Draft

ADVISORY BOARD ON
RADIATION AND WORKER HEALTH

National Institute for Occupational Safety and Health

REVIEW OF THE SUMMARY SITE PROFILE FOR THE PACIFIC PROVING GROUNDS, REVISION 01, JULY 11, 2016

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ABBREVIATIONS AND ACRONYMS

Advisory Board	Advisory Board on Radiation and Worker Health
A/P	anterior/posterior
AWE	Atomic Weapons Employer
CDC	Centers for Disease Control and Prevention
DNA	Defense Nuclear Agency
DOE	U.S. Department of Energy
DOL	U.S. Department of Labor
EEOICPA	Energy Employees Occupational Illness Compensation Program Act of 2000
ISO	isotropic
keV	kiloelectron volt
MDA	minimum detectable activity
NIOSH	National Institute for Occupational Safety and Health
NRC	National Research Council
NTS	Nevada Test Site
ORAUT	Oak Ridge Associated Universities Team
POC	probability of causation
PPG	Pacific Proving Grounds
ROT	rotational
SAIC	Science Applications International Corporation
SEC	Special Exposure Cohort
SRDB	Site Research Database
TBD	technical basis document
U.S.C.	United States Code
WG	work group

1.0 STATEMENT OF PURPOSE

This draft report presents SC&A's evaluation of the recently revised *Summary Site Profile for the Pacific Proving Ground* (ORAUT-TKBS-0052, Revision 01 [ORAUT 2016]). This draft report was prepared at the request of the Advisory Board on Radiation and Worker Health (Advisory Board). Authorization for the preparation of this report was issued during a full Advisory Board meeting held in Idaho Falls, Idaho, on August 9 and 10, 2016.

2.0 RELEVANT BACKGROUND INFORMATION

2.1 TECHNICAL APPROACH AND REVIEW CRITERIA

The standard approach used by SC&A to perform site profile reviews includes, but is not limited to, the procedural protocols described in *Standard Operating Procedure for Performing Site Profile Reviews* (SC&A 2004). Approved by the Advisory Board on March 18, 2004, SC&A's protocol reflects the following review criteria:

1. Completeness of data sources
2. Technical accuracy
3. Adequacy of data
4. Consistency with other site profiles
5. Regulatory compliance

2.2 CHRONOLOGY OF RELEVANT PRIOR EVENTS

The following is a timeline of events leading to the enclosed review of ORAUT-TKBS-0052, Revision 01, issued July 11, 2016:

- On August 30, 2006, the National Institute for Occupational Safety and Health (NIOSH) issued ORAUT-TKBS-0052, Revision 00, *Summary Site Profile for the Pacific Proving Ground* (ORAUT 2006).
- In June 2012, at the request of the Advisory Board, SC&A was tasked to conduct a review of Revision 00 to the Pacific Proving Grounds (PPG) site profile.
- SC&A issued its first draft review of ORAUT-TKBS-0052, Revision 00, to the Advisory Board on October 21, 2013, as SCA-TR-SP2013-0040, Revision 0, *Review of the Summary Site Profile Review for the Pacific Proving Grounds* (SC&A 2013a).

SC&A's draft review identified a total of nine findings and one observation. Among the findings, Finding 1 questioned the 250-day Special Exposure Cohort (SEC) requirement for PPG participants and made the following recommendation:

> *The site profile should make an affirmative statement regarding a reduced time period onsite at PPG that may potentially substitute as the equivalence of the 250 day for the purpose of designating a PPG worker as part of an SEC.* [SC&A 2013a]

The 250-day PPG SEC requirement was revised after Revision 00 to ORAUT-TKBS-0052, which was issued on August 30, 2006. Revision 00 predates Energy Employees Occupational Illness Compensation Program Act (EEOICPA) Bulletin No. 06-15 and EEOICPA Bulletin No. 07-05, which were issued on September 27, 2006, and January 22, 2007, respectively, by the U.S. Department of Labor (DOL). Bulletin No. 06-15 and No. 07-05 amended the 250-workday requirement for PPG participants to 83 days.

In order to address and explain this new information, the Advisory Board asked SC&A to revise and reissue its review of ORAUT-TKBS-0052, Revision 00.

- In November 2013, SC&A issued its revised review of ORAUT-TKBS-0052, Revision 00, as SCA-TR-SP2013-0040, Revision 1 (SC&A 2013b).

- In response to SC&A's revised draft review (SC&A 2013b) of the PPG site profile (ORAUT-TKBS-0052, Revision 00), NIOSH issued an *Issues Resolution Matrix for Pacific Proving Ground Site Profile* on May 20, 2014.

  As a convenience to the reader, NIOSH's May 2014 issues resolution matrix is enclosed herein as Appendix A. Appendix A briefly summarizes each of the nine findings and one observation identified by SC&A and their corresponding resolutions proposed by NIOSH.

- On January 16, 2015, the Pacific Proving Grounds Work Group (PPG WG) convened a teleconference that also included the participation of personnel representing NIOSH, its contractors, and SC&A. Members of the PPG WG weighed the merits of each of SC&A's findings and observation and critically assessed the adequacy of NIOSH's proposals for their resolution.

  On the basis of data presented, the PPG WG concluded that NIOSH's proposed resolutions adequately addressed SC&A's concerns and assigned the status of all findings to be "In Abeyance." The status of "In Abeyance" requires that, for final "Closure" of a finding, NIOSH is required to revise ORAUT-TKBS-0052 in compliance with the stated proposed resolutions.

- On July 11, 2016, NIOSH issued Revision 01 to ORAUT-TKBS-0052 for SC&A's review.

- During a full Advisory Board meeting held August 9 and 10, 2016, SC&A was requested to conduct a review of ORAUT-TKBS-0052, Revision 01, that focuses exclusively on findings "In Abeyance" for their resolution in a future PPG WG meeting.

3.0 REVIEW OF ORAUT-TKBS-0052, REVISION 01, FOR RESOLUTION OF FINDINGS 1 THROUGH 9 AND OBSERVATION 1

Resolution of the findings held "In Abeyance" involves an assessment of the revised text in the PPG site profile for the purpose of confirming that the full intent of NIOSH's proposed resolution has been met, as stated in Appendix A. The following list summarizes each finding and briefly describes NIOSH's revisions to the text and the resultant status for each finding.

- Finding 1: NIOSH needs to update ORAUT-TKBS-0052, Revision 00, with regard to the 250-workday requirement for SEC class inclusion based on EEOICPA Bulletin No. 06-15 and No. 07-05.

  NIOSH Resolution of Finding 1. Section 1.3 of ORAUT-TKBS-0052 was amended in accordance with provisions of EEOICPA Bulletin No. 06-15 (DOL 2006) and EEOICPA Bulletin No. 07-05 (DOL 2007), which equate any 24-hour period (spent working or living on the PPG) to be equivalent to three 8-hour work days for establishing the 250-workday requirement for potential inclusion in the SEC class.

  Status of Finding 1. SC&A agrees with the text revision and recommends closure of Finding 1.

- Finding 2: Section 4.0, "Occupational Environmental Dose," ignores occupational environmental doses for PPG locations from fallout.

  NIOSH Resolution of Finding 2. SC&A's concern about the definition and quantitative assessment of exposure to fallout prior to 1955 (when participants were issued permanent film badges) was briefly acknowledged in Section 4.0, "Occupational Environmental Dose." Definitive guidance for the assignment of unmonitored external exposure to fallout prior to 1955 is provided in revisions to Sections 6.2 and 6.3 and Attachment A to the PPG site profile.

  Status of Finding 2. Revision to Section 6.0 provides the necessary guidance to account for unmonitored external exposures to fallout prior to 1955. SC&A recommends closure of Finding 2.

- Finding 3: Available U.S. Department of Energy (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.

  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: Independent of other concerns and limitations that characterize the Defense Nuclear Agency (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.

Finding 9: Operation-specific dose distributions defined by DNA must be adjusted to account for the minimum detectable activity (MDA) value of film dosimeters regardless of what percentile value is employed.

NIOSH Resolution of Findings 3, 4, 8, and 9. Generic limitations associated with personal dosimeters, their limited use/assignment to personnel during select time periods, and other procedural practices were recognized by NIOSH as deficiencies that are "intractable." To overcome these deficiencies, NIOSH proposes the optional 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. In Section 3.0, "Relevant Background Information," of SC&A's *Review of the Summary Site Profile for the Pacific Proving Grounds*, Revision 1 (SC&A 2013b), SC&A fully recognized the difficulties NIOSH faced in the dose reconstruction of PPG personnel by providing the following statements:

> [SC&A's] *purpose of presenting the aforementioned statistics is to point out the magnitude and dynamics of the PPG testing program and the demands and limitations it placed on personnel and resources that were further complicated by the remote/isolated locations that characterize the four test sites of the PPG.*
>
> *Undoubtedly impacted by unexpected events, limited resources, and adverse operating conditions were RadSafe personnel. Their charter was to provide radiological surveillance and personnel monitoring for tens of thousands of personnel assigned to the PPG program.*

Given the intractable nature of said limitations, SC&A believes that the use of coworker dose values cited in Attachment A of the PPG site profile, Revision 01, is a reasonable resolution. Accordingly, SC&A recommends closure of Findings 3, 4, 8 and 9.

- Finding 5: Average photon energies associated with fallout are well above >250 kiloelectron volts (keV). Depending on what exposure geometry is assumed, a default photon energy of 30–250 keV may not be claimant favorable.

NIOSH's Resolution of Finding 5. From a purely factual viewpoint (and openly acknowledged by NIOSH), external photon energy and exposure geometry at the PPG did involve photon energies >250 keV and geometries other than anterior/posterior (A/P). However, NIOSH's choice of (1) the 30–250 keV photon energy and (2) the AP exposure geometry for dose reconstruction was defended by the fact that for all but four organs (lung, esophagus, red bone marrow, and bone marrow), the corresponding dose conversion factor (DCF) values were higher and, therefore, more claimant favorable. For these four organs, revisions in Section 6.3.3 suggest that an AP-to-rotational (ROT) geometry ratio should be considered for claimant favorability with isotropic (ISO) geometry for cases requiring best estimates.

Status of Finding 5. The issue of a higher photon energy at the PPG was discussed at length during the January 16, 2015, teleconference. Given the fact that the lower photon

energy and AP geometry assumed by NIOSH generally yield higher DCF/probability of causation (POC) values (for most, but not all, organs), SC&A agrees that NIOSH should retain its "general approach with all EEOICPA claims [which] is to apply the DCF yielding the highest POC" (NIOSH 2014). In support of claimant favorability, SC&A therefore withdraws Finding 5 and recommends closure.

- Finding 6: Because claims involving skin cancer usually specify the locations 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.

  NIOSH's Resolution of Finding 6. SC&A notes that the ratio of beta to gamma dose associated with exposure to fallout is highly variable with the age of the fallout, as well as the distance above the source plane. In the absence of dosimeter-beta dose, this variability is of critical importance for claims involving skin cancers and other surficial tissues. In Section 6.1 of the revised PPG site profile, NIOSH eliminated the default Nevada Test Site (NTS) 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 selection tissues. SC&A agrees with the revisions to Section 6.1 and recommends closure of Finding 6.

- Finding 7: 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.

  NIOSH's Resolution of Finding 7. This finding pertains to deficiencies in the assignment, processing, and interpretation of film badges for years prior to 1955 and that limit NIOSH's ability to estimate missed doses. To account for unmonitored exposures and the uncertainties of recorded exposures, NIOSH revised Section 6.0 of the PPG site profile with the following guidance:

  > *To account for these large uncertainties, the 95th percentile coworker doses in Attachment A should be assigned for cases in which the data are incomplete or nonexistent. If before 1955, the employee had recorded dose, the dose reconstruction should compare that recorded dose with the 95th percentile doses in Attachment and assign the larger of the two doses.*

  Status of Finding 7. In Sections 6.1, 6.2, and 6.3 of the revised PPG site profile, NIOSH also addressed exposures to fallout associated with Operation Greenhouse in 1951 for personnel stationed on the base islands of Enewetak, Parry, and Japtan, as well as for personnel assigned to naval support vessels. SC&A has assessed the revision to Section 6 of ORAUT-TKBS-0052 in the context of the stated findings. SC&A concludes that current guidance adequately addresses Finding 7 and recommends its closure.

- Observation 1. 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 Atomic Weapons Employer (AWE) facility.

  NIOSH's Resolution to Observation 1. SC&A's concerns for the need to provide more definitive guidance on assignment of occupational medical dose was addressed by NIOSH in revisions to Section 3.0, which substituted protocols defined in ORAUT-PROC-0061, *Occupational X-Ray Dose Reconstruction for DOE Sites*, Revision 00 (ORAUT 2004), for guidance provided in ORAUT-OTIB-0079, *Guidance on Assigning Occupational X-Ray Dose under EEOICPA for X-Rays Administered Off Site*, Revision 00 (ORAUT 2011a).

  Status of Observation 1. SC&A concurs with text revision to Section 3.0 and recommends closure of Observation 1.

4.0 SUMMARY CONCLUSIONS

This report summarizes SC&A's focused review of ORAUT-TKBS-0052, Revision 01, with regard to changes that address nine findings and one observation identified in SC&A's draft review of ORAUT-TKBS-0052, Revision 00. These site profile changes correspond to proposed resolutions that were presented to and accepted by the PPG WG pending proper revisions to the PPG site profile.

SC&A concurs with said revisions and recommends closure of all findings and the observation.

5.0 REFERENCES

Barss and Weitz 2006. N.M. Barss and R.L. Weitz, "Reconstruction of External Dose from Beta Radiation Sources of Nuclear Weapon Origin," *Health Physics*, Vol. 91, No. 4 (2006), pp. 379–389. [SRDB Ref. ID 26776]

DOL 2006. *Processing Claims for the Pacific Proving Grounds SEC Class, 1946 – 1962*, EEOICPA Bulletin No. 06-15, U.S. Department of Labor, Washington, DC. September 27, 2006. [SRDB Ref. ID 155208]

DOL 2007. *Supplemental Guidance for Processing Claims for the 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 2014. *Issues Resolution Matrix for Pacific Proving Ground Site Profile*, National Institute for Occupational Safety and Health, Cincinnati, Ohio. May 20, 2014.

ORAUT 2004. *Occupational X-Ray Dose Reconstruction for DOE Sites*, ORAUT-PROC-0061, Revision 00, Oak Ridge Associated Universities Team, Oak Ridge, Tennessee. December 1, 2004.

ORAUT 2006. *Summary Site Profile for the Pacific Proving Ground*, ORAUT-TKBS-0052, Revision 00, Oak Ridge Associated Universities Team, Oak Ridge, Tennessee. August 30, 2006.

ORAUT 2011a. *Guidance on Assigning Occupational X-Ray Dose Under EEOICPA for X-Rays Administered Off Site*, ORAUT-OTIB-0079, Revision 00, Oak Ridge Associated Universities Team, Oak Ridge, Tennessee. January 3, 2011.

ORAUT 2011b. *Use of Coworker Dosimetry Data for External Dose Assignment*, ORAUT-OTIB-0020, Revision 03, Oak Ridge Associated Universities Team, Oak Ridge, Tennessee. November 14, 2011.

ORAUT 2016. *Summary Site Profile for the Pacific Proving Ground*, ORAUT-TKBS-0052, Revision 01, Oak Ridge Associated Universities Team, Oak Ridge, Tennessee. July 11, 2016.

SC&A 2004. *Standard Operating Procedure for Performing Site Profile Reviews*, Revision 1, S. Cohen & Associates, McLean, Virginia. May 13, 2004.

SC&A 2013a. *Review of the Summary Site Profile Review for the Pacific Proving Grounds*, SCA-TR-SP2013-0040, Revision 0, S. Cohen & Associates, Vienna, Virginia. October 21, 2013.

SC&A 2013b. *Review of the Summary Site Profile Review for the Pacific Proving Grounds*, Revision 1, SCA-TR-SP2013-0040, Revision 1, S. Cohen & Associates, Vienna, Virginia. November 5, 2013.

APPENDIX A: ISSUES RESOLUTION MATRIX FOR PACIFIC PROVING GROUND SITE PROFILE (NIOSH 2014)

Finding Number	Report Section	Finding Description	NIOSH Response
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."
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."

Finding Number	Report Section	Finding Description	NIOSH Response
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.
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)

Finding Number	Report Section	Finding Description	NIOSH Response
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."
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.
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.

Finding Number	Report Section	Finding Description	NIOSH Response
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.
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 50^{th} percentile doses with the 95^{th} percentile doses to be used for coworker doses, as appropriate.
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.