Draft White Paper

SC&A'S SUMMARY EVALUATION OF DWE ERRORS (BLUNDERS) IN WELDON SPRING DATA

Contract Number 200-2009-28555

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February 2012

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S. COHEN & ASSOCIATES: ***Technical Support for the Advisory Board on Radiation & Worker Health Review of NIOSH Dose Reconstruction Program***	Document No. SC&A's Summary Evaluation of DWE Errors Effective Date: Draft – February 23, 2012 Revision No. 0 (Draft)
SC&A's Summary Evaluation of DWE Errors (Blunders) In Weldon Spring Data	Page 2 of 5
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Record of Revisions

Revision Number	Effective Date	Description of Revision
0 (Draft)	02/23/2012	Initial issue

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1.0 INTRODUCTION

On September 7, 2011, the National Institute for Occupational Safety and Health (NIOSH) provided a response (NIOSH 2011a, Rev. 00) to the Weldon Spring Site (WSS) Special Exposure Cohort (SEC) issue (SC&A 2010) concerning errors, or sometimes called "blunders,"[1] in the original daily weighted exposure (DWE), or sometimes referred to as daily weighted average (DWA), air concentration data as discussed at the WSS Work Group meeting on May 9, 2011. On September 27, 2011, SC&A issued an evaluation of that paper (SC&A 2011).

On November 28, 2011, NIOSH issued Rev. 01 to their original September 7, 2011, paper (NIOSH 2011b).

On January 17, 2012, SC&A issued their evaluation (SC&A 2012) of NIOSH's November 28, 2011, Rev. 01, response.

A Weldon Spring Work Group conference call meeting was held on February 14, 2012, in which the issue of errors in WSS DWA data was discussed. The following is a summary of that discussion and the conclusions reached.

2.0 SUMMARY OF FEBRUARY 14, 2012 CONFERENCE CALL CONCERNING WSS ISSUE #1b, ERRORS IN DWE DATA

In SC&A's evaluation (SC&A 2012) of NIOSH's response to the issue of errors in the DWE original data (NIOSH 2011a and NIOSH 2011b), the following areas of concern were addressed:

(1) Limited data
(2) Representativeness of the limited data
(3) Type and magnitude of errors
(4) Application of findings

In the evaluation report (SC&A 2012), SC&A found that for Item #3, the type and magnitude of errors identified in the WSS DWE data were similar to those found in other studies concerned with errors associated with data transcription and manual calculations based on field-recorded data. Additionally, SC&A found that for Item #4, NIOSH's method of deriving and applying the results of the DWE errors for dose reconstruction purposes is appropriate. However, SC&A continues to have concerns with how the data were selected for the error analyses (Item #1), and how well the uranium DWE error data represented thorium DWE errors (Item #2).

Item #1 – Limited data
SC&A had concerns that while some of the available original data in the SRDB documents referenced by NIOSH in their DWE error analyses was used, other pages of the original data were not used. SC&A inquired as to the bases for the selection of the data that were used in the

[1] The ISO definition emphasizes that a blunder is often considered a serious mistake caused by ignorance or confusion; stupidity, which is included in some U.S. English definitions of blunder, is not implied in this case (ISO 1995).

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NIOSH DWE error analyses. It was found that NIOSH used only those original data sheets that had corresponding calculation summary sheets. This allowed a direct comparison of entries in the original data sheets to those transcribed to the summary sheets and an analysis of their use in the calculation of DWE. Original data sheets and calculational summary sheets were not used unless there was a direct documented link between them. While this approach resulted in less data to analyze, it nonetheless ensured a one-to-one correspondence between the original data and the calculational summary sheet for each set of data used in the error analyses.

Item 2 – Representativeness of the limited data

NIOSH did not find any of the original data sheets, only summary calculational data sheets, for the thorium DWE values to be used in dose reconstruction. Instead, the error analyses were performed using uranium DWE data. SC&A recognizes that for any given operator, the human errors associated with data recording and calculations would be similar for both thorium and uranium. Thus, the use of uranium data to assess the error rate for thorium data is appropriate if the same operators processed the data or if the error types and rates were similar for different operators. SC&A was concerned that the errors in the uranium DWE data might not be representative of the errors in the thorium DWE data, since only 17 of the 82 lines of data in NIOSH's error analyses reports (NIOSH 2011a and NIOSH 2011b) represented the thorium processing era of 1963–1966 at the WSS. However, in evaluating the data available for error analyses, SC&A did not find that additional analyses and/or investigations would result in significant changes in the error rate and dose reconstruction correction factors, as already derived from the uranium DWE data.

3.0 SUMMARY

SC&A found the NIOSH error analyses methods and the recommendations for application to dose reconstruction to be acceptable for thorium DWE data at the WSS. SC&A finds that there were limited DWE data available for the era that thorium was used at the WSS. Despite the limited data, however, the types and magnitudes of errors in the WSS data are consistent with those observed in Davis and Strom (2008) and a recent NIOSH error analysis for Fernald, a sister plant to WSS that employed the same processes and DWE methodologies (NIOSH 2012). SC&A also notes that the Fernald analysis, which did not suffer from data limitations, demonstrated an error rate of about 1%, much lower than for WSS. Thus, while it would have been advantageous to have had more data representative of thorium processing at WSS, we believe that additional resources and investigations are not likely to impact the resulting error correction factors significantly.

4.0 REFERENCES

Davis, A.J., and D.J. Strom, 2008. *Uncertainty and Variability in Historical Time-Weighted Average Exposure Data,* Health Physics, Vol. 94. February 2008. SRDB 41616.

NIOSH 2011a. *White Paper for Weldon Spring Plant – Evaluation of Blunders Associated with Daily Weighted Average (DWA) Reports at the Weldon Spring Plant,* Rev. 00. National Institute for Occupational Safety and Health, Office of Compensation Analysis and Support, Cincinnati, Ohio. September 7, 2011.

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NIOSH 2011b. *White Paper for Weldon Spring Plant - Evaluation of Blunders Associated with Daily Weighted Average (DWA) Reports at the Weldon Spring Plant,* Rev. 01. National Institute for Occupational Safety and Health, Office of Compensation Analysis and Support, Cincinnati, Ohio. November 28, 2011.

NIOSH 2012. *White Paper: Evaluation of Blunders Associated with Daily Weighted Exposure (DWE) Reports at Fernald (FMPC),* Rev. 00. National Institute for Occupational Safety and Health, Office of Compensation Analysis and Support, Cincinnati, Ohio. February 7, 2012.

ISO 1995. "Guide to the expression of uncertainty in measurement." International Organization for Standardization, Geneva. 1995.

SC&A 2010. *Preliminary Issues from SC&A's Review of NIOSH's Evaluation Report for the Weldon Spring Site, Weldon Spring, Missouri, Special Exposure Cohort Petition SEC-00143.* SCA-TR-TASK5-0015. SC&A, Inc., Vienna, Virginia, and Saliant, Inc., Jefferson, Maryland. October 2010.

SC&A 2011. *SC&A's Evaluation of NIOSH's Response of September 7, 2011, to Daily Weighted Exposure Blunders in Weldon Spring Data.* SCA-TR-TASK5-0015. SC&A, Inc., Vienna, Virginia, and Saliant, Inc., Jefferson, Maryland. September 2011.

SC&A 2012. *Evaluation of NIOSH's Response to SC&A's Concerns Regarding DWE Errors (Blunders) in Weldon Spring Data.* SCA-TR-TASK5-0015. SC&A, Inc., Vienna, Virginia, and Saliant, Inc., Jefferson, Maryland. January 17, 2012.

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