
DRAFT

**DCAS-PER-033, SUBTASK 4
REVIEW OF IMPACTED CASES REWORKED FOR THE
EVALUATION OF INTERNAL INTAKES AND SHALLOW
DOSE FROM THE HUNTINGTON PILOT PLANT**

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S. Cohen & Associates: <i>Technical Support for the Advisory Board on Radiation & Worker Health Review of NIOSH Dose Reconstruction Program</i>	Document No. DCAS-PER-033, Subtask 4 Review
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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 on Radiation and Worker Health to conduct a review of DCAS-PER-033, *Huntington Pilot Plant TBD Revision* (DCAS 2011). 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. DCAS-PER-033 was issued to determine the number of claims impacted by the revision to the HPP technical basis document (TBD) of 2008, OCAS-TKBS-0004 (OCAS 2008). The revised TBD provided an increase in the recommended internal intakes for the periods 1956–1963 and 1978–1979, and additional hand/forearm shallow dose recommendations.

On July 18, 2013, SC&A submitted to the Procedures Review Subcommittee (PRSC) our review of NIOSH’s program evaluation report (PER), DCAS-PER-033 (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.

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This report fulfills the requirement defined in Subtask 4, “Conduct audits of DRs affected by the PER under review.” Under Section 2.0 of DCAS-PER-033 (DCAS 2011), NIOSH identified the following issue, for which some cases may require re-evaluation.

Several changes in the Dose Reconstruction methodology occurred in this revision to the TBD. Most changes reflect a decrease in the estimated dose. However, the estimate of internal dose increased from 1956 through 1963 and for 1978 and 1979. The inhalation estimate for operators went from approximately 3.83 pCi/day (1400 pCi/yr) to 44 pCi/day. The original intake was the geometric mean of a lognormal distribution with a geometric standard deviation of 4.3. The new estimate is a single bounding value.

Using the following criteria as outlined in Section 3.0 of DCAS-PER-033, NIOSH identified 32 cases that were completed before OCAS-TKBS-0004 (OCAS 2008) was released.

1. *Probability of Causation (PC) less than 50%*
2. *Most recent version of the dose reconstruction approved by DCAS on or prior to August 13, 2008*
3. *Employed at the Reduction Pilot Plant between 1956 and 1963 or during 1978 or 1979*

According to DCAS-PER-033, NIOSH recalculated all the external and internal doses for all 32 cases using the dose recommendations in OCAS-TKBS-0004 (OCAS 2008) and found that, while some of the probability of causation (POC) values increased and some decreased, none of the POCs exceeded 50%; therefore, NIOSH did not ask the Department of Labor (DOL) to return any of the claims for a complete DR revision.

SC&A reviewed the potential claims on the NIOSH/DCAS Claims Tracking System (NOCTS) database and concurs with NIOSH’s identification of the number of cases potentially impacted by DCAS-PER-033. Therefore, SC&A recommended that the Advisory Board assign the necessary cases for SC&A’s evaluation concerning the correct implementation of DCAS-PER-033.

At the November 7, 2013, PRSC meeting, the following criteria for evaluation of reworked cases for DCAS-PER-033 were selected:

For PER-033, HPP, the applicable criteria for selection of cases are as follows (must have POC<50% and DR after 8/13/2008):

- 1) *A case that includes internal dose assignment during 1956–1963 and/or 1978, and/or 1979 (these are the periods the intakes increased).*
- 2) *A case that includes shallow dose assignment to the hands and forearms during the period 1956–1963 and/or 1978, and/or 1979 (there [sic] are the periods of additional recommendations).*

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SC&A was tasked with reviewing the applicable reworked dose evaluations. It was determined that SC&A's review should be limited to evaluating only those methods and corrective actions introduced in the re-evaluated dose that relate strictly to issues addressed in DCAS-PER-033. Two relevant cases were provided to SC&A by NIOSH on December 9, 2013. Presented in Section 2.0 is SC&A's focused review to determine whether the internal doses and hand/forearm doses associated with the two selected cases were correctly assigned per recommendations in DCAS-PER-033. In reviewing the two cases selected by the PRSC, SC&A found that the NIOSH file "PER-033 Reduction Pilot Plant.xls" dated June 5, 2013, appears to list the incorrect *PER CLAIM ID* cross reference code to the case number for Cases #**[A – redacted]** and #**[B – redacted]**. Comparing the POC values from the original and reworked cases, SC&A found that the POC values listed in the table in Section 3.2 of DCAS-PER-033, page 2, match Case #**[A – redacted]** to Claim AE, and Case #**[B – redacted]** to Claim R; whereas, the "PER-033 Reduction Pilot Plant.xls" document lists Case #**[A – redacted]** as Claim P, and Case #**[B – redacted]** as Claim AB. This did not impact the dose or POC determinations, but did create initial tracking issues.

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2.0 REVIEW OF DCAS-PER-033 ISSUE FOR CASE # [A – REDACTED] (HPP)

2.1 BACKGROUND INFORMATION FOR CASE # [A – REDACTED]

Case # [A – redacted] represents an energy employee (EE) who worked at the HPP from [redacted]. During this worker’s employment, the EE worked as a [redacted], and, according to the Computer-Assisted Telephone Interview (CATI), the EE worked throughout the site on various equipment. The EE was diagnosed with **cancer of the skin of the hand** (ICD-9 Code 172.6) in [redacted]. The EE was not monitored for external photon and electron exposures or internal intakes during employment; therefore, the recommendations for assigning internal intakes from OCAS-TKBS-0004 (ORAUT 2008) Table 5, page16, were used in this case.

2.2 COMPARISON OF NIOSH’S ORIGINAL AND REWORKED DOSE RECONSTRUCTIONS

NIOSH performed the original DR of Case # [A – redacted] in February 2004. The claim was reworked in June 2011 due to revisions in the TBD for HPP.

NIOSH indicated that the original DR was an **overestimate** of dose. In the original DR, NIOSH calculated a total dose of **10.580 rem** to the skin of the hand, using recommendations in ORAUT-TKBS-0004 (ORAUT 2004). Based on this assigned dose estimate, the DOL determined the POC to be **39.20%** and the claim was denied.

Using the most current TBD, OCAS-TKBS-0004 (OCAS 2008), a total dose to the skin of the hand of **5.058 rem** was derived. Table 1 provides a comparison of the original and revised external and internal organ dose estimates for the skin of the hand, and POC values. It should be noted that the values cited in Table 1 were extracted directly from NIOSH’s IREP tables and files. With the exception of internal dose and shallow hand dose, SC&A has not assessed the accuracy/correctness of other external doses listed in Table 1, since performing such an assessment is beyond the scope of this Subtask 4 report.

Table 1. Comparison of NIOSH Estimated External/Internal Dose to the Skin of the Hand and Resulting POC in the Original DR and from Applying DCAS-PER-033

Dose Categories	Original Dose (rem)	Revised Dose (rem)
External Photon	1.258	0.393
External Electron	8.217	1.890
Medical X-ray	1.100	2.700
Internal	0.004	0.075
Total:	10.580	5.058
POC	39.2%	22.55%

As shown in Table 1, a revised hand skin dose of **5.058 rem** was derived by NIOSH, with a resulting POC of **22.55%**.

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2.3 SC&A'S REVIEW OF DCAS-PER-033 ISSUE RELATED TO CASE #[A – REDACTED]

As directed by the PRSC, SC&A's review of Case #[A – redacted] focused on revised internal dose, and the shallow dose to the hand, as specified by the criteria in DCAS-PER-033. Case #[A – redacted] required the doses to be reworked, since the EE worked at HPP sometime during the period 1956–1963.

Original DR

The original DR (performed in 2004) assigned internal intakes using the recommended intake values from Table 5, page 8, of ORAUT-TKBS-0004 (ORAUT 2004) in the chronic annual workbook (CADW) and entered the resulting doses in the Interactive Radioepidemiological Program (IREP) Input table. NIOSH also assigned a shallow dose to the hand of 0.85 rem/year (>15 keV electrons), as recommended on page 12 of that document.

Reworked DR

In the reworked dose evaluation (performed in 2011), NIOSH used the recommended internal intake values from Table 5, page 16, of OCAS-TKBS-0004 (OCAS 2008) in the CADW and entered the resulting doses in the IREP Input table. Additionally, NIOSH used the recommended annual 0.270 rem shallow electron dose to the hand for non-operators from Table 6, page 17, of OCAS-TKBS-0004. The new IREP Input table (which contained other revised doses according to OCAS-TKBS-0004 recommendations) was used to determine the revised POC.

SC&A's Evaluation

SC&A evaluated the recent dose evaluation and concurs that NIOSH used the correct intake values and assigned the higher dose considering the potential solubility types (Type M and Type S). Additionally, NIOSH correctly re-evaluated the shallow dose to the hand. The resulting dose values were entered correctly in the IREP Input table [along with other revised dose values according to OCAS-TKBS-0004 (OCAS 2008)] and used to determine the final POC. SC&A had no findings concerning this case in view of DCAS-PER-033.

3.0 REVIEW OF DCAS-PER-033 ISSUE FOR CASE # [B – REDACTED] (HPP)

3.1 BACKGROUND INFORMATION FOR CASE # [B – REDACTED]

Case # [B – redacted] represents an energy employee (EE) who worked at the HPP from [redacted]. During this worker’s employment, the EE worked as a [redacted], and, according to the Computer-Assisted Telephone Interview (CATI), the EE worked at various locations in the plant. The EE was diagnosed with **Left Bronchogenic Carcinoma** (ICD-9 Code 162) in [redacted]. The EE was not monitored for external photon and electron exposures or internal intakes during employment; therefore, the recommendations for assigning internal intakes from OCAS-TKBS-0004 (OCAS 2008) Table 5, page 16, were used in this case.

3.2 COMPARISON OF NIOSH’S ORIGINAL AND REWORKED DOSE RECONSTRUCTIONS

NIOSH performed the original DR of Case # [B – redacted] in November 2003. The claim was reworked in June 2011 due to revisions in the TBD for HPP.

NIOSH indicated that the original DR was an **overestimate** of dose. In the original DR, NIOSH calculated a total dose of **5.795 rem** to the lung, using recommendations in ORAUT-TKBS-0004 (ORAUT 2003). (SC&A found that the dose entries in the original IREP Table were correct, but that the summation in the right column was incorrect, which led to an additional 0.055 rem being listed in the dose reconstruction report, i.e., 5.850 rem total dose was reported instead of the correct total dose of 5.795 rem. However, the IREP table and resulting POC were not impacted by this error.) Based on this assigned dose estimate, the DOL determined the POC to be **13.85%** and the claim was denied.

Using the most current TBD, OCAS-TKBS-0004 (OCAS 2008), a total dose to the lung of **20.289 rem** was derived. Table 2 provides a comparison of the original and revised external and internal organ dose estimates for the lung and POC values. It should be noted that the values cited in Table 2 were extracted directly from NIOSH’s IREP tables and files. With the exception of internal dose, 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 2. Comparison of NIOSH Estimated External/Internal Dose to the Skin of the Hand and Resulting POC in the Original DR and From Applying DCAS-PER-033

Dose Categories	Original Dose (rem)	Revised Dose (rem)
External Photon	1.925	0.475
Medical X-ray	1.596	1.006
Internal	2.274	18.808
Total:	5.795	20.289
POC	13.85%	21.63%

As shown in Table 2, a revised lung dose of **20.289 rem** was derived by NIOSH, with a resulting POC of **21.63%**.

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3.3 SC&A'S REVIEW OF DCAS-PER-033 ISSUE RELATED TO CASE #**[B-REDACTED]**

As directed by the PRSC, SC&A's review of Case #**[B – redacted]** focused on revised internal dose, as specified in DCAS-PER-033. Case #**[B – redacted]** required the doses to be reworked, since the EE worked at HPP sometime during the period 1956–1963.

Original DR

The original DR (performed in 2003) assigned internal intakes using the recommended intake values in ORAUT-TKBS-0004 (ORAUT 2003) in the CADW and entered the resulting doses into the IREP Input table.

Reworked DR

In the reworked dose evaluation (performed in 2011), NIOSH used the recommended internal intake values from Table 5, page 16, of OCAS-TKBS-0004 (OCAS 2008) in the CADW and entered the resulting doses in the IREP Input table. The new IREP Input table (which contained other revised doses according to OCAS-TKBS-0004 recommendations) was used to determine the revised POC.

SC&A's Evaluation

SC&A evaluated the recent dose evaluation and concurs that NIOSH used the correct intake values and assigned the higher dose considering the potential solubility types (Type M and Type S). The resulting dose values were entered correctly in the IREP Input table [along with other revised dose values according to OCAS-TKBS-0004 (OCAS 2008)] and used to determine the final POC. SC&A had no findings concerning this case in view of DCAS-PER-033.

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4.0 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 DCAS-PER-033, there were 32 cases that met the applicable criteria.

During the November 7, 2013, PRSC meeting, SC&A was tasked with evaluating the appropriate cases concerning the application of DCAS-PER-033.

This current report satisfies the Subtask 4 requirement. For the two cases selected from the 32 cases impacted by DCAS-PER-033, SC&A provided an overview of the case and a brief comparison of doses assigned in the original dose reconstructions and the revised dose estimates. Based on directives from the PRSC, SC&A's audit of the two cases focused on those elements of the dose reconstructions that were affected by the issuance of DCAS-PER-033. Therefore, our audit determined if internal doses and hand doses were appropriate for these cases, and if so, if they were assigned correctly.

As discussed in Section 2, SC&A found that NIOSH did correctly derive the appropriate doses as recommended by DCAS-PER-033. SC&A had no findings in the two cases reviewed concerning the reworked doses as per DCAS-PER-033.

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5.0 REFERENCES

DCAS 2011. *Huntington Pilot Plant TBD Revision*, DCAS-PER-033, Rev. 0, National Institute for Occupational Safety and Health, Office of Compensation Analysis and Support, Cincinnati, Ohio. December 9, 2011.

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