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OCAS-PER-025, SUBTASK 4

REVIEW OF ONE IMPACTED CASE REWORKED FOR THE EVALUATION OF SHALLOW DOSE FROM THE HUNTINGTON PILOT PLANT

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Record of Revisions

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1.0 RELEVANT BACKGROUND INFORMATION

S. Cohen and Associates (SC&A) was tasked by the Advisory Board to conduct a review of OCAS-PER-025, *Huntington Pilot Plant TBD Revision* (OCAS 2007). The terms *Huntington Pilot Plant* and *Reduction Pilot Plant* are often used interchangeably; therefore, the term Huntington Pilot Plant (HPP) will be used in this report. OCAS-PER-025 was issued to determine the number of claims impacted by the revision to the HPP technical basis document (TBD). That revision provided an estimate of shallow dose (electron dose) that did not appear in the original version of the TBD. Electron dose is used primarily for skin dose estimates, but also for the breast and testes.

On July 18, 2013, SC&A submitted to the Procedures Review Subcommittee (PRSC) our review of NIOSH's program evaluation report (PER), OCAS-PER-025 (SC&A 2013). In conducting a PER review, SC&A is committed to perform five subtasks, as specified below:

Subtask 1: Assess NIOSH's evaluation/characterization of the "issue" and its potential impacts on Dose Reconstruction (DR). Our assessment intends to ensure that the "issue" was fully understood and characterized in the PER.

Subtask 2: Assess NIOSH's specific methods for corrective action. In instances where the PER involves a technical issue that is supported by document(s) (e.g., white papers, technical information bulletins, procedures) that have not yet been subjected to a formal SC&A review, Subtask 2 will include a review of the scientific basis and/or sources of information to ensure the credibility of the corrective action and its consistency with current/consensus science. Conversely, if such technical documentation has been formalized and previously subjected to a review by SC&A, Subtask 2 will simply provide a brief summary/conclusion of this review process.

Subtask 3: Evaluate the PER's stated approach for identifying the universe of potentially affected DRs, and assess the criteria by which a subset of potentially affected DRs was selected for re-evaluation. The third step may have important implications in instances where the universe of previously denied DRs is very large and, for reasons of practicality, NIOSH's re-evaluation is confined to a subset of DRs that, based on their scientific judgment, have the potential to be significantly affected by the PER. In behalf of Subtask 3, SC&A will also evaluate the timeliness for the completion of the PER.

Subtask 4: Conduct audits of DRs affected by the PER under review. The number of DRs selected for audit for a given PER will vary, based on important elements such as (1) the number of target organs/tissues that may be impacted by a PER, (2) the method/data that were employed in the original DR, and (3) the time period, work location, and job function(s) that characterize the DR of a claim. (It is assumed that the selection of the DRs and the total number of DR audits per PER will be made by the Advisory Board.)

Subtask 5: Prepare a comprehensive written report that contains the results of the above-stated subtasks, along with our review conclusions.

This report fulfills the requirement defined in Subtask 4, "Conduct audits of DRs affected by the PER under review." Under Section 2.0 of OCAS-PER-025, NIOSH identified the following set of criteria for identifying those claims for which shallow dose may be necessary, which in turn may require application of the electron dose.

> *Claims in which the external target organ is skin, breast, or testes may be affected if they were completed prior to revision 1 of the TBD.*

Using this criterion, NIOSH identified only one case that was completed before Rev. 01 of the HPP TBD was released (ORAUT 2004). SC&A reviewed the potential claims on the NIOSH/OCAS Claims Tracking System (NOCTS) database and concurs with NIOSH's identification of the case potentially impacted by OCAS-PER-025. Therefore, SC&A recommended that the Advisory Board assign this case for SC&A's evaluation concerning the correct implementation of OCAS-PER-025.

At the November 7, 2013, PRSC meeting, the subcommittee selected the reworked case in accordance with SC&A's recommendations and tasked SC&A with reviewing the reworked DR. It was determined that SC&A's review should be limited to evaluating only those methods and corrective actions introduced in the re-evaluated DR that relate strictly to issues addressed in OCAS-PER-025. Presented in Section 2.0 below is SC&A's focused review to determine whether the shallow doses associated with the case were correctly assigned per recommendations in OCAS-PER-025.

2.0 REVIEW OF OCAS-PER-025 ISSUE FOR CASE [REDACTED] (HPP)

2.1 BACKGROUND INFORMATION FOR CASE [REDACTED]

Case [redacted] represents an energy employee (EE) who worked at the HPP from [redacted], through [redacted], and [redacted], through [redacted]. During this worker's employment, the EE's job title was [redacted] and, according to the Computer-Assisted Telephone Interview (CATI), the EE worked throughout the site [redacted]. The EE was not monitored for external photon and electron exposures during employment; therefore, the recommendation for assigning dose values from ORAUT-TKBS-0004 (ORAUT 2003), Table 6, page 17, was used in this case. The EE was diagnosed with l[redacted] (ICD Code [redacted]) in [redacted].

2.2 COMPARISON OF NIOSH'S ORIGINAL AND REWORKED DOSE RECONSTRUCTIONS

NIOSH performed the original DR of Case [redacted] in [redacted]. The claim was reworked in [redacted] due to revisions in the TBD for HPP, as well as a change in the dates of employment for the EE. The original employment dates were [redacted]; the later confirmed dates by the Department of Labor (DOL) were [redacted] and [redacted].

NIOSH indicated that the original DR was a **reasonable overestimate** of dose, and the revised DR was a **reasonable estimate** of dose. In the original DR, NIOSH calculated a dose of **[redacted]** to the **[redacted]**. Based on this assigned dose estimate, the DOL determined the probability of causation (POC) to be **[redacted]** and the claim was denied.

Using the most current technical guidance documents, a **[redacted]** dose of **[redacted] rem** was assigned in the revised DR. Table 1 provides a comparison of the original and revised external and internal organ dose estimates for the **[redacted]**. It should be noted that the values cited in Table 1 were extracted directly from NIOSH's reworked DR Report. With the exception of external shallow doses, SC&A has not assessed the accuracy/correctness of these doses, since performing such an assessment is beyond the scope of this Subtask 4 report.

Table 1. Comparison of NIOSH-Derived External/Internal Dose Estimates Assigned for the [redacted] in the Original and Reworked DRs

Dose Categories	Original Dose (rem)	Revised Dose (rem)
External	[redacted]	[redacted]
Medical X-ray	[redacted]	[redacted]
Internal	[redacted]	[redacted]
Total	[redacted]	[redacted]

As shown in Table 1, a revised **[redacted]** dose of **[redacted]** rem was derived by NIOSH. According to the DOL files, the revised POC was **[redacted]**.

2.3 SC&A'S REVIEW OF OCAS-PER-025 ISSUE RELATED TO CASE [REDACTED]

As directed by the PRSC, SC&A's review of Case [redacted] strictly focused on revised shallow doses, as specified in OCAS-PER-025. Case [redacted] required the DR to be reworked, since the cancer site was the [redacted] (which could be impacted by shallow dose).

Original DR

The original DR, performed in [redacted], did not assign shallow dose, and there were no recommendations in Rev. 00 of the HPP TBD (ORAUT 2003) for shallow dose assignments.

Reworked DR

In the reworked DR, performed in [redacted], NIOSH did not assign shallow dose, did not mention shallow dose in the DR Report, and did not refer to OCAS-PER-025. SC&A investigated this issue, because OCAS-PER-025 (OCAS 2007), HPP TBD Rev. 01 (ORAUT 2004, page 12), and HPP TBD, Rev. 00 (OCAS 2008, page 17) all contain recommendations for assigning shallow dose. Therefore, the reworked DR, being performed in [redacted], would have been expected to incorporate shallow dose into the reworked DR according to the revised TBD and OCAS-PER-025. The claimant's file on the NOCTS database lists *PER #025* at the top of page, and contains a letter dated [redacted], informing the claimant that the case would be reworked under OCAS-PER-025, and the DR was reworked in [redacted].

SC&A's Evaluation

SC&A's investigation indicates that, while the reworked DR Report used the EE's job category of "Production Worker" (page 5 of the DR Report) for assignment of photon dose from Table 6 of the TBD, and also used "Production Worker" for internal intakes (page 6 of the DR Report), which included the intake values for production workers from Table 5 of the TBD, NIOSH apparently did not consider the EE a production worker when applying shallow dose from Table 6 of OCAS-TKBS-0004 (OCAS 2008, page 17), which is reproduced below as Exhibit A. As can be seen from this table, the DR has the choice of assigning an annual shallow dose of 0.540 rem for Operators, 0.270 rem for other Production Workers, or none for Administrative Workers (the 1.000 rem to the hands and forearms would not apply in this case). Apparently, NIOSH did consider the EE a production worker for other exposures, but not for shallow doses.

Although NIOSH's choice to assign dose to this EE as an [redacted] is somewhat subjective, SC&A found that, based on statements made on page 8 of the CATI Report, the EE was involved in [redacted] (the EE was not generally involved in [redacted] away from the production facility). Therefore, SC&A concluded that the EE would have had the potential for shallow dose exposures from [redacted], which prompted the following finding:

Finding #1: Since the EE had the potential for shallow dose exposure as an [redacted] in operations and the [redacted] was the site of the [redacted], shallow dose should have been assigned. The most appropriate category from Table 6 of the TBD would have been *other Production Workers* at 0.270 rem/year, >15 keV electrons, for the years 1960–1963. This dose would be modified by clothing and overlying tissue attenuation, which would result in a dose

multiplication factor of 0.3 per ORAUT-OTIB-0017 (ORAUT 2005, page 18). An example of the annual shallow dose to the [redacted] would be as follows:

Shallow dose = 0.270 rem × 0.3 = 0.081 rem/year

For the period 1960–1963, this would result in a total dose of 0.324 rem to be added to the reworked DR dose of [redacted] rem. Assigning this additional dose in the Interactive RadioEpidemiological Program (IREP) Input table and running the POC program results in a POC of [redacted].

Exhibit A: Table 6 from OCAS-TKBS-0004

Table 6. Summary of External Doses

Production Workers[c]				
Start[a]	End[a]	Dose Type	Annual dose, rad[b]	Radiation and energy
01/01/1956 01/01/1978	12/31/1963 12/31/1979	Deep Dose	0.065	photons 30 - 250 keV 50% > 250 keV 50%
01/01/1956 01/01/1978	12/31/1963 12/31/1979	Shallow Dose	0.540 (Operators) 0.270 (other Production Workers)	electrons > 15 keV
		Shallow Dose (hands and forearms)	1.000 (Operators and Maintenance only)	electrons > 15 keV
Administrative Workers[c]				
Start	End	Dose Type	Annual dose, rad[b]	Radiation and energy
01/01/1956 01/01/1978	12/31/1963 12/31/1979	Deep Dose	0.033	photons 30 - 250 keV 50% > 250 keV 50%
01/01/1956 01/01/1978	12/31/1963 12/31/1979	Shallow Dose	none	

(a) Doses are normalized to calendar days and are to be assigned based on actual start and stop dates of covered employment during the listed covered period.
(b) Whole body photon doses are to be converted to organ doses using the Kerma to Organ Dose conversion factors (US DHHS 2007).
(c) See Section 6 for determination of Production or Administrative Workers.

3.0 SUMMARY CONCLUSIONS

Under SC&A's *A Protocol to Review NIOSH's Program Evaluation Reports (PERs)* (SC&A 2009), Subtask 4 requires the audit of DR case(s) reworked as a result of the PER under review. For OCAS-PER-025, there was only one case that met the applicable criteria.

During the November 7, 2013, PRSC meeting, SC&A was tasked with evaluating this case concerning the application of OCAS-PER-025.

This current report satisfies the Subtask 4 requirement. For the one case impacted by OCAS-PER-025, SC&A provided an overview of the case and a brief comparison of external and internal doses assigned in the original and revised DRs. Based on directives from the PRSC, SC&A's audit of this case focused strictly on those elements of the DR that were affected by the issuance of OCAS-PER-025. Therefore, our audit determined if shallow dose was appropriate for this case, and if so, if it was assigned correctly.

As discussed in Section 2, SC&A found that NIOSH did **not** assign shallow dose as recommended by OCAS-PER-025. Therefore, SC&A had one finding associated with the rework of the case selected for review by the PRSC in behalf of OCAS-PER-025. The correction of the error identified in this finding would have a small impact on the case and not affect the outcome of the compensation of the case.

4.0 REFERENCES

OCAS 2007. *Huntington Pilot Plant TBD Revision*, OCAS-PER-025, Rev. 00, National Institute for Occupational Safety and Health, Office of Compensation Analysis and Support, Cincinnati, Ohio. September 27, 2007.

OCAS 2008. *Technical Basis Document for the Huntington Pilot Plant, Huntington, West Virginia,* OCAS-TKBS-0004, Rev. 00, Oak Ridge Associated Universities Team, Cincinnati, Ohio. August 13, 2008.

ORAUT 2003. *Technical Basis Document: Basis for Development of an Exposure Matrix for Huntington Pilot Plant,* ORAUT-TKBS-0004, Rev. 00, Oak Ridge Associated Universities Team, Cincinnati, Ohio. October 31, 2003.

ORAUT 2004. *Technical Basis Document: Basis for Development of an Exposure Matrix for Huntington Pilot Plant,* ORAUT-TKBS-0004, Rev. 01, Oak Ridge Associated Universities Team, Cincinnati, Ohio. January 16, 2004.

ORAUT 2005. *Technical Information Bulletin: Interpretation of Dosimetry Data for Assignment of Shallow Dose,* ORAUT-OTIB-0017, Rev. 01. Oak Ridge Associated Universities Team, Cincinnati, Ohio. October 11, 2005.

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U.S. DHHS (United States Department of Health and Human Services) 2007. *External Dose Reconstruction Implementation Guideline*, Rev. 3, Appendix B, National Institute of Occupational Safety and Health, 2007.