

 **Memorandum**

To: Subcommittee for Procedure Reviews  
From: Robert Anigstein, SC&A, Inc.  
Date: August 17, 2021  
Subject: Reply to NIOSH Response to SC&A Observation 6 on DCAS-PER-057

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## Introduction

During the meeting of the Advisory Board on Radiation and Worker Health Subcommittee for Procedure Reviews on February 18, 2021, SC&A was tasked with addressing the National Institute for Occupational Safety and Health (NIOSH) response to SC&A's observation 6 on DCAS-PER-057: "NIOSH used efficiency measures to estimate internal doses to the kidneys" (SC&A, 2016). The basis of the observation was NIOSH's use of an efficiency method for assigning internal doses from intakes of radionuclides. NIOSH developed a tool, the Chronic Annual Dose Workbook (CADW), that calculates annual internal doses from annual intakes. SC&A (2016) performed several independent dose calculations that confirmed the NIOSH results in cases where workers were exposed to a uniform intake during each of several years of exposure; i.e., the intake was uniform during each year of exposure, although it could vary year by year. However, SC&A found discrepancies in cases where the intake rate was not uniform during one or more years: for instance, if the worker's employment began or ended during a given year, or if the operation of the facility where the worker was employed changed during a given year. An example of the latter occurrence was the end of the operational period at General Steel Industries, which occurred on June 30, 1966.

NIOSH calculated internal doses from intakes that began or ended during a calendar year by first calculating the total intake for the year, then prorating that intake to reflect the exposure duration during that year. Because of the long retention of uranium aerosols in the respiratory system, intakes occurring only during the first part of a given year produce higher doses than if these same total intakes were evenly distributed over the entire year: the longer the uranium intakes remain in the body, the higher the dose. Conversely, intakes occurring only during a later part of a given year produce lower doses than if these same total intakes were evenly distributed over the entire year.

## NIOSH Response

In its response to the SC&A comments, NIOSH (2017, p. 2) stated "that the technique does cause an over or underestimate of the dose during the year of the intake but the opposite effect occurs in subsequent years." NIOSH (2017, p. 2) further stated that "the CADW tool has been modified so that it now allows partial years of exposure to be used." This last statement is correct in that the dose reconstructor no longer needs to calculate the prorated intake if the intake occurs

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during only a part of a given year—the CADW tool does this automatically. However, the subsequent dose assessment is still based on a uniform (albeit prorated) intake rate during the entire year.

## Resolution

This issue was resolved during the February 18, 2021, meeting of the Subcommittee for Procedures Review. During the course of the meeting, David Allen (NIOSH/DCAS) stated:

I've told our dose reconstructors they could still prorate and use that for most cases, but if it gets into the 45 to 52 percent range, the best estimate range, they should use IMBA [Integrated Modules for Bioassay Analysis], which is what they've been doing since then. [ABRWH, 2021, p. 72]

SC&A agrees with this resolution and recommends that the observation be closed by the Subcommittee.

## References

Advisory Board on Radiation and Worker Health (ABRWH). (2021). *Subcommittee for Procedures Review Thursday, February 18, 2021*. [Transcript of teleconference meeting]. <https://www.cdc.gov/niosh/ocas/pdfs/abrwh/2021/sctr021821-508.pdf>

National Institute for Occupational Safety and Health (NIOSH). (2017). *NIOSH response to Sanford Cohen & Associates review of DCAS-PER-057* [Response paper].

SC&A, Inc. (2016). *DCAS-PER-057, Subtask 4: Review of five cases reevaluated by NIOSH using TBD-6000, appendix BB, revision 1* (SCA-TR-2016-PER057-ST4, rev. 0).