Draft

ADVISORY BOARD ON
RADIATION AND WORKER HEALTH

National Institute for Occupational Safety and Health

ISSUES RESOLUTION MATRIX FOR PACIFIC PROVING GROUNDS SITE PROFILE

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ABBREVIATIONS AND ACRONYMS

ABRWH	Advisory Board on Radiation and Worker Health
AP	anterior-posterior
AWE	Atomic Weapons Employer
CE	Claims Examiner
DCF	dose conversion factor
DNA	Defense Nuclear Agency
DOE	U.S. Department of Energy
DOL	U.S. Department of Labor
EEOICPA	Energy Employees Occupational Illness Compensation Program Act
ISO	isotropic
keV	kiloelectron volt
MDA	minimum detectable activity
NIOSH	National Institute for Occupational Safety and Health
NRC	U.S. Nuclear Regulatory Commission
NTS	Nevada Test Site
ORAUT	Oak Ridge Associated Universities Team
OTIB	ORAUT technical information bulletin
POC	probability of causation
PPG	Pacific Proving Grounds
REF	radiation effectiveness factor
ROT	rotational
SEC	Special Exposure Cohort
TBD	technical basis document
WG	Work Group

Finding Resolution for Site Profile Issues for the Pacific Proving Grounds

Finding No.: Report Sect.	Finding Description	NIOSH Response	Finding Resolution
1: 4	NIOSH needs to update ORAUT-TKBS-0052, Rev. 00, with regard to the 250-workday requirement for SEC Class inclusion. Revision 00 of ORAUT-TKBS-0052, *Summary Site Profile for the Pacific Proving Grounds*, was issued on August 30, 2006. At that time, SEC status for presumptive cancer claimants required employment with at least 250 workdays. The 250-workday requirement for PPG workers was subsequently amended by the Department of Labor (DOL) in EEOICPA Bulletin No. 06-15 issued on September 27, 2006, and EEOICPA Bulletin No. 07-05 issued on January 11, 2007. Additionally, there may be a need for further discussions pertaining to the surrogate use of film badge dosimetry for PPG employment period(s) as recommended in DOL's EEOICPA Bulletin No. 07-05.	NIOSH agrees than an update is needed to ORAUT-TKBS-0052, Rev. 00, with regard to the 250-workday requirement for SEC Class inclusion. The next revision of ORAUT-TKBS-0052 will include provisions of EEOICPA Bulletin No. 06-15 issued on September 27, 2006, and EEOICPA Bulletin No. 07-05 issued on January 11, 2007 which state, *inter alia*, that: "For any 24-hour period that the employee was present (either worked or lived) on the PPG or on ships (evacuated prior to a nuclear weapon testing), the CE would credit the employee with the equivalent of three (8-hour) work days. If there is evidence the employee was present at the PPG or on ships for 24 hours in a day for 83 days, the employee would have the equivalent of 250 work days and would meet the 250 work day requirement."	NIOSH issued Rev. 01 to ORAUT-TKBS-0052 on July 11, 2016. Section 1.3 was amended in accordance with EEOICPA Bulletins Nos. 06-15 and 07-05, which equate any 24-hour period (working or living on the PPG) with three 8-hour work days for establishing the 250-workday requirement for potential inclusion in the SEC class. At the April 21, 2017, PPG WG teleconference meeting, the WG concurred with the revision to Section 1.3 and closed the finding.

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Observation 1: 5	There is a need for more definitive guidance pertaining to the assignment of occupational medical dose in behalf of claimants with no formal affiliation with a DOE or AWE facility.	The next revision of ORAUT-TKBS-0052 will include provisions from ORAUT-OTIB-0079 which states the NIOSH interpretation is that the EEOICPA defines covered radiation as the radiation received by a covered employee at a covered facility during a covered period. Section 2.0 of ORAUT-OTIB-0079 also states that "For most cases in which energy employee medical records are not provided, dose reconstructors should assume that any occupational medical X-ray exposure occurred at the covered facility where the energy employee worked." Therefore, if a covered employee cannot be affiliated with a covered facility and there are no records of X-rays being administered at a covered facility, then occupational medical exposures should not be assigned. In addition, the next revision of ORAUT-TKBS-0052 will delete reference to the guidance found in ORAUT-PROC-0061 for covered employees "hired on location."	NIOSH issued Rev. 01 to ORAUT-TKBS-0052 on July 11, 2016. In Section 3.0 of the revised site profile, NIOSH substituted protocols defined in *Occupational X-Ray Dose Reconstruction for DOE Sites* (ORAUT-PROC-0061, Rev. 03) for guidance provided in *Guidance on Assigning Occupational X-Ray Dose under EEOICPA for X-Rays Administered Off Site* (ORAUT-OTIB-0079, Rev. 01). At the April 21, 2017, PPG WG teleconference meeting, the WG concurred with the text revision to Section 3.0 and closed Observation 1.
2: 6	Section 4.0 "Occupational Environmental Dose" completely ignores occupational environmental doses for PPG locations from fallout. (Note: For PPG locations, occupational external environmental dose is for all practical purposes an integral part of the occupational external (as well as internal) dose and should be assessed as such in Section 6.0 of the PPG Site Profile.)	NIOSH agrees with the finding and Section 4 of the next revision of ORAUT-TKBS-0052 will be revised to instruct dose reconstructors that external dose should be assessed in Section 6.0 of the PPG Site Profile. Under the current SEC, in the absence of bioassay data, internal doses cannot be reconstructed.	NIOSH issued Rev. 01 to ORAUT-TKBS-0052 on July 11, 2016. Definitive guidance for assignment of unmonitored external exposure to fallout before 1955 was provided in revisions to Sections 6.2 and 6.3 and Attachment A of the PPG site profile. At the April 21, 2017, PPG WG teleconference meeting, the WG agreed that the revisions to Section 6.0 of the PPG site profile provided the necessary guidance to dose reconstructors and closed Finding 2.

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3: 7.4.2	Available DOE records for a claimant may not only be incomplete/inaccurate, but more importantly may not include unmonitored exposures associated with cohort badging, exposure to fallout, etc.	NIOSH understands there are serious deficiencies related to film badge dosimetry data and procedural practices identified by the NRC (1989), SAIC (1989–2006), and Perkins and Hammond (1980). In light of these deficiencies, NIOSH finds it intractable to achieve more accurate dose assessments than those provided by the DNA and reduced in Attachment A of ORAUT-TKBS-0052, with realistic uncertainty ranges; too many data have been lost or never captured to make such an effort feasible. However, the next revision ORAUT-TKBS-0052 will include revisions to the Attachment A to provide 95% doses as appropriate (see response to Findings 8 and 9 below). For cases where occupation on the various islands is documented in the dosimetry records and their stay times are known, either by personal or cohort film badges or reentry logs, additional dose can be calculated in accordance with the information provided in Figures 7-6 through 7-10 and added to doses assigned using Attachment A to account for unmonitored exposure to fallout. It should be noted that during Operation Castle in the first half of 1954, 85% to 90% of all personnel were issued operational film badges. In addition, all personnel involved in reentry activities were also issued mission badges that were read at the end of each mission. (Castle Series, 1954, DNA 6035F). For Operation Wigwam on May 15, 1955, and all subsequent tests at PPG, 100% of all personnel were issued operational film badges. In addition, all personnel involved in reentry activities were also issued mission badges that were read at the end of each mission. (Wigwam, DNA 6000F, 1981)	NIOSH issued Rev. 01 to ORAUT-TKBS-0052 on July 11, 2016. Considering the limitations of personal dosimeters, their limited use, and other procedural practices, NIOSH proposed the use of the 95th percentile coworker doses defined in Attachment A of the revised PPG site profile as a reasonable resolution for assigning dose. At the April 21, 2017, PPG WG teleconference meeting, the WG concurred with the NIOSH resolution and closed Finding 3.

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4: 7.4.2	ORAUT-TKBS-0052 does not provide a definition for unmonitored dose as it applies to PPG participants or any specific guidance.	The next revision of ORAUT-TKBS-0052 will revise this statement to read as follows: "Covered employees that participated in the various PPG operations and were not badged can be assigned coworker dose as outlined in Attachment A."	NIOSH issued Rev. 01 to ORAUT-TKBS-0052 on July 11, 2016. In this revision, NIOSH has introduced guidance that specifies the use of the 95th percentile coworker doses, as defined in Attachment A. At the April 21, 2017, PPG WG teleconference meeting, the WG concurred with NIOSH's revision to the PPG site profile and closed Finding 4.
5: 7.4.2	Average photon energies associated with fallout are well above >250 keV. Depending on what exposure geometry is assumed, a default photon energy of 30–250 keV may not be claimant favorable	Although ISO or ROT geometries might be more realistic, the general approach taken with all EEOICPA claims is to apply the DCF yielding the highest POC. Except for the lung, esophagus, red bone marrow, and bone surfaces (as discussed in IG-001, Section 4.4) the highest DCF is typically associated with the 30-250 keV photon energy range and the AP geometry. In addition, as described in Table 5A of the *NIOSH –IREP Technical Documentation* (2002), the radiation effectiveness factor (REF) is significantly higher for photons in the 30-250 keV range when compared to the > 250 keV range. These two factors lead to the recommendation given in Section 6.0.	NIOSH issued Rev. 01 to ORAUT-TKBS-0052 on July 11, 2016. While NIOSH acknowledged photon energies for fallout are well above 250 keV, its choice of 30–250 keV photon energy and AP geometry represent claimant-favorable dose conversion factors for all but four organs (lung, esophagus, red bone marrow, and bone surfaces). For these four organs, revisions to Section 6.3.3 recommend that an AP-to-ROT geometry ratio be considered for claimant favorability, with ISO geometry for cases requiring best estimates. At the April 21, 2017, PPG WG teleconference meeting, SC&A and the WG concurred with NIOSH's approach to apply the DCF yielding the highest POC. Therefore, SC&A withdraws Finding 5.

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6: 7.4.2	Since claims involving skin cancer usually specify the location(s) on the body, the critical variable of distance above the source plane defined by Barss and Weitz (2006) should be included in the assignment of beta-to-gamma dose ratios for PPG claimants.	Figure C-1 in Attachment C of the NTS external TBD provides the information given in Table 7-4 of the SC&A report. In addition, with respect to the ratios in Table C-1 of the NTS document, Attachment C recommends: "These values can be modified with appropriate factors for shielding and distance (Barss and Weitz 2006)." Guidance on the assignment of beta-to-gamma ratios from Barss and Weitz (2006) will be added to the next revision of ORAUT-TKBS-0052 for clarity. The guidance will include, from Barss and Weitz 2006, Table 1, Beta-to-gamma dose Ratios for Pacific Test Sites, Table 3, Beta-to gamma Ratios for eye Exposures, and Table 7, Standard Distances from Source Plane for Various Anatomical Locations.	NIOSH issued Rev. 01 to ORAUT-TKBS-0052 on July 11, 2016. In Section 6.1 of the revised PPG site profile, NIOSH eliminated the default Nevada Test Site beta-to-gamma ratio of 1:1 and introduced guidance that included beta-to-gamma ratios by Barss and Weitz (2006). The revision also incorporated critical variables that include age of fallout, distance, and weathering impacts on the beta-to-gamma ratios. At the April 21, 2017, PPG WG teleconference meeting, the WG agreed with the revision to Section 6.1 of the PPG site profile and closed Finding 6.

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7: 7.4.2	NIOSH's guidance for the assignment of missed dose is based on assumptions that are not supported by facts and in the face of uncertainty are clearly not claimant favorable.	The next revision of ORAUT-TKBS-0052 will revise the missed dose guidance as follows: "Assign missed dose based on the number of exchanges found in the dosimetry records. Also, compare the total of the recorded dose plus the missed dose to the 50% dose in Attachment A and assign the larger dose. In addition, for cases where occupation on the various islands is documented in the dosimetry records and their stay times are known, additional dose can be calculated in accordance with the information provided in DNA's 1983 report entitled *Operation Greenhouse 1951* related to calculating dose based on island occupation times and added to doses assigned as described above to account for potentially unmonitored exposure to fallout." It should be noted that in most cases where an individual's dose was assigned based on cohort badging, logs were maintained in the individual's dosimetry records which documented the location and stay times associated with reentry activities. These logs can be used to estimate potential dose received during these reentry activities.	NIOSH issued Rev. 01 to ORAUT-TKBS-0052 on July 11, 2016. To account for unmonitored exposures and the uncertainties of recorded film badge data prior to 1955, NIOSH revised Section 6.0 of the PPG site profile. The revision states that the 95th percentile coworker doses should be assigned when data are incomplete or nonexistent. Pre-1955, recorded doses should be compared to 95th percentile doses, and the larger of the two doses should be assigned. Sections 6.1, 6.2, and 6.3 were revised to address exposures to Operation Greenhouse fallout in 1951. At the April 21, 2017, PPG WG teleconference meeting, the WG agreed with the revision to the PPG site profile and closed Finding 7.
8: 7.4.2	Independent of other concerns/limitations that characterize the DNA dose distribution data (e.g., their accuracy, completeness, etc.), use of the 50th percentile dose as a coworker dose is not justified for PPG participants for Operations up to and inclusive of Operation CASTLE and for the subsequent Operations where dosimeter damage was an issue.	Owing to the large uncertainties in the operation-specific dose reported by DNA, the next revision of ORAUT-TKBS-0052, Attachment A will be revised to replace the 50th percentile doses with the 95th percentile doses to be used for coworker doses, as appropriate.	NIOSH issued Rev. 01 to ORAUT-TKBS-0052 on July 11, 2016. In this revision, NIOSH has introduced guidance that specifies use of the 95th percentile coworker doses, as defined in Attachment A. At the April 21, 2017, PPG WG teleconference meeting, the WG concurred with NIOSH's revision to the PPG site profile and closed Finding 8.

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9: 7.4.2	Operation-specific dose distributions defined by DNA must be adjusted to account for the MDA value of film dosimeters regardless of what percentile value is employed.	The next revision of ORAUT-TKBS-0052, Attachment A will be revised to ensure the coworker dose approach follows the guidance in ORAUT-OTIB-0020 with respect to the treatment and inclusion of potential missed dose.	NIOSH issued Rev. 01 to ORAUT-TKBS-0052 on July 11, 2016. In this revision, NIOSH has introduced guidance that specifies the use of the 95th percentile coworker doses, as defined in Attachment A. At the April 21, 2017, PPG WG teleconference meeting, the WG concurred with NIOSH's revision to the PPG site profile and closed Finding 9.