
Draft White Paper

**EVALUATION OF NIOSH'S RESPONSE TO SC&A'S
CONCERNS REGARDING DWE ERRORS (BLUNDERS) IN
WELDON SPRING DATA**

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Record of Revisions

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0 (Draft)	01/17/2012	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 of 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).

The following presents SC&A’s evaluation of NIOSH’s November 28, 2011, Rev. 01, response. Note that many of the concerns expressed in SC&A 2011 have not been resolved in NIOSH 2011b and are retained in this response.

2.0 SC&A’S EVALUATION OF NIOSH’S NOVEMBER 28, 2011, RESPONSE TO WSS ISSUE #1b, ERRORS IN DWE DATA

SC&A evaluated NIOSH’s response to the issue of errors in the DWE original data and found the following.

- (1) **Limited data** – NIOSH’s white paper indicated that about 20 DWE reports were available and suitable for analysis. Nine Site Research Database (SRDB) documents were located that contained dust studies and DWE evaluations. Of these, there were 81 pages that contained calculations that were of interest. These pages contained 1,405 operations that were used to estimate the error rate. NIOSH indicated that the calculations were duplicated in all cases except those where errors were noted. However, SC&A noted that not all of the available raw data were included in the error analyses. NIOSH 2011b is silent on why some of the data were excluded from the analysis. Although NIOSH acknowledges that the available raw data are a “small” proportion of the total DWE data set that will be used in dose reconstruction (DR), they do not quantify that proportion (i.e., what percentile). The DWE datasets to be used in DR are identified in Tables 6-4 (uranium) and 6-5 (thorium) of the SEC-00143 petition evaluation report (NIOSH 2010).
- (2) **Representativeness of the limited data** – NIOSH’s report does not indicate the extent to which the available raw data are representative of the DWE data identified in NIOSH (2010). It is not clear from the report if the evaluated data pertain to the highest DWEs for each building, year, and job category. For example, SRDB 14945 contains 27 pages of raw data calculations that are applicable to the metals plant (Building 301) in the years 1958–1959. However, Table 6-4 (uranium) of NIOSH 2010 contains no DWEs for

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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Building 301 in 1958, and only one value for one operation in 1959; that value is the second lowest DWE for Building 301 for all 7 years reported.

SC&A’s analyses of the DWE data used by NIOSH indicate that out of the 82 lines of data on pages 9–14 (1958–1965), only 17 correspond to the period when the thorium DWE data were taken (1963–1966). Unfortunately, the thorium DWE datasheets only contain the building number, job title, year, DWE results, and some information concerning the month(s) when samples were taken, but no exact dates or raw data. Thus, it would appear difficult to correlate the DWE data NIOSH used to determine errors directly to the thorium intake data. SC&A found that in many entries, the building numbers and dates listed in the 82 lines of data on pages 9–14 of the NIOSH Rev. 00 and Rev. 01 papers were incorrect (NIOSH 2011a and NIOSH 2011b). SC&A corrected these errors before analyzing the data.

Another aspect of representativeness involves the personnel who performed data transcription and reduction at different times (referred to herein as “operators”). SC&A is concerned that different operators may have been involved in thorium data transcription and reduction than those represented by the limited NIOSH dataset. If so, the attributes of the errors and their influence on DWE during thorium operations could be quite different from those identified in NIOSH 2011b.

- (3) **Type and Magnitude of Error** – Notwithstanding our concerns regarding representativeness of the limited dataset, SC&A notes that the types and relative magnitudes of the errors identified in NIOSH’s white paper are similar to those found in Davis and Strom (2008). That is, the average error resulted in about a factor of 2 underestimate, while the largest errors resulted in an order of magnitude underestimate.
- (4) **Application of Findings** – NIOSH’s Rev. 01 of the white paper (NIOSH 2011b), Section 4, presents an evaluation of the impact that errors could have on the resulting thorium intakes assigned during the DR process. A Monte Carlo simulation of the impact of the errors observed in the 82 lines of the dataset listed on pages 9–14 of the NIOSH Rev. 01 paper (NIOSH 2011b) indicates that the error rate and distribution of observed errors would result in approximately a 4% decrease (95th percentile level) in the intakes assigned. Therefore, if the type, magnitude, and frequency of the observed errors in this limited dataset are assumed to be representative of those common to the thorium DWE data, the assigned intakes would have to be increased by about 4% to compensate for errors in the DWE data.

3.0 SUMMARY

As previously stated in SC&A’s evaluation of September 27, 2011 (SC&A 2011), SC&A believes that NIOSH should address the representativeness of the limited available uranium raw data to the dataset used by NIOSH in determining the error rate in thorium DWE data to be applied during DR. Only 17 of the 82 lines of data were recorded during the period that the thorium intake data were taken (1963–1966), and these have not been determined to be

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representative. Additionally, though not all available raw data were included in the error analyses, no explanation of the criteria for inclusion/exclusion is provided by NIOSH.

4.0 REFERENCES

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