

Closeout of TBD Issues Pertaining to the Summary Site Profile for the Pacific Proving Grounds (PPG)

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Overview of PPG Activities/Locations

- Between 1946 and 1962, the U.S. Atomic Energy Commission conducted a total of 105 atmospheric and underwater nuclear weapons tests at several locations.
- N-Test Locations in Mid-Pacific Ocean
 - Bikini Atoll – Marshall Islands
 - Enewetak Atoll – Marshall Islands
 - Johnston Island
 - Christmas Island
 - Other Pacific locations

Summary Statistics of PPG N-Tests

Key N-Test Data	Bikini Atoll	Enewetak Atoll	Christmas Island Area	Johnson Atoll Area	Other Pacific Locations
Time Period	1946–1958	1948–1958	1962	1958–1962	1955; 1962
Number of Tests	24	42	24	12	3
YIELD (Mt TNT equivalent):					
Minimum	0.0017	0.0022	0.0022	0.0113	0.030
Maximum	15.000	10.400	7.650	8.300	0.030
Sub-Totals	76.838	31.653	23.253	19.776+	0.030+

Comparison of Nuclear Tests Conducted in the U.S. vs. PPG

Location of Test	Number of Weapons Detonated	Total Yield (megatons TNT)
Continental United States	107	1.38
All PPG Tests	105	151.55
Marshall Islands	66	108.5
• Bikini Atoll	24	76.84
• Enewetak Atoll	42	31.65

Chronology for the Resolution of the PPG Technical Basis Document (TBD)

- August 30, 2006: NIOSH issued ORAUT-TKBS-0052, *Summary Site Profile for the Pacific Proving Ground* (NIOSH 2006).
- June 2012: SC&A was tasked to conduct a review of Revision 00 to the PPG site profile.
- November 5, 2013: SC&A issued *Review of the Summary Site Profile for the Pacific Proving Grounds* (SC&A 2013), which identified 9 findings and 1 observation.
- May 20, 2014: In response to SC&A's findings/observation, NIOSH issued an *Issues Resolution Matrix for Pacific Proving Ground Site Profile* (NIOSH 2014).

Chronology (cont.)

- January 16, 2015: PPG Work Group (WG) teleconference:
 - Discussed findings/observation.
 - Concluded NIOSH’s proposed resolutions adequately addressed SC&A’s concerns.
 - All findings placed “In Abeyance” awaiting a revision to the site profile.
- July 11, 2016: NIOSH issued Revision 01 to the PPG site profile (NIOSH 2016).
- August 9–10, 2016: At a full Board meeting, SC&A was tasked to conduct a limited review of Rev. 01 to ORAUT-TKBS-0052 that focused on the resolution of “In Abeyance” findings.

Chronology (cont.)

- December 21, 2016: SC&A issued its review of Rev. 01 to the PPG site profile (SC&A 2016). SC&A concurred with said revisions and recommended closure of all findings and the observation.
- April 21, 2017: PPG WG teleconference:
 - Discussed SC&A's review.
 - WG concurred with SC&A's recommendations.
 - All findings and the observation were closed.

A Summary of PPG Findings and Their Resolution

- Finding 1: Update ORAUT-TKBS-0052, Rev. 00, regarding the 250-workday requirement for SEC class inclusion based on EEOICPA Bulletins No. 06-15 and No. 07-05.
- NIOSH Resolution of Finding 1. Section 1.3 of PPG site profile was amended in accordance with EEOICPA Bulletins No. 06-15 (DOL 2006) and No. 07-05 (DOL 2007), 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.
- Status of Finding 1. PPG WG agreed with SC&A's recommendation and closed Finding 1.

PPG Findings and Their Resolution (cont.)

- Finding 2: Section 4.0, “Occupational Environmental Dose,” ignores environmental doses for PPG locations from fallout.
- NIOSH Resolution of Finding 2. SC&A’s concern regarding exposure to fallout before 1955 was acknowledged in Section 4.0, “Occupational Environmental Dose.” Definitive guidance for assignment of unmonitored external exposure to fallout before 1955 is provided in revisions to Sections 6.2 and 6.3 and Attachment A of the PPG site profile.
- Status of Finding 2. Section 6.0 revisions provide the necessary guidance to account for unmonitored external exposures to fallout before 1955. PPG WG recommended closure of Finding 2.

PPG Findings and Their Resolution (cont.)

- Finding 3: DOE records may be incomplete/inaccurate and also not include unmonitored exposures associated with cohort badging, exposure to fallout, etc.
- Finding 4: ORAUT-TKBS-0052 does not provide a definition for unmonitored dose as it applies to PPG participants or any specific guidance.
- Finding 8: Use of the 50th percentile coworker dose is not justified for PPG participants for operations up to and inclusive of Operation CASTLE.
- Finding 9: Operation-specific dose distributions defined by the Defense Nuclear Agency must be adjusted to account for the minimum detectable activity value of film dosimeters regardless of what percentile value is employed.
- NIOSH Resolution of Findings 3, 4, 8, and 9. Limitations of personal dosimeters, their limited use, and other procedural practices were recognized by NIOSH as deficiencies that are “intractable.” To overcome these deficiencies, NIOSH proposes the use of the 95th percentile coworker doses defined in Attachment A of the revised PPG site profile.
- Status of Findings 3, 4, 8, and 9: SC&A recognizes the difficulties NIOSH faced in the dose reconstruction of PPG personnel. Given the intractable nature of said limitations, SC&A believes that the use of coworker dose values cited in Attachment A of Rev. 01 of ORAUT-TKBS-0052 is a reasonable resolution. Accordingly, the PPG WG concurred with SC&A’s recommendation and closed Findings 3, 4, 8, and 9.

PPG Findings and Their Resolution (cont.)

- Finding 5: Average photon energies for fallout are well above >250 keV. Depending on exposure geometry, a default photon energy of 30–250 keV may not be claimant favorable.
- NIOSH's Resolution of Finding 5. While NIOSH acknowledged photon energies >250 keV, its choice of 30–250 keV photon energy and AP geometry represent claimant-favorable dose conversion factors (DCFs) for all but four organs (lung, esophagus, red bone marrow, and bone marrow). For these four organs, revisions to Section 6.3.3 suggest that an AP-to-ROT geometry ratio should be considered for claimant favorability, with ISO geometry for cases requiring best estimates.
- Status of Finding 5. Because the lower photon energy and AP geometry generally yield higher DCF/POC values, SC&A agrees that NIOSH should retain its past practice to apply the DCF yielding the highest POC. In support of claimant favorability and with concurrence of the PPG WG, SC&A withdraws Finding 5.

PPG Findings and Their Resolution (cont.)

- Finding 6: Assignment of external dose from PPG fallout for skin cancers requires a beta-to-gamma dose ratio that is defined by the distance of the skin cancer location above the source plane. A second variable affecting dose is the age of fallout.
- NIOSH's Resolution of Finding 6. In Section 6.1 of the revised PPG site profile, NIOSH eliminated the default Nevada Test Site beta-to-gamma ratios of 1:1 and revised guidance that included beta-to-gamma ratios by Barss and Weitz (2006) along with efficiency ratios that include the effects of weathering.
- Status of Finding 6. Revisions incorporated in Section 6.1 fully address critical variables that include age of fallout, distance, and weathering impacts on the beta-to-gamma ratios that must be used to derive the beta dose contribution for select tissues. The PPG WG agrees with the revisions to Section 6.1 and recommends closure of Finding 6.

PPG Findings and Their Resolution (cont.)

- Finding 7: NIOSH's guidance for the assignment of missed photon dose is based on assumptions that are not supported by facts and, in the face of uncertainty, are not claimant favorable.
- NIOSH's Resolution of Finding 7. To account for unmonitored exposures and uncertainties of recorded film badge data prior to 1955, NIOSH revised Section 6.0 of the PPG site profile as follows:
 - 1) 95th percentile coworker doses should be assigned when data are incomplete or nonexistent. Pre-1955, recorded dose should be compared to 95th percentile doses and assigned larger of two doses.
 - 2) Sections 6.1, 6.2, and 6.3 were revised to address exposures to Operation Greenhouse fallout in 1951.
- Status of Finding 7. SC&A has assessed all revisions to Section 6 of ORAUT-TKBS-0052 in the context of the stated finding. The WG concludes that current guidance adequately addresses Finding 7 and recommends its closure.

PPG Findings and Their Resolution (cont.)

- Observation 1: More definitive guidance is needed for assignment of occupational medical dose in behalf of claimants with no formal affiliation with a DOE or Atomic Weapons Employer facility.
- NIOSH's Resolution to Observation 1. To address this finding, NIOSH revised Section 3.0, which substituted protocols defined in *Occupational X-Ray Dose Reconstruction for DOE Sites* (NIOSH 2004) for guidance provided in *Guidance on Assigning Occupational X-Ray Dose under EEOICPA for X-Rays Administered Off Site* (NIOSH 2011).
- Status of Observation 1. PPG WG concurs with text revisions to Section 3.0 and recommends closure of Observation 1.

Path Forward

- Issuance of a PER addressing changes incorporated in Revision 01 to ORAUT-TKBS-0052
- Review of said PER by SC&A
- Resolution and approval of the PER by the PPG WG, and selection of a sample set of dose reconstructions for review/compliance by SC&A

References

- Barss and Weitz 2006. "Reconstruction of External Dose from Beta Radiation Sources of Nuclear Weapon Origin," *Health Physics*, Vol. 91, No. 4 (2006), pp. 379–389.
- DOL 2006. *Processing Claims for Pacific Proving Grounds SEC Class, 1946 – 1962*, EEOICPA Bulletin No. 06-15, U.S. Department of Labor, Washington, DC. Sept. 27, 2006. [SRDB Ref. ID 155208]
- DOL 2007. *Supplemental Guidance for Processing Claims for Pacific Proving Grounds SEC Class, 1946 – 1962*, EEOICPA Bulletin No. 07-05, U.S. Department of Labor, Washington, DC. January 11, 2007. [SRDB Ref. ID 131050]
- NIOSH 2004. *Occupational X-Ray Dose Reconstruction for DOE Sites*, ORAUT-PROC-0061, Rev. 00, National Institute for Occupational Safety and Health, Cincinnati, OH. Dec. 1, 2004.
- NIOSH 2006. *Summary Site Profile for the Pacific Proving Ground*, ORAUT-TKBS-0052, Rev. 00, National Institute for Occupational Safety and Health, Cincinnati, OH. August 30, 2006.
- NIOSH 2011. *Guidance on Assigning Occupational X-Ray Dose Under EEOICPA for X-Rays Administered Off Site*, ORAUT-OTIB-0079, Rev. 00, National Institute for Occupational Safety and Health, Cincinnati, OH. January 3, 2011.
- NIOSH 2014. *Issues Resolution Matrix for Pacific Proving Ground Site Profile*, National Institute for Occupational Safety and Health, Cincinnati, OH. May 20, 2014.
- NIOSH 2016. *Summary Site Profile for the Pacific Proving Ground*, ORAUT-TKBS-0052, Rev. 01, National Institute for Occupational Safety and Health, Cincinnati, OH. July 11, 2016.
- SC&A 2013. *Review of the Summary Site Profile for the Pacific Proving Grounds*, SCA-TR-SP2013-0040, Rev. 1, SC&A, Inc., Vienna, VA. November 5, 2013.
- SC&A 2016. *Review of the Summary Site Profile for the Pacific Proving Grounds, Revision 01, July 11, 2016*, SCA-TR-2016-SP009, SC&A, Inc., Vienna, VA. December 21, 2016.