



## MEMO

**DATE:** November 12, 2013  
**TO:** Subcommittee for Procedures Review  
**FROM:** U. Hans Behling  
**SUBJECT:** PER-014 Review Findings #1 and #3

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As a follow-up to the Procedures Review Subcommittee teleconference on November 7, 2013, and at the direction of the Subcommittee, SC&A reviewed the employment periods of Construction Trade Workers (CTWs) at the Rocky Flats facility, which is the only facility for which CTW employment periods are available.

The purpose of this review is linked to Finding #1 (Conditional) (as well as Finding #3) cited by SC&A in our review of OCAS-PER-014, *Construction Trades Workers*, dated March 2012. Summaries for Finding #1 (Conditional) and Finding #3 (Conditional) are enclosed herein as Exhibit #1.

Our review consisted of assessing the employment periods of CTWs in order to determine if employment periods were substantially less than a full year. Annual employment periods substantially less than 1 year for CTWs would invalidate comparisons of the 95<sup>th</sup> percentile values of annual deep dose between CTWs and all monitored workers (AMWs) and raise potential concerns about the validity of the 1.4 adjustment factor.

A full review for all years (1953–2005) is beyond the scope of this effort. Correspondingly, our review was limited to 3 years: 1970, 1977, and 1978.

### 1970 Data

CTW employment data for 1970 was presented by ORAUT during the teleconference on November 7, 2013, and is enclosed herein as Exhibit #2. Inspection of Exhibit #2 identifies three highlighted columns. The first two highlighted columns (F and G) are the “Begin” and “End” dates of each CTW worker in 1970. The third highlighted column (Column I) represents the fraction of the year during which the CTW was employed. For example, [redacted].

For 1970, there were a total of 60 CTWs at the Rocky Flats facility whose employment ranged from 0.2 year to essentially a full year (i.e., 0.99726). A breakdown of employment periods for 1970 is shown in Table 1. When weighted, the average CTW worker for 1970 was employed for 0.908 year.

**Table 1. Distribution of Employment Duration (Fraction of Year) for Construction Trades Workers for 1970 at Rocky Flats Plant**

No. of CTWs	Fraction of Year Employed
1	[redacted]
1	[redacted]
5	[redacted]
1	[redacted]
1	[redacted]
1	[redacted]
50	0.9973
Total CTW = 60	Avg. CTW Employment = 0.908

Based on the 1970 data alone, SC&A would fully agree that an average annual employment period of 0.908 year for CTWs approximates “full-time” employment or the average employment period of AMWs.

1977 and 1978 Data

Our review of CTW employment data for 1977 and 1978 revealed significantly different values. Due to the large number of CTWs for each of these years, raw data sheets are not included herein but may be verified by accessing the spreadsheet “Construction\_External\_Dosimetry\_RFP\_CTW.xls”.

Presented in Table 2 and Table 3 below are summary data for each of the two years. Inspection of Table 2 shows that for 1977, there were 665 CTWs whose employment ranged from 0.9178 year to 0.1534 year with a weighted average of 0.51 year or about 6 months.

For 1978, Table 3 shows that a total of 855 CTWs were employed at Rocky Flats for employment periods ranging from 0.9973 year to 0.2520 year with a weighted average of 0.474 year (or less than 6 months).

**Table 2. Distribution of Employment Duration (Fraction of Year) for Construction Trades Workers for 1977 at Rocky Flats Plant**

No. of CTWs	Fraction of Year Employed
5	0.9178
230	0.7516
1	0.5890
1	0.5123
163	0.5068
40	0.5041
1	0.3370
2	0.2603
165	0.2575
3	0.2547
21	0.2521
1	0.1616
1	0.1534
Total CTWs = 665	Avg. CTW Employment = 0.51

**Table 3. Distribution of Employment Duration (Fraction of Year) for Construction Trades Workers for 1978 at Rocky Flats Plant**

No. of CTWs	Fraction of Year Employed
1	0.9973
2	0.9178
2	0.7589
297	0.7561
1	0.6219
92	0.50685
50	0.5041
272	0.2548
138	0.2520
Total CTWs = 855	Avg. CTW Employment = 0.474

It should also be noted that large groups of workers were hired on identical dates for fixed periods of employment. For example, Table 3 shows that 272 CTWs had a common yearly fraction of 0.2548. The spreadsheet data for year 1978 shows that all of the 272 CTWs were hired on June 29, 1978, and terminated September 30, 1978, which supports SC&A's contention that CTWs are frequently hired for specific tasks of limited duration.

In summary, SC&A stands by its conditional Finding #1(as well as Finding #3) that annual employment periods for CTWs differ sufficiently from AMWs. In turn, the recommended deep dose adjustment factor of 1.4 may not be claimant favorable. In addition, there may be a need for a shallow dose adjustment factor.

## EXHIBIT #1: SUMMARY OF FINDINGS #1 and #3 (CONDITIONAL) FROM SC&A'S REVIEW OF OCAS-PER-014

### 2.3 SC&A'S COMMENTS, OBSERVATIONS, AND FINDINGS PERTAINING TO ORAUT-OTIB-0052 AS THE PRINCIPAL SUPPORT DOCUMENT FOR OCAS- PER-014

#### 2.3.1 External Penetrating Dose Adjustment Factor

Guidance for the reconstruction of external penetrating dose for unmonitored CTWs involves the use of a 1.4 adjustment factor (i.e., multiplier) and the 95<sup>th</sup> percentile, site-specific coworker dose. Based on dose data that compared CTW to AMW doses for six DOE sites, NIOSH's selection of the 1.4 adjustment factor for **all** DOE facilities and for **all** years appears to be conservative and claimant favorable.

At this time, SC&A has neither been given access to the original dose data nor an explanation that would indicate whether the **annual** doses for CTWs and AMWs were scaled to reflect **exposure/employment duration** in any given year. Unlike "all monitored workers" who mostly represent full-time employees/workers at a site, CTWs are more likely to be hired on an as-needed basis and for restrictive time periods that may represent a small fraction(s) of a given year.

Finding #1 (Conditional): The Deep-Dose Adjustment Factor of 1.4 May Not be Claimant Favorable. In the event that annual doses for CTWs (and to a lesser extent for AMWs) were not adjusted to account for exposure/employment periods of less than a full year, the recommended deep-dose adjustment factor of 1.4 may not be claimant favorable.

Finding #2 (Conditional): The Inclusion of CTWs Among AMWs May Obscure Dose Differences. As stated in Section 4.0 of OTIB-0052, ". . . Sometimes the AMW group **includes** the CTWs and in others it did not." However, the OTIB does not identify which data sets (i.e., external deep dose, shallow dose, and/or bioassay data sets) failed to separate CTW from AMW data.

A review of external data contained in Tables 5-1, 5-2, 5-3, 5-4, and 6-1 of OTIB-0052 identifies the following:

- (1) The number of monitored CTWs relative to AMWs represents a substantial fraction of AMWs.
- (2) A ratio of "number monitored" to "number with measurable dose" among CTWs is consistently lower than those for AMWs.

## EXHIBIT #1 (Continued)

The inclusion of CTWs among AMWs, therefore, obscures the true ratios of CWTs/AMWs in instances where AMWs represent a combination of CTWs and **non**-CTWs.

### 2.3.2 External Shallow Dose

Only two of the eight DOE sites (i.e., SRS and Rocky Flats) provided annualized shallow dose data for deriving CTWs/AMWs dose ratios. According to NIOSH, these limited data, nevertheless, suggest that AMW doses consistently bounded CTW doses and obviate the need for an adjustment factor.

Finding #3 (Conditional): A Shallow-Dose Adjustment Factor May be Required. Annual shallow doses (like penetrating doses) received by CTWs may, nevertheless, have been understated in the event that NIOSH failed to adjust CTW shallow doses to account for employment/exposure periods of less than 1 year as was cited in Findings 1 and 2 above for penetrating dose assessment.

If Finding #1 holds and there are significant differences in exposure times between CTWs and AMWs in any given year, an adjustment factor may be required for the reconstruction of shallow dose for CTWs.

## EXHIBIT #2: CTW EMPLOYMENT DATA FOR 1970

1	Year	HS ID	Deep	Skin	Expid	Begin	End	Company	Fraction
2	1970		57	57	[redact]	[redact]	[redact]	SWINERTON & WALBERG COMPANY	[redact]
3	1970		323	373	[redact]	[redact]	[redact]	KAISER-HILL COMPANY, L.L.C.	[redact]
4	1970		230	230	[redact]	[redact]	[redact]	SWINERTON & WALBERG COMPANY	[redact]
5									
6	1970		379	379	[redact]	[redact]	[redact]	J A JONES CONSTRUCTION\3893	[redact]
7	1970		100	100	[redact]	[redact]	[redact]	SWINERTON & WALBERG COMPANY	[redact]
8	1970		31	31	[redact]	[redact]	[redact]	SWINERTON & WALBERG COMPANY	[redact]
9	1970		47	47	[redact]	[redact]	[redact]	SWINERTON & WALBERG COMPANY	[redact]
10									
11	1970		199	199	[redact]	[redact]	[redact]	SWINERTON & WALBERG COMPANY	[redact]
12	1970		653	881	[redact]	[redact]	[redact]	J A JONES CONSTRUCTION\3893	[redact]
13									
14	1970		320	320	[redact]	[redact]	[redact]	SWINERTON & WALBERG COMPANY	[redact]
15	1970		385	385	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
16	1970		0	0	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
17	1970		441	441	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
18	1970		345	345	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
19									
20	1970		363	363	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
21	1970		76	76	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
22	1970		0	0	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
23	1970		101	101	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
24	1970		224	224	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
25	1970		392	392	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
26									
27	1970		1438	1438	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
28	1970		146	146	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
29	1970		0	0	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
30	1970		0	0	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
31	1970		21	21	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
32	1970		0	0	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
33	1970		130	130	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
34	1970		0	0	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
35									
36	1970		342	342	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
37	1970		0	0	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
38	1970		190	190	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
39	1970		19	19	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
440	1970		804	804	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
41	1970		344	344	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
42	1970		856	856	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
43	1970		1302	1302	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
44	1970		405	405	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
45	1970		0	0	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726

**NOTICE:** This report has been reviewed for Privacy Act information and has been cleared for distribution. However, this report is pre-decisional and has not been reviewed by the Advisory Board on Radiation and Worker Health for factual accuracy or applicability within the requirements of 42 CFR 82.

## EXHIBIT #2 (Continued)

	Year	HS ID	Deep	Skin	Expid	Begin	End	Company	Fraction
46	1970		299	299	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
47	1970		229	229	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
48	1970		220	220	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
49	1970		749	749	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
50									
51	1970		83	83	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
52	1970		269	269	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
53	1970		72	72	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
54	1970		0	0	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
55	1970		236	251	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
56	1970		211	211	[redact]	1-Jan-70	31-Dec-70	SWINERTON & WALBERG COMPANY	0.99726
57	1970		201	201	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
58	1970		152	152	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
59	1970		488	488	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
60	1970		182	182	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
61	1970		0	0	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
62	1970		152	152	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
63	1970		430	430	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
64	1970		392	392	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
65	1970		458	458	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
66	1970		38	38	[redact]	1-Jan-70	31-Dec-70	J A JONES CONSTRUCTION\3893	0.99726
67									
68									
69									
70									
71									
72	1970		1496	1496	[redact]	1-Jan-70	31-Dec-70	KAISER-HILL COMPANY, L.L.C.	0.99726
73	1970		137	137	[redact]	1-Jan-70	31-Dec-70	KAISER-HILL COMPANY, L.L.C.	0.99726

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