-0034, Rev. 02.
- SC&A was tasked with the review of Section 5.0 of OTIB-0034, Rev. 02, and was still not satisfied that the guidance was prescriptive enough.
- NIOSH recommended that this issue be addressed in an forthcoming implementation guide (IG) regarding coworker modeling.

Rev. 01 – Finding 3 (continued): Guidance for the assignment of the 95th percentile intake values to unmonitored workers is currently inadequate.

- *Resolution as of April 16, 2014: The SCPR changed the status of the finding to “In Abeyance,” awaiting the issuance of the implementation guide.*
- The coworker IG is currently in draft form but has been reviewed by the Board. A summary of the IG’s discussion on assignment of the 95th percentile dose is as follows:
 - For workers who are considered to have worked in areas with a potential for elevated exposure, the 95th percentile exposure should be assigned during the modeled time period. An attempt to list the job categories that fall under this criterion is not recommended, since it may be artificially restrictive. This decision is most accurately made using the information available in the site profiles, the claimant interview, and other documents that might be in the worker’s records.
- This wording in the draft guide appears to adequately address Rev. 01, Finding 3. However, the SCPR will need to formally close the finding at a future meeting.

Rev. 01 – Finding 4: NIOSH’s assumption of ORNL bioassay data as representative of a full day (24 hours) of urinary excretion is subject to question.

- SC&A explained that the ORISE/CER urinalyses data show that for all bioassays, the dpm/24-hour activity values are consistently a factor of 10 higher than the dpm/sample values.
- NIOSH provided a copy of the data dictionary, which showed that the value in the “dpm/24” column in both the “1951 – 1978” and “1979 – 1985” datasets is expressed to one decimal place. Within this format, the integer value expressed as “000000001” is actually the real number value “0.1.”
- *Resolution as of April 16, 2014: Based on this explanation, SC&A and the SCPR concluded the samples represent a 24-hour excretion, and the SCPR closed the finding.*

Questions?