
**Draft Report
For the Weldon Spring Site Work Group**

**SC&A'S INITIAL TEST OF EXTERNAL AND BIOASSAY DATA
COMPLETENESS FOR THE WELDON SPRING SITE**

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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.: Weldon Spring – External and Bioassay Data Completeness
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INTRODUCTION

The recorded external monitoring and bioassay results for the Weldon Spring site (WSS) workers during the SEC-00143 period (1957–1967) consist of photo copies of the original handwritten and/or computer generated records, and also those contained on the Center for Epidemiological Research (CER) database. However, NIOSH has stated that the CER database will not be used for dose reconstruction purposes; only the original records will be used. Therefore, the accuracy of the original records is not an issue, since they are legible, but the completeness of the original records does need to be addressed. During the May 9, 2011, WSS Work Group (WG) meeting, the WG instructed SC&A to perform an initial test of the completeness of the external and bioassay monitoring data for the WSS workers for the period of 1957–1967 to determine if there are any indications of a problem with data completeness for the WSS.

INITIAL TEST FOR DATA COMPLETENESS

Unless 100% of the workers were externally monitored 100% of the time, and all the records are verified to be available, completeness of data is a subjective issue; i.e., to what degree is it necessary to be shown that all the original records are presently available. Generally the task is approached by evaluating the available records of workers that one would expect would have had the potential for occupational external/internal exposures as a result of a combination of their work location, job title, and/or time period of employment. If the overall mission of a site is fairly constant, such as it was at the WSS, then the fraction of the workers monitored should remain reasonably constant, allowing for some variations for different missions and changes in regulatory requirements. If the records for a certain period show that an unusually low fraction of the workers were monitored, then there may be a potential issue for that period. Evaluating the fraction of workers monitored, instead of the absolute number, allows for fluctuations in the number of employees in the work force without sufficiently influencing the results.

SC&A selected 15 cases from the WSS claims files that covered employment during the period 1957–1967. These cases were selected on the basis of having potential external/internal exposures and with many of the workers having job titles of Operator or Chemical Operator, which provided a database for evaluation of data completeness during the time period. For this initial data completeness test of the selected 15 cases, approximately 300 DOE records containing around 5,000 pages of data was scanned for dosimetry and bioassay records. If a worker had external dose entries for any given year, then that year was counted as monitored. In most cases, there were multipliable entries for each year, but the details for each year (i.e., the number of months monitored, etc.) were not analyzed for this initial test. This analysis method was also applied to bioassay monitoring.

INDIVIDUAL CASE RESULTS – EXTERNAL MONITORING

SC&A analyzed the total number of years worked for each of the 15 workers and their respective years of external dose data according to the DOE records in the claimant’s files. On average, these workers were monitored approximately 91% of the time. Figure 1 below summarizes these results.

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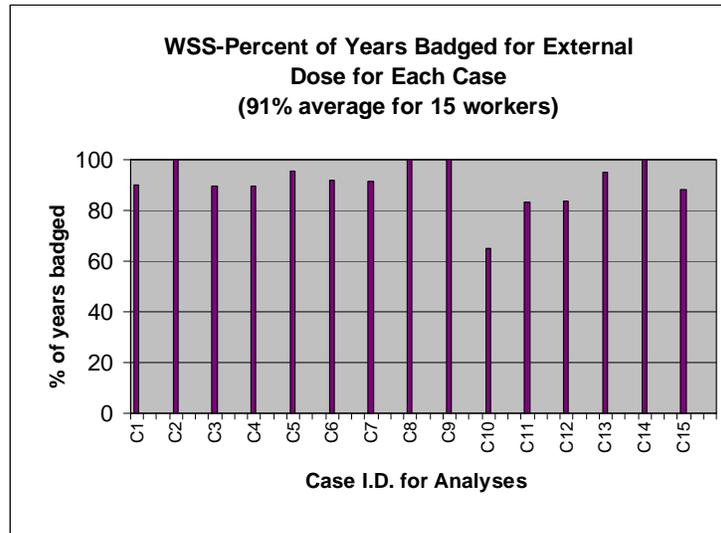


Figure 1. Percent of Years Monitored (Badged) for External Exposure for Individual Cases

INDIVIDUAL CASE RESULTS – BIOASSAYS

SC&A analyzed the total number of years worked for each of the 15 workers and their respective years of bioassay monitoring data according to the DOE records in the claimant’s files. On average, these workers were monitored approximately 94% of the time. Figure 2 below summarizes these results.

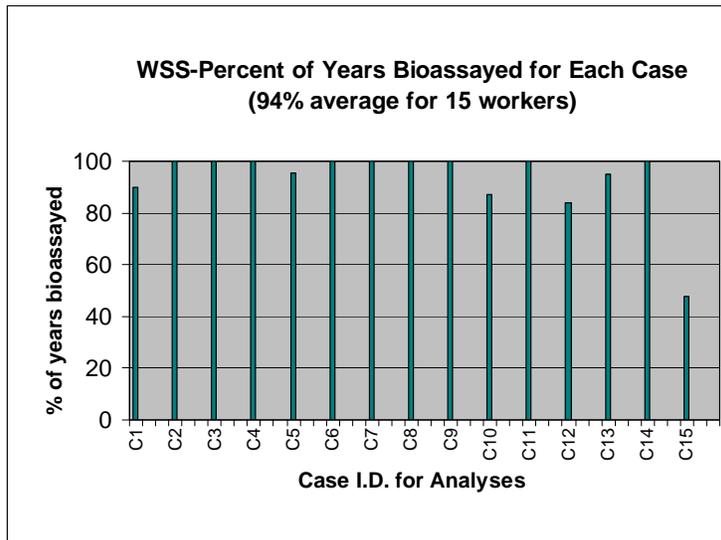


Figure 2. Percent of Years Bioassayed for Individual Cases

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COLLECTIVE MONITORING RESULTS - EXTERNAL MONITORING

The individual monitoring results described above provide some useful indications, but the collective monitoring results as a function of year provide for a further breakdown of the data by year. Figure 3 below indicates that there was reasonable availability of records for most years during the 1957–1966 time period, with 1957 and 1958 being the two years with the lowest availability of recorded data, while there were no records for 1967 (this is further illustrated in Figure 4).

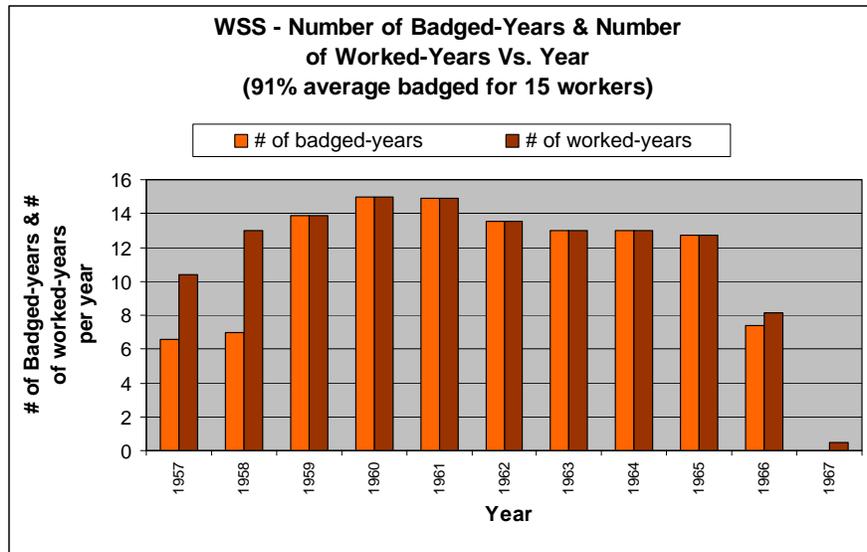


Figure 3. Number of Years Monitored (Badged) for External Exposure and Number of Years Worked vs. Year

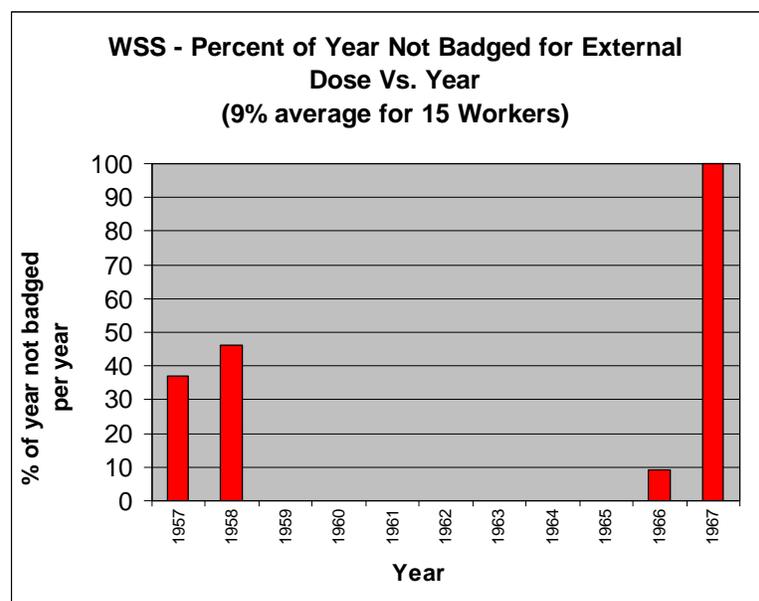


Figure 4. Percent of Years Not Monitored (Badged) for External Exposure vs. Year

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SUMMARY - EXTERNAL DOSE DATA

This initial analysis consisted of sampling 15 cases of potentially exposed workers for external dose data completeness. This was a very limit sampling, but did indicate the following:

- 1957: The records indicate that, on average, 63% of the workers were monitored for external dose during this year.
- 1958: The records indicate that, on average, 54% of the workers were monitored for external dose during this year.
- 1967: The records indicate that none of the workers were monitored for external dose during this year.
- 1957–1967: The records indicate that, on average, 91% of the workers were monitored for external dose during these years.

For the year 1958, SC&A did not count the year as monitored if there was no data specially labeled for 1958; however, there were a number of cases where there was a summary sheet that listed the total dose recorded to date through 1958. If there was 1957 dose data, then the total dose for 1958 could be determined by subtracting the two total dose values. SC&A’s review of NIOSH’s dose reconstruction files indicated that this method was used to derive the 1958 dose in most cases where external dose reconstruction was performed. If the 1958 total-to-date data is included, it would increase the average to 85% of the workers monitored for 1958.

COLLECTIVE MONITORING RESULTS - BIOASSAY MONITORING

Figure 5 below indicates that there was reasonable availability of records for most years during the 1957–1966 time period, with 1957 and 1958 being the two years with the lowest availability of recorded data, while there were no records for 1967 (this is further illustrated in Figure 6).

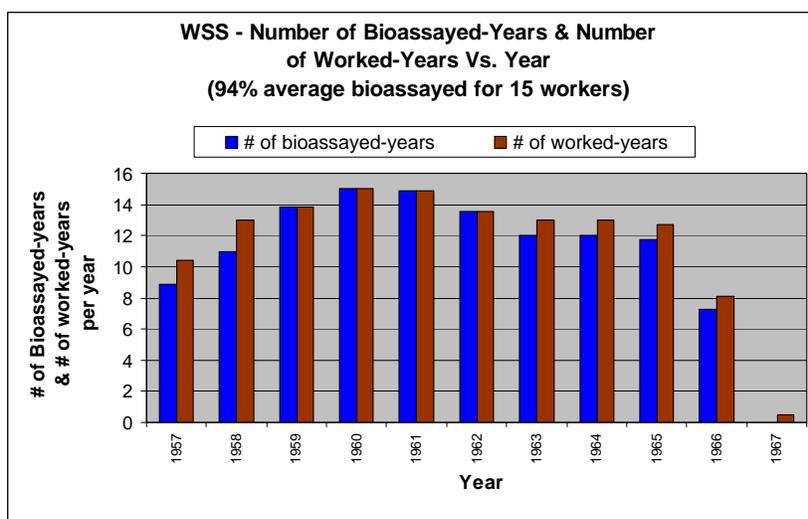


Figure 5. Number of Years Bioassayed and Number of Years Worked vs. Year

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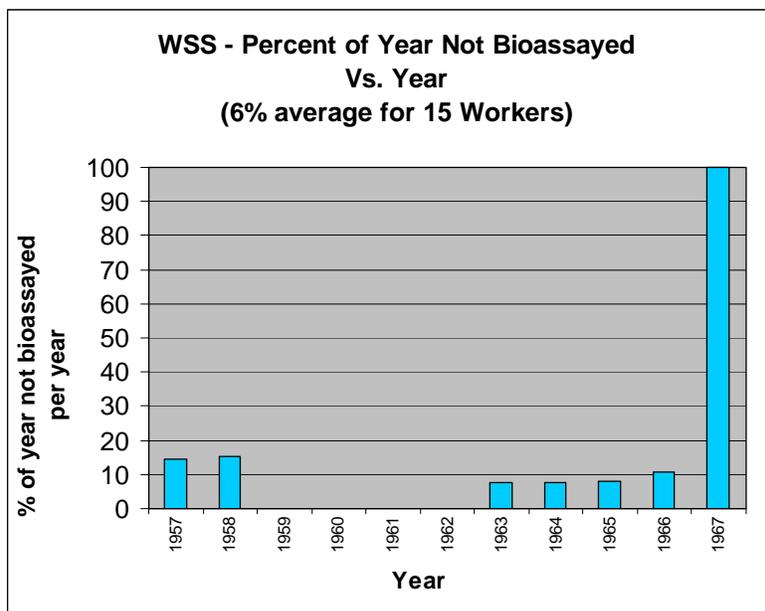


Figure 6. Percent of Years Not Bioassayed vs. Year

SUMMARY – BIOASSAY MONITORING DATA

This initial analysis consisted of sampling 15 cases of potentially exposed workers for bioassay data completeness. This was a very limit sampling, but did indicate the following:

- 1957: The records indicate that, on average, 85% of the workers were bioassayed during this year.
- 1958: The records indicate that, on average, 85% of the workers were bioassayed during this year.
- 1966: The records indicate that, on average, 89% of the workers were bioassayed during this year.
- 1967: The records indicate that none of the workers were bioassayed during this year.
- 1957–1967: The records indicate that, on average, 94% of the workers bioassayed during these years.

Only urinalyses were counted as bioassays for this initial test; breath analyses or in-vivo counts for thorium were not included.

SUMMARY

This initial look at the completeness of external exposure and bioassay records for the WSS indicates that approximately 90% or more of the workers had recorded results each year, with the exception of 1957 and 1958, where the recorded external exposure results dropped to around 60% and the bioassay results dropped to around 85%, and for 1967, when there was neither external exposure or bioassay recorded results.

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SC&A independently analyzed the DOE files of the WSS workers to derive the data used in this analysis. As a cross-check, SC&A then compare their results to those used by NIOSH in the final dose reconstruction reports, and associated files, for each case when these documents were available. SC&A found that their external monitoring and bioassay data was in agreement with NIOSH's data used for dose reconstruction purposes. SC&A did not analyze the CER database files for these 15 cases, because the CER database is not to be used for dose reconstruction purposes. However, while reviewing one of the dose reconstruction reports, SC&A did find that a worker had 0.454 rem of beta and 0.374 rem of gamma dose recorded in the CER database for 1966, and none was recorded for 1966 in the original copies.