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Bioassay Co-worker Approach (Construction Workers) Response to 2013 Fernald Matrix Item 5

by
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(May 15, 2013)

Item 5: *Look for amount of CW [Construction Worker] data in HIS-20 to see when there was a significant amount of CW data.*

Response: Previous work has shown that the hardcopy records for construction subcontractors match the records in HIS-20 after December 1985, but are not included in HIS-20 before that time. Therefore, the answer to Item 5 is there is no significant amount of CW data in HIS-20 prior to 1986. A follow-up question might be: Are there any data that *could* be used prior to 1986? This paper reconsiders the hardcopy results that might be used for a separate CW co-worker study targeted to before the end of the Fernald’s NLO period in 1985. The latest revision of the co-worker study (ORAUT-OTIB-0078, Rev 2) incorporated all of the “Code 50” results in HIS-20; however, it excluded the captured hardcopy results because it was not clear whether those results represented all of the subcontractor results, or at the least, a random sample of them. Table 1 shows the results of a review of the hand-entered bioassay results captured by NIOSH.

| Year | No. of Individuals | Results |
|-------------|---------------------------|----------------|
| 1969 | 12 | 52 |
| 1971 | 13 | 85 |
| 1972 | 6 | 17 |
| 1973 | 3 | 4 |
| 1981 | 16 | 35 |
| 1983 | 38 | 164 |
| 1984 | 82 | 275 |
| 1985 | 67 | 307 |
| 1986 | 79 | 370 |

The hardcopy results for 1986 (the first full year under the new contractor - Westinghouse Materials Company of Ohio) are also in HIS-20. The number of results in 1986 is consistent with

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the number of results for 1984 and 1985. Most of these results had a Code 50 and are now included in the co-worker study. The number of workers monitored is reasonably consistent. The number of results per individual for 1983-1986 ranges from 3.4 to 4.6. The average number of results per individual for 1986 is 4.7. Considering that different projects probably occurred in each of these years, the level of sampling seems to be remarkably consistent.

It appears that a case can be made for a separate CW co-worker study for 1984 and 1985 using hardcopy records. The year 1983 might also be included on the basis that there are more than 30 individuals for an OPOS analysis, and that the average number of samples is consistent with the successive years. Of course, NIOSH would have to assume that any missing results are missing at random. While there is no proof of this, the level of sampling is consistent with 1986 when CWs were incorporated fully. The use of Code 50 for CW samples is also consistent through 1986, which is another indicator that the operation of the bioassay program was probably similar to the practices of the prior years.

A statistical comparison between the CW data and the data used for the co-worker study was completed and the resulting plots are provided below. The methods used are described in ORAUT-RPRT-0053. The bottom line is that, in 1983 and 1984, the subs have urinary excretion rates that are statistically higher than the non-subs; however, in 1985 there is no significant difference. The difference in 1984, while statistically significant, is not really of practical significance. In reaching all of these conclusions, it was assumed that: (1) the dataset consisted of all of the data for monitored workers; or (2) that data were missing at random.

Summary: There are no data in HIS-20 that can be used for a CW-specific co-worker study prior to 1986. However, if hardcopy results are considered, the number of results, the number of workers monitored, and the average number of samples per worker are similar for 1984, 1985, and 1986. Fewer samples were taken from fewer workers in 1983; however, the average number of samples is similar. Furthermore, there are more than 30 workers for 1983, which might justify including 1983 in a CW-specific co-worker study. A statistical comparison showed differences for 1983 and 1984, but not for 1985. The resulting plots are shown in Figure 1, Figure 2, and Figure 3.

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Peto-Prentice Test for Fernald U - sub vs. non 1983

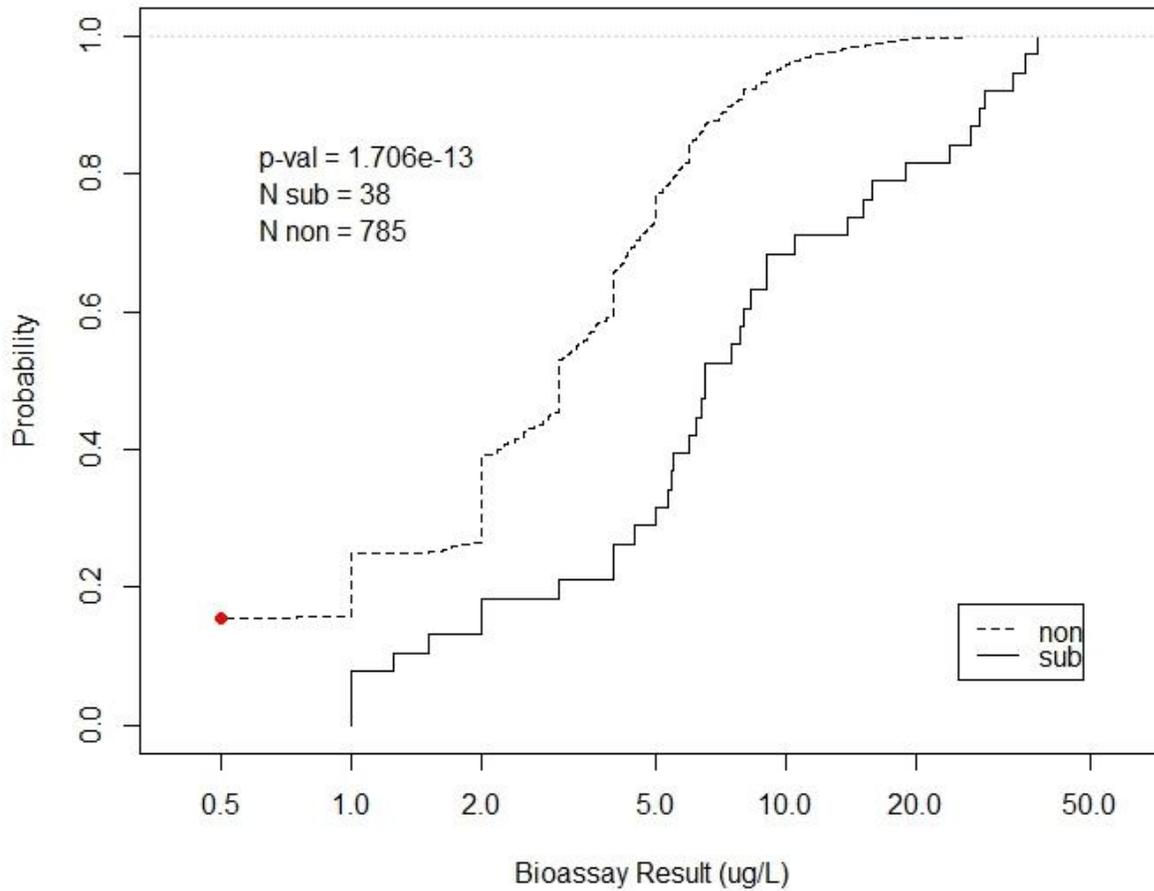


Figure 1: Peto-Prentice Test for Fernald U – sub vs. non-sub for 1983

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Peto-Prentice Test for Fernald U - sub vs. non 1984

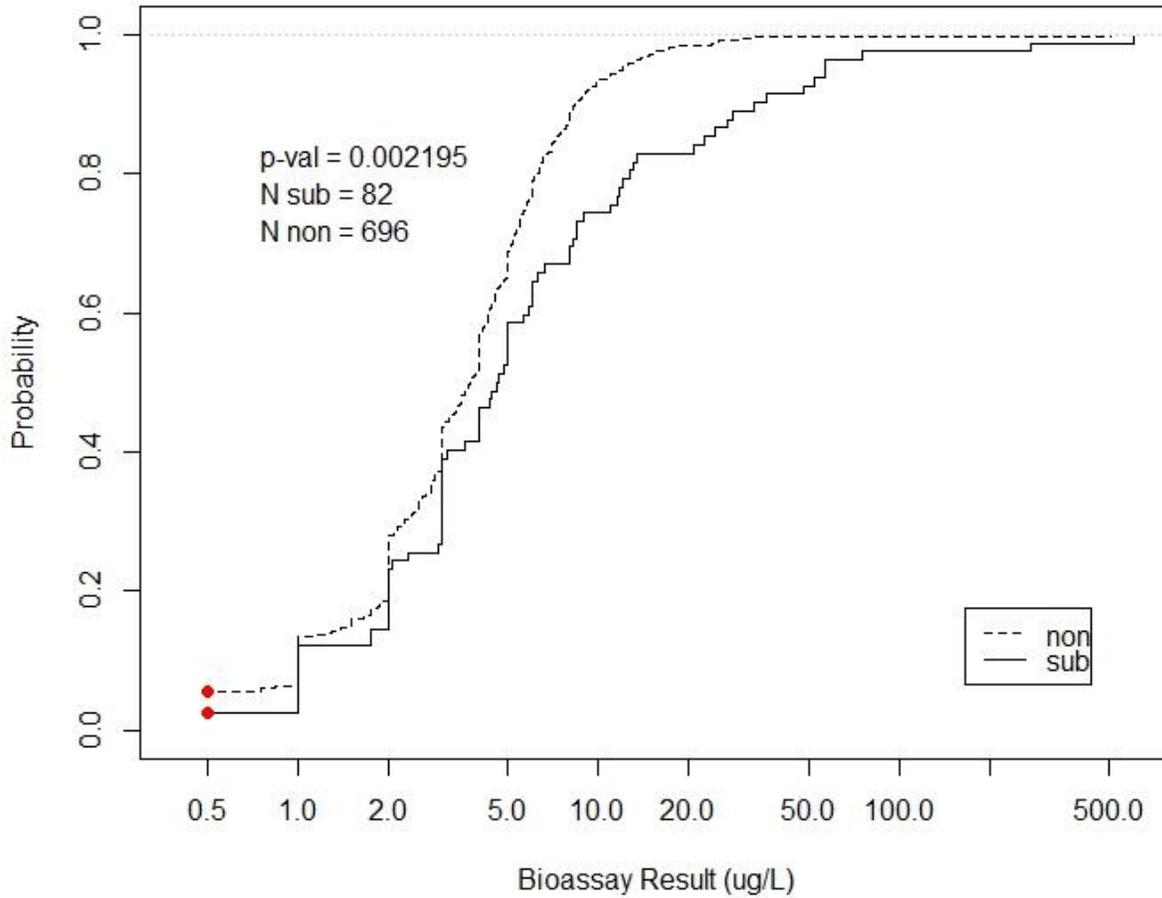


Figure 2: Peto-Prentice Test for Fernald U – sub vs. non-sub for 1984

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Peto-Prentice Test for Fernald U - sub vs. non 1985

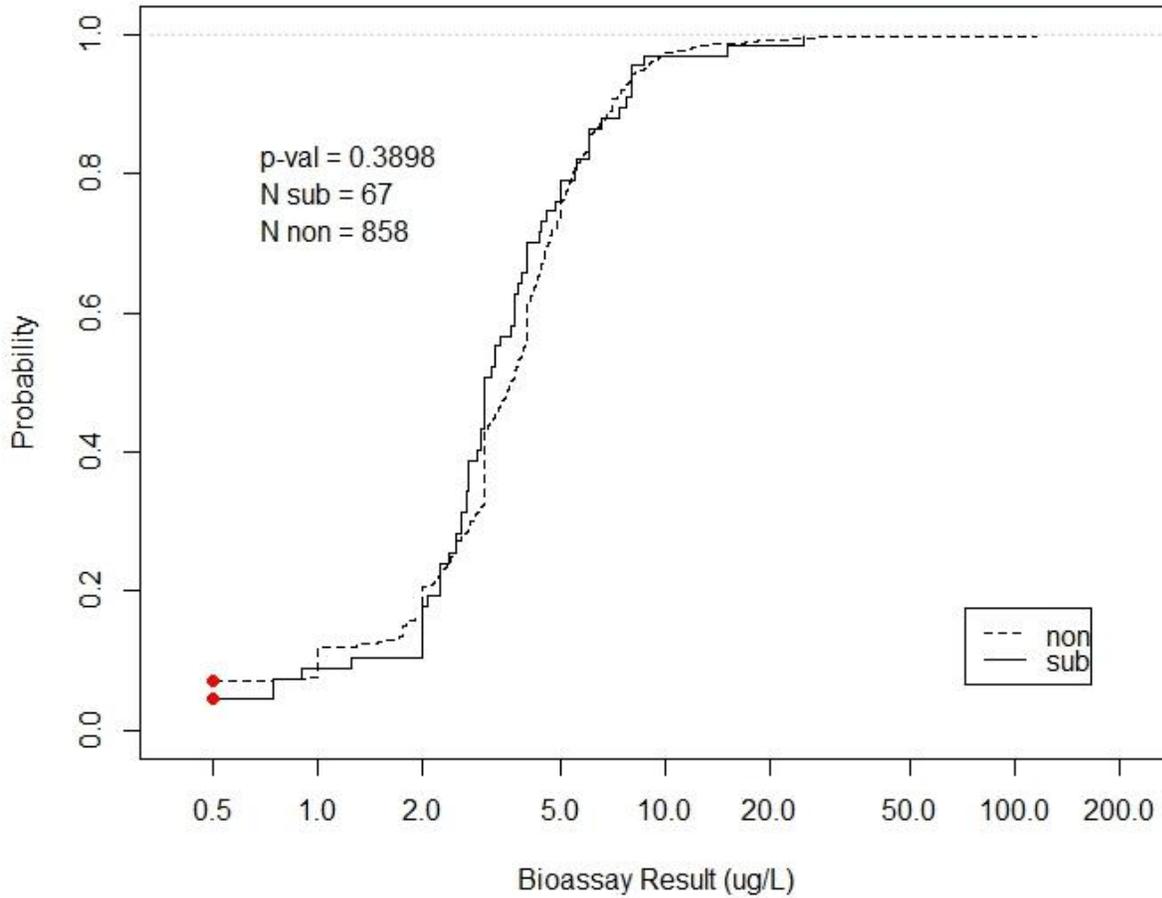


Figure 3: Peto-Prentice Test for Fernald U – sub vs. non-sub for 1985