



MEMORANDUM

TO: Nevada Test Site Work Group
FROM: SC&A, Inc.
DATE: December 16, 2016
SUBJECT: SC&A's Position on Comment 8 – Resuspension Issues at the Nevada Test Site

Introduction and Background

Revision 03 to ORAUT-TKBS-000804 (ORAUT 2012a), the occupational environmental dose technical basis document (TBD) for the Nevada Test Site (NTS), was put into effect on August 24, 2012. As part of its review of this document, SC&A delivered the white paper, *Status Report on Resuspension Issues at the Nevada Test Site* (SC&A 2015), which contained eight main comments. In that white paper, SC&A compared the guidance in ORAUT (2012a) against individual dose reconstructions for the NTS that fit the following criteria:

- Covered employment after 1962
- Probability of causation less than 50%
- Dose reconstruction performed after ORAUT (2012a) was put into effect

These criteria were chosen because these types of claims would be the most appropriate candidates for application of ORAUT (2012a) methods. A total of 241 claimant dose reconstructions were examined. SC&A determined that several different methods had been employed to reconstruct environmental internal doses at the NTS. This raised concerns about the consistency among individual dose reconstructions regarding application of ORAUT (2012a) guidance. This was the subject of Comment 8 which is the topic of this memorandum. Specifically, Comment 8 of SC&A (2015) states:

A comparison of actual NIOSH dose reconstructions with the guidance provided in the TBD reveals that there are discrepancies and inconsistencies between the TBD guidance and the actual dose reconstructions. These inconsistencies need to be discussed with the WG [work group].

On June 6, 2016, the National Institute for Occupational Safety and Health (NIOSH) delivered a white paper response specific to SC&A's concerns about consistent application of dose reconstruction methods (NIOSH 2016). That document contained a thorough and transparent discussion of the evolving dose reconstruction methods since the program's inception as well as the need for individualized methods depending on the unique characteristics of a specific dose reconstruction. NIOSH noted that the program itself allows for the individual dose reconstructor to use professional judgment when assigning environmental intakes or a combination of environmental intakes and other methods, such as

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ORAUT-OTIB-0018, *Internal Dose Overestimates for Facilities with Air Sampling Programs*, Revision 01 (ORAUT 2005; hereafter “OTIB-0018”), within the framework of claimant favorability. Furthermore, NIOSH states:

NIOSH agrees that, over the years, the lack of detailed instructions and the evolution of project- and NTS-specific guidance has resulted in inconsistencies in the manner in which OTIB-0018 and environmental intakes are assigned and the resultant doses evaluated. However, these inconsistencies have not resulted in any discernible effect on case decisions. [NIOSH 2016, p. 7]

NIOSH has recommended the following instructions (excerpted from NIOSH 2016¹) be added in the next revision to the NTS occupational environmental dose TBD for use in dose reconstruction:

1. Assign environmental intakes for all employees who were issued dosimetry at NTS between 1963 and 1992 and to all employees after 1993.
2. Beginning in 1993, OTIB-0018 can be applied in lieu of environmental intakes as an overestimating technique for cases that do not require a best estimate.
3. Beginning in 1993, OTIB-0018 intakes may be applied in lieu of evaluating claims that had bioassay results (in vivo and in vitro) that were less than the minimum level of detection (i.e., <MDA), or had relatively-low positive results reported (see Tables 7-1 and 7-2 of ORAUT 2005).
4. When OTIB-0018 intakes are assigned, environmental intakes do not need to be assigned but may be assigned for claimant favorability.
5. If the energy employee’s (EE’s) employment periods for the Tonopah Test Range (TTR) and the NTS overlap for less than a year, the NTS environmental intakes may be assigned for the entire employment periods for claimant favorability.
6. For short-duration employment/visits to the NTS (typically less than a single month in any given year), in which the assignment of environmental intakes would result in internal dose of less than 0.001 rem, the environmental intakes do not need to be evaluated, because these doses would not affect the overall dose to the organ(s).
7. If there was only employment at the TTR, or employment at the TTR for more than a year that did not overlap with employment at the NTS, the TTR environmental intakes should be assigned.
8. Prior to 1993, for periods greater than a year, if no external dosimeter data are available, the assumption should be made that the EE was not on site at the NTS and environmental intakes

¹ Note that these recommended instructions appear in a bulleted, not numbered, list in NIOSH 2016. We have numbered them in this memo for ease of discussion.

should not be assigned. However, for these periods, environmental intakes may be assigned for claimant favorability for cases that do not require a best estimate.

Discussion of NIOSH Response

In reviewing NIOSH's response and path forward, SC&A has five comments and/or requests for clarification for consideration by NIOSH and the Advisory Board on Radiation and Worker Health (Advisory Board) related to the proposed dose reconstruction instructions.

1. Instruction 1 indicates that environmental intakes will be assigned beginning in 1963 due to the existence of Special Exposure Cohort (SEC) 0055 (January 27, 1951, to December 31, 1962). The rationale for establishing this SEC was the lack of sufficient internal monitoring data to reconstruct internal exposures. This is the same rationale used for establishing SEC-0084 (January 1, 1963, to December 31, 1992). It must be noted that it is SC&A's position that ambient environmental intakes should be assigned beginning on July 17, 1962, which coincides with the cessation of atmospheric testing.

However, it would be beneficial for NIOSH to address the period before this date regarding the feasibility of reconstructing ambient environmental doses. SC&A recognizes that the radiological environment occurring during the period of above-ground testing would be decidedly different than the ambient radiological environment during below-ground testing. Thus, it may not be feasible to construct a sufficiently accurate model to assign environmental doses prior to July 17, 1962. However, the next revision of the occupational environmental dose TBD (ORAUT 2012a) would benefit from a more substantive discussion about the feasibility of reconstructing such exposures.

2. Instructions 2 and 3 indicate the use of OTIB-0018 to assign intakes after 1992 (i.e., post-SEC period). This method is assumed to account for both occupational and environmental internal dose. However, Instruction 2 indicates that OTIB-0018 would not be used to assign environmental intakes if a "best estimate" dose reconstruction is required. It is not clear whether OTIB-0018 would still be used in "best estimate" cases to assess occupational internal dose to unmonitored workers.

Typically, it is preferable to construct coworker intakes for unmonitored workers based on available bioassay data. However, as noted in the 1993 NTS document, *Technical Basis for Internal Dosimetry at the Nevada Test Site* (REECO 1993), the number of workers on a routine bioassay program is severely limited (300 of the approximately 12,000 employees, or ~2.5%). A review of 100 randomly selected NTS claimants affirms the limited internal monitoring for most workers. Of those 100 claims, only 5 appeared to have been on a reasonably consistent whole body count schedule for gamma emitters. Other types of internal monitoring, such as urinalysis for plutonium, were even less prevalent. Therefore, it may not be feasible to construct a coworker model with sufficient accuracy post-1992; however, the TBD would benefit from a thorough discussion of the issue.

Finally, OTIB-0018 was designed as an efficiency measure for facilities with a sufficiently robust air sampling program. REECO (1993) provides a thorough discussion of the air sampling program implemented at NTS in the context of compliance with the U.S. Department of Energy

(DOE) *Radiological Control Manual* (DOE 1992; also known as the “RadCon manual”) as well as DOE Order 5480.11, *Radiation Protection for Occupational Workers* (DOE 1988). Operational air sampling reports produced in 1993 affirm a robust air sampling program. Therefore, SC&A feels that the methods described in OTIB-0018 are sufficient to bound both occupational and environmental internal dose.

3. Instructions 4 and 8 indicate cases for which environmental intakes are not required to be included in the dose reconstruction but could be included in the dose estimate (presumably at the discretion of the individual dose reconstructor). Clearly, inclusion of environmental intakes in addition to OTIB-0018 intakes (Instruction 4) or in cases where there is no external dosimetry prior to 1993 (Instruction 8) is an added layer of claimant favorability that one could argue is not required. However, this also opens up the possibility that the same claim could be evaluated differently depending on the judgment of the individual dose reconstructor. It may be advantageous to standardize the decision to assure more consistency among the claimant dose reconstructions.
4. Instructions 5 and 7 involve situations in which the EE worked at both TTR and the NTS. Instruction 5 indicates that if there was overlap of employment at both sites for less than 1 year, the NTS intakes should be assumed. Instruction 8 indicates that if employment was only at TTR with no overlap at NTS, then the TTR intakes should be assigned. Neither instruction appears to address situations in which TTR and NTS employment overlap for more than 1 year. Presumably, the more claimant-favorable NTS intakes would be assigned in this case.
5. The section, “Path forward for the Application of Ambient Environmental Intakes at the NTS,” in NIOSH 2016 indicates that derived environmental intakes are considered bounding and will be applied as a constant. However, if the dose reconstruction requires a “best estimate,” then only 10% of the derived environmental intakes will be applied assuming a lognormal distribution with a geometric standard deviation of 3. The section cites ORAUT-PROC-0031, *Site Profile and Technical Basis Document Development*, Revision 04 (ORAUT 2012b); however, SC&A did not identify guidance in that document to indicate the use of a 90% reduction factor. SC&A recognizes that use of a 10% reduction factor has been used in circumstances where a lower exposure potential is indicated for a given job type (for example, administrative/supervisor job categories). SC&A is unaware of the technical basis for using the 10% reduction factor based on the type of dose reconstruction (overestimate versus best estimate). NIOSH should provide justification for the use of 10% of the derived environmental intake or, alternately, provide the underlying documentation and references supporting this as a general programmatic policy.

In general, SC&A appreciates the transparency and thoroughness of the discussion of the historical evolution of dose reconstruction methods presented in NIOSH 2016. Such discussion and documentation is helpful not only to SC&A and the Advisory Board, but also to other interested parties, such as worker advocates and the claimants themselves. SC&A also acknowledges that the dose reconstruction process involves constantly evolving methods that are not always reflected in the most recent TBDs, as these documents can sometimes take several years to revise. NIOSH and SC&A are in agreement that, to the extent feasible, the dose reconstruction program should strive for as much consistency as possible. In essence, if a claim were to be evaluated by several different dose reconstructors, the derived doses and probability of causation would be as close to identical as is

reasonable. To that end, the inclusion of specific instructions such as those presented in NIOSH 2016 provides the appropriate framework to achieve such goals.

References

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ORAUT 2012b. *Site Profile and Technical Basis Document Development*, ORAUT-PROC-0031, Revision 04, Oak Ridge Associated Universities Team. November 5, 2012.

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