



MEMO

TO: Dose Reconstruction Review Methods Work Group

FROM: Rose Gogliotti, SC&A

DATE: March 11, 2016

SUBJECT: Consistency in Dose Reconstruction

During the Dose Reconstruction Review Methods Work Group Teleconference held on November 5, 2015, the Work Group discussed ways in which the dose reconstruction (DR) review process could be modified to better assess how consistently assumptions that require judgment by the dose reconstructor are applied to DRs. SC&A was tasked with using institutional knowledge to suggest possible areas where there may be inconsistencies and to propose possible ways to investigate consistency issues through DR. This memo satisfies that request.

Historically, SC&A has performed two types of DR-related reviews: 1) DR reviews and 2) blind DR reviews. These review types target different aspects of the DR process. A DR review looks at a previously completed National Institute for Occupational Safety and Health (NIOSH) DR and compares the DR against guidance documents. DR reviews identify technical and quality assurance (QA) errors to measure how well Oak Ridge Associated Universities Team (ORAUT)/NIOSH follow their own technical guidance documents. Alternatively, in a blind DR review, SC&A independently completes a DR and then compares its review to the DR completed by NIOSH for the same claimant. Blind reviews are intended to quantify how well two independent dose reconstructors interpret the same data and guidance documents, and seek to identify key decision points that might affect a compensation decision. Blind DR reviews do not identify errors in the form of findings; instead, differences between the SC&A and NIOSH dose reconstructions are outlined in a comparison report. At the discretion of the Dose Reconstruction Subcommittee (DRSC), discrepancies from the comparison report are discussed in the DRSC forum; however, only those discrepancies that may impact the compensation decision are typically investigated further by the DRSC. Given the differences outlined above, SC&A believes that a non-blind approach is better suited for a consistency comparison.

In order for the Advisory Board to effectively use the non-blind DR approach to target consistency-related issues, the criteria for selecting cases would need to be modified to reflect the change in priorities. A non-blind DR approach is best used to verify if assumptions are consistently applied within a specific site. To do this, a set number of cases from a single site should be selected for review. To obtain a useful comparison, the selected cases should have similar employment histories. Once the reviews were completed, a report comparing the assumptions used in each approach would be generated that highlights inconsistencies through

the use of findings. SC&A suggests the Advisory Board first target sites without formal, reviewed Technical Basis Documents (TBDs) that may or may not have accompanying templates. While, in general, these sites tend to have fewer employees and thus fewer claimants, the DR approach is far less prescriptive than for the larger, more complex sites. With less formal DR guidance, SC&A believes that these cases are more likely to contain inconsistencies in approach. A drawback of this type of review is that SC&A has not been tasked to review the DR templates for technical merit. Thus, while this approach would help to verify consistency, the question of technical adequacy remains.

Another possible approach to target consistency-related issues is to limit the review scope to only certain aspects of the DR review process (i.e., focused or partial reviews). Reviewers could look at a single aspect of a number of cases to identify potential inconsistencies. Although a partial or focused approach has never been applied to DR reviews, there is nonetheless precedence for this type of approach: Subtask 4 of Program Evaluation Reports (PER) Reviews involves a focused review of only the aspects of select cases impacted by a PER. This approach could be extended to the investigation of consistency in the DR process by focusing on a single aspect or select aspects of multiple DRs. This would enable reviewers to look at a large sample of similar cases to verify that a consistent approach was applied within the sample. It is important to keep in mind that partial reviews do not substantially reduce the amount of work needed to research background information on a given type of case; however, they would reduce the time spent on each individual review.

Similar to the suggested non-blind approach, for a partial review a set number of cases for a given criteria should be selected and reviewed, limiting the scope of the review to the targeted criteria. Once the partial reviews are completed, a report comparing the assumptions used in each DR would be generated that highlights inconsistencies through the use of findings. To effectively use a partial approach, the Advisory Board would need to carefully select specific criteria to target in order to identify aspects of the DR process where consistency issues are most likely to arise. Based on SC&A's institutional knowledge, some potential criteria to target are listed below; however, a more exhaustive list could be developed through a thorough analysis of past DR reviews.

- 1. Coworker Dose** – Coworker dose is typically assigned as a 50th and 95th percentile. Selection of which percentile should be applied to a DR has a very significant impact on the dose assigned to an energy employee (EE). SC&A has long felt that the limited instructions provided to aid dose reconstructors in selecting the appropriate percentile of the dose distribution to assign may lead to an inconsistent application of assumptions. *Recommendation: Select numerous cases from a single site where coworker dose was applied and compare the percentile applied with case specifics to analyze if consistent assumptions are applied to select the percentile assigned.*
- 2. Location of Skin Cancers** – The location of a skin cancer is very important when determining the appropriate x-ray dose. Many claimants have multiple skin cancers, and the assignment of x-ray doses can greatly impact the total assigned dose and resulting probability of causation (POC). One example is a skin cancer listed as being on the back: a cancer located in the middle of the back would be assigned greater x-ray dose than

those located elsewhere on the back; additionally, left or right side is important. Another example includes skin cancers located on the scalp, face, and neck: the assigned dose varies depending on the location of the cancer, which is not always specific in the U.S. Department of Labor (DOL) files. *Recommendation: Select cases that have similar back and head skin cancers.*

3. **Use of In-vitro and/or In-vivo Data** – It is not apparent that there is consistency in the selection of the bioassay data used to derive internal intakes and resulting doses. Sometimes both in-vitro and in-vivo data are used, sometimes only one, and sometimes comparisons are performed, with the greater intake/dose used—or discarded if it exceeds some of the other results. *Recommendation: Select some cases with EEs who would have potentially numerous bioassays, such as operators, over long employment periods.*
4. **Construction Trade Worker Determination** – Despite not being monitored in many instances, many Construction Trade Workers (CTWs) have been determined to have elevated risks of exposure during employment. Unmonitored workers who are classified as CTWs are assigned unmonitored dose 1.4 times greater than non-CTWs. An abbreviated list of construction careers is provided in ORAUT-OTIB-0052; however, the determination of careers that qualify as CTW is largely left up to the dose reconstructor. SC&A questions if construction careers outside the short list are consistently processed as CTW claims. *Recommendation: Select cases with unmonitored dose applied and construction careers not listed in ORAUT-OTIB-0052 (e.g., heavy equipment operators, millwrights, maintenance workers, etc.) and verify CTW coworker dose was applied consistently.*
5. **Glovebox Factor** – It is not apparent what criteria are used to determine if a glovebox correction factor is applied. In some cases, it appears to be the years that the EE had extremity monitoring; in other cases, it depends on if the EE worked at a glovebox; and in others it appears to be the ratio of the shallow to deep dose. *Recommendation: Select some cases where the EE may have worked with gloveboxes and/or had shallow dose exposures over long employment periods.*
6. **Exposure Area Criteria** – It is not always apparent in the DR reports what criteria are used to determine whether an EE's work involved exposure to environmental (non-radiation) areas, general work areas (such as laborer), or operational areas (i.e., production area) and whether that changed during the EE's employment history. If badging and bioassaying were intermittent, or if DOL files do not provide details of job assignments (with dates), this is sometimes a subjective decision without apparent support in the DR reports. *Recommendation: Select cases from a site that did not have consistent monitoring practices, workers with numerous job titles, and/or sites that performed Atomic Energy Commission/U.S. Department of Energy work intermittently.*
7. **Oak Ridge Sites** – For EEs who worked at multiple Oak Ridge sites (Oak Ridge National Laboratory, Y-12, and/or K-25), it is not always obvious what facility performed the dosimetry, bioassays, and x-ray exams, and the records are sometimes intertwined. Determination of the correct TBD to use is sometimes subjective and not

always supported in the DR report; this leads to potential inconsistency in the DR for different cases. *Recommendation: Select Oak Ridge cases where EEs worked at multiple sites.*

Selecting cases for a partial review comparison will be somewhat challenging, because, in order to be compared for consistency in approach, depending on the criteria being investigated, the cases must have similar exposure history, work locations, and employment dates. Additionally, because the program has matured over time, cases selected for comparison should have been completed within similar time periods to ensure the same procedure revisions are used.

SC&A stresses the importance of selecting numerous cases with similar employment characteristics for any consistency investigation. A minimum of two cases are needed for a consistency comparison; however, SC&A recommends a greater number of cases be selected for a more statistically sound comparison. Cases for any type of consistency review would also need to be selected with POCs near the 50% threshold to ensure best-estimate assumptions were applied. Efficiency claims (minimizing and maximizing) are not suited for a consistency review because efficiency cases do not aim to accurately calculate POC but rather seek to confirm the expected compensation decision. As a result, consistency in approach is less important.