

# **ORAUT-OTIB-0052**

## **Parameters to Consider When Processing Claims for Construction Trade Workers**

Report from the Procedures Review Subcommittee

Presented to the  
Advisory Board on Radiation and Worker Health  
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# ORAUT-OTIB-0052 Summary

Because of their employment and exposure practices (frequently short-term, but high dose rate), construction trade workers (CTWs) are very different from most other workers at a site. As such, exposure data from other workers may not apply to CTWs.

ORAUT-OTIB-0052 provides guidance for developing a coworker model for unmonitored CTWs, and presents information that compares doses received by monitored CTWs to doses received by all monitored workers (AMWs). CTWs were defined as including, but are not limited to, laborers, mechanics, masons, carpenters, electricians, painters, pipefitters, insulators, boilermakers, sheet-metal workers, operating engineers, and iron workers.

For the DOE complex, it was generally found that the internal and external annual doses received by CTWs were usually bounded by those received by AMWs. However, examination of individual DOE sites indicated that in some instances, at some sites, the doses received by CTWs exceeded those of AMWs. In those instances, ORAUT-OTIB-0052 developed a claimant-favorable adjustment factor based on the ratio of CTW to AMW monitored doses.

# ORAUT-OTIB-0052 Timeline

- Aug 31, 2006 – Revision 0
- July 2007 – SC&A Review of Revision 0
- WG/Subcommittee, NIOSH, and SC&A discussions: Aug 29, 2007; June 24, 2008; July 21, 2008; Sept 4, 2008; & Oct 14, 2008
- Feb 17, 2011 – Revision 1
- July 2011 – SC&A Review of Revision 1

# ORAUT-OTIB-0052, Revision 0

- Used to calculate coworker doses
- Not directly used in dose reconstructions
- Recommends CTW coworker external doses be 1.4 times AMW doses
- Recommends CTW coworker internal doses be equal to AMW doses, except for Hanford
- Based on data from SRS, Y-12, K-25, RFP, INL, and Hanford (over 1 million histories, with over 215,000 CTW histories)

# OTIB-0052 Methodology – External Dose Comparison

## OTIB-0052 Methodology versus Actual Dose Records

**CTWs selection biased towards high dose occupations,  
e.g., pipefitters**

<b>Site</b>	<b>Number of CTWs Compared</b>	<b>Ratio Range (OTIB / Actual)</b>	<b>Number of CTWs with Ratio &lt;1</b>
SRS	20	1.96 to 6.17	0
Rocky Flats	20	0.80 to 3.15	1
Hanford	20	0.9 to 4.2	1
Total	60	0.80 to 6.17	2 (3%)

# SC&A Review Findings

(all are closed; 2 examples detailed)

- 1 Does not address differences in doses received by different construction occupations.
- 2 The dose databases used are lacking significant data during the early operational years.
- 3 The dose databases do not always identify who were CTWs, and for CTWs, what were their occupations.
- 4 NIOSH did not make modifications to the internal dose calculation methodology, as they indicated to the Center to Protect Workers' Rights (CPWR) that they would.
- 5 Plutonium and/or uranium were used to compare internal CTW to AMW doses. What about other radionuclides?
- 6 Does not address how to determine CTW doses at sites that do not have a coworker OTIB.
- 7 Does not address how to determine neutron CTW doses.
- 8 All SRS external doses are from the HPAREH. Need to evaluate other dose databases, e.g., Fayerweather, SRSABST.
- 9 Evaluation is based on DOE annual exposure report. Need to address the MUD dose database for INL.

# SC&A Review Findings (Cont'd)

- 10 For post-1974 ratio of penetrating doses experienced by CTWs to other workers in OTIB-0052, does not agree with NIOSH 2005 (INL EPI study), which indicates a correction factor closer to 2, and perhaps greater for some job types.
- 11 Claimant favorability of OTIB-0052 approach for INL early period internal dose (to 1965) cannot be determined.
- 12 The REX dose database was not used. Need to evaluate results based on the REX database to those given.
- 13 The CTW doses need to be compared consistently to either AMWs or Non-CTWs. Currently, different sections perform different comparisons.
- 14 The handling of 'missing dose' needs to be consistent. Currently, some sections include 'missing dose' while others do not.
- 15 No instructions are given as to what to do if high or low cumulative exposures are suspected.
- 16 Some construction occupations (e.g., pipefitters) receive exposures larger than the average CTW exposure, and may receive exposures above the 95<sup>th</sup> percentile CTW exposure.

# Example - Finding 5: Plutonium and/or uranium were used to compare internal CTW to AMW doses. What about other radionuclides?

Finding 5 details:

*..., plutonium was used as the standard for comparing the internal doses of CTWs to AMWs at three of the sites: Rocky Flats, ORNL, and Hanford, while uranium was used at Y-12, K-25, and ORNL.*

*Monitoring for a number of other radionuclides was performed at most DOE sites. For example, at Hanford the other monitored radionuclides include H-3, Sr-90, Cs-137, Am-241, Cm-242, and fission products.*

*No documentation was found in ORAUT-OTIB-0052 or in its supporting documentation to demonstrate that using uranium and/or plutonium as a standard for comparing internal doses was claimant favorable should the exposure be the result of the intake of another radionuclide.*

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# Finding 5: Response and Reply

**NIOSH Initial Response (August 23, 2007):** The underlying assumption for internal dose comparison is that the internal dose hazard for a site is closely tied to the radionuclide being handled in greatest quantity at the site. The vast majority of bioassay data in the DOE complex is for plutonium and uranium. Data on other radionuclides are limited in time frame and number of results. Consequently, meaningful comparisons between the groups for less prominent radionuclides were not judged to be feasible.

**SC&A Reply (June 20, 2008):** SC&A agrees with what is said in the NIOSH Initial Response. However, it is not whether a comparison between groups for less prominent radionuclide is “feasible,” but whether such a comparison is “necessary.” For example, do the plutonium/uranium doses always dominate the AMW doses, or do other radionuclides sometimes dominate? Also, do the AMW doses from other radionuclides ‘follow’ the plutonium/uranium doses in any predictable fashion? When AMWs have bioassay data for other radionuclides, why were these data collected? Was there any systematic reason?

# Finding 5: Resolution

To resolve Finding 5, NIOSH placed a limitation in Revision 1 on the use of the internal dose reconstruction portions of ORAUT-OTIB-0052:

*Intakes of less common radionuclides, those other than uranium or plutonium, are not assessed. Refer to the site technical basis document (TBD) for information about less common radionuclides...[Section 3.1]*

SC&A agreed with this approach, and recommended Finding 5 be closed.

On July 14, 2011, the Subcommittee concurred and closed Finding 5.

SC&A also recommended a PER be developed to determine if any CTW internal doses from less common radionuclides (including tritium) were reconstructed using OTIB-0052 methodology between Revisions 0 and 1.

# Example - Finding 1: Does not address differences in doses received by different construction occupations.

Finding 1 Example #1: SRS Construction Trade Worker 1952 to 1989 External Penetrating Dose (SCA-TR-TASK3-0004, Table 3.2-1)

Prefix	Occupation	Construction Trade Worker-Years with Dose				All Monitored Construction Trade Worker-Years		
		Number	Percent of Type	Average Dose (mrem/y)	Percent At or Below	0 Dose Number	Average Dose (mrem/y)	Percent At or Below
30	Radiographers	761	2.5%	294.89	100.0%	428	188.74	100.0%
26	Pipefitters	2968	9.6%	211.79	97.5%	1811	131.53	97.6%
20	Boilermakers	1367	4.4%	161.28	88.0%	566	114.06	87.8%
34	Not Identified*	27	0.1%	145.19	83.6%	13	98.00	83.8%
5	Laborers	4576	14.8%	131.74	83.5%	1919	92.82	82.8%
8	Cement Mason	346	1.1%	128.90	68.7%	124	94.89	83.8%
6	Carpenters	2667	8.6%	121.98	67.6%	993	88.89	69.5%
31	Asbestos Workers	1324	4.3%	121.17	59.0%	668	80.54	62.0%
All Construction Trade Workers		31008	100.0%	115.72	N.A.	17876	73.40	N.A.

# Finding 1: Continued

Finding 1 Example #2: Summary of Dose Data Returned by REMS  
(SCA-TR-TASK3-0004, Table 2.2-1)

Labor Category/Occupation		Number of Worker-Years		Average Dose (mrem/yr)	
		Monitored	Measured Dose	Monitored	Measured Dose
All Workers	All Wkr	2,053,992	398,483	14.6	75.4
All Construction	Cnstrct	138,542	45,152	21.7	66.5
Carpenters	Crpntr	8,884	3,696	26.5	63.6
Electricians	Elctrcn	35,138	11,861	18.5	54.8
Masons	Mason	593	167	9.1	32.2
Mechanics/Repairers	M/R	21,029	6,505	19.4	62.6
Miners/Drillers	M/D	2,131	86	1.2	30.2
Misc. Repair/Construction	MR/C	50,691	14,022	14.8	53.5
Painters	Paint	5,171	2,110	27.9	68.5
Pipe Fitter	PipeFit	14,905	6,705	54.1	120.2
Handlers/Laborers/Helpers	Labors	30,032	10,499	29.6	84.8

# Finding 1: Response and Reply

**NIOSH Initial Response (August 23, 2007):** NIOSH believes that the goal of favorable treatment for construction trade workers who were unmonitored, or who were monitored but are deficient in some portion of their records for a period of time, has been achieved by assigning doses that are among the highest observed on any site. Any refinement in the model with respect to subgroups of construction occupations is not necessary.

**SC&A Reply (June 20, 2008):** SC&A believes that this is a policy decision — what constitutes “claimant favorable” for a generic procedure? It’s already been established that “claimant favorable” is in the 90% to 95% realm. The policy question that needs answering is 90%/95% of whom? — the entire DOE population, the entire site population, the site’s CTW population, a specific trade’s population.

It’s SC&A’s recommendation that this issue be transferred to OTIB-0020, where a statement alerting the dose reconstructor that certain construction trades (e.g., pipefitters) may have received higher exposures than the CTW as a whole, and therefore, additional ‘conservatism’ should be included in the dose reconstruction when the claimant belongs to one of these trades.

# Finding 1: Resolution

November 14, 2011: NIOSH added the following to ORAUT-OTIB-0020:

*For routinely exposed workers (i.e., workers who were expected to have been monitored), the 95th-percentile dose should be applied. Also note that certain construction trades (e.g., pipefitters) might have received higher exposures than construction trade workers in general; therefore, they might fall into the category of workers who were expected to have been monitored.*

# Finding 1: Closed

SC&A agreed that this change to OTIB-0020 addressed OTIB-0052 Finding 1, and recommended this finding be closed.

On April 11, 2012, the Subcommittee concurred and closed Finding 1, as well as related Findings 15 and 16.

SC&A also recommended a PER be developed to determine if any pipefitters who had their doses reconstructed using OTIB-0052 methodology between Revisions 0 and 1 need to have their doses revised.