

**OCAS-IG-001**

**External Dose Reconstruction  
Implementation Guideline**

**Report from the Procedures Review  
Subcommittee**

Presented to the  
ABRWH Full Board Meeting  
Augusta, Georgia

March 12, 2013

# OCAS-IG-001 Summary

- Provides general (not specific) guidance on the components, standards, and methods to be used to reconstruct external radiation dose for probability of causation (POC) calculations
- Detailed implementation guidance and related information is provided in other site-specific or issue-specific technical documents, procedures, and workbooks.

# OCAS-IG-001 Timeline

- May 2002 – Revision 0 – Not Reviewed by SC&A
- August 2002 – Revision 1
- January 17, 2005 – SC&A Review of Revision 1
- July 27, 2006 – Discussed with Subcommittee
- August 25, 2006 – Revision 2
- October 29, 2007 – SC&A Review of Revision 2
- March 5, 2012 – Revision 3
- April 11, 2012 – SC&A to Review Revision 3 Only to Determine which Findings were Closed
- February 5, 2013 – Discussed with Subcommittee – All findings Closed

# Findings Summary: OTIB-0070

- 24 Findings in total– complete histories captured in the Board Review System (BRS)
  - <http://app-cinc-dcas.cdc.gov:8106/documents/default.aspx?mode=ASSIGNED>
- Revision 1 – 17 Findings
- Revision 2 – 7 Findings
- All 24 Findings are Closed
- Resolution spanned 11 Years; May 2002 – February 2013
- The following slides provide summary information on resolution of each Finding – Details in BRS and handout

# IG-001, Rev 1 Review Findings

#	Finding	Resolution
1	Deficiencies with procedure layout include: (1) fragmented structure, (2) excessive amount of useless data and/or historical background in main body, and (3) critical data for dose reconstruction found in Appendices rather than main body.	Closed on July 31, 2012  The Subcommittee determined that this finding is Closed. Concerns raised by this issue are covered in Finding 19 (below).
2	Guidance for deriving (1) film and TLD dosimeter uncertainty, (2) neutron dose from source term, and (3) occupational medical dose using x-ray machine operating parameters requires data and resources that are not available to the dose reconstructor.	Closed on November 1, 2012  IG-001 provides general principles, not specific guidance. Detailed implementation guidance and related information are found in other documents and procedures.

# IG-001, Rev 1 Review Findings

#	Finding	Resolution
3	IG-001 provides inadequate guidance for classifying a case as potentially < 50% POC or > 50% POC and should identify the role of Task 2 personnel.	<p>Closed on July 27, 2006</p> <p>IG-001 is intended to provide general DR guidance. The level of detail suggested in this comment is not needed in this implementation guide. This guidance is found in PROC-006.</p>
4	IG-001 recommends inappropriate methods for estimating TLD uncertainty.	<p>Closed on August 25, 2006 / October 29, 2007</p> <p>Revision 2 of IG-001 eliminated recommending inappropriate methods for TLD uncertainty and includes guidance that directs the dose reconstructor to site specific documentation, when available.</p>

# IG-001, Rev 1 Review Findings

#	Finding	Resolution
5	IG-001 recommends a range of LOD values for 1956-1960 that the reviewer considers too low for the period.	Closed on August 25, 2006 / October 29, 2007  In Revision 2, Table 2.1 that referenced LOD values for the 1956–1960 period has been modified to remove any date-specific LOD values.
6	Guidance implies that LOD for deep dose from gamma may also be applied to electron dose, which is inconsistent with historical data that show uncertainty for shallow dose is considerably higher than deep dose.	Closed on August 25, 2006 / October 29, 2007  Revision 2 of IG-001 removes the example that implies LOD for deep dose from gamma is also appropriate for electron dose.

# IG-001, Rev 1 Review Findings

#	Finding	Resolution
7	IG-001 assumes NTA film dosimeters were insensitive to neutron below 500 keV, however, reviewer contends that the dosimeter is insensitive to neutron <1 MeV.	Closed on August 25, 2006 / October 29, 2007  Revision 2 indicates that a variety of energy thresholds for NTA film dosimeters are cited in the literature and recommends reviewing site-specific information for determining actual threshold values.
8	Methods for reconstruction of neutron doses from survey data or source term data do not appear practical, achievable, and defensible.	Closed on July 31, 2012  Revision 3 has included the use of more practical methods such as employing neutron-to-photon ratios.

# IG-001, Rev 1 Review Findings

#	Finding	Resolution
9	IG-001 does not acknowledge the likely use of neutron/ photon ratio methods in neutron dose reconstruction and erroneously states that "... at most facilities, neutron exposure were generally less than 20% of the photon exposures."	Closed on August 25, 2006 / October 29, 2007  Revision 2 modified Section 2.2.2 to eliminate the offending statement, and introduced a statement acknowledging the use of site-specific neutron-to-photon ratios.
10	IG-001, Appendix B, DCFs for bone surface and red marrow are underestimated.	Closed on August 25, 2006 / October 29, 2007  Revision 2 recommends applying a correction factor to the rotational and isotropic DCFs for bone surface and red marrow (as well as esophagus and lung).

# IG-001, Rev 1 Review Findings

#	Finding	Resolution
11	IG-001 does not account for additional laboratory uncertainty for film badge readings associated with exposure less than 200 mrem.	Closed on August 25, 2006 / October 29, 2007  Revision 2 added guidance to Section 2.1.1.3 indicating that site-specific dosimetry data may be available in the site profile.
12	IG-001, Appendix B, PA geometry DCFs are in error and underestimates dose (i.e., assumes the dosimeter is worn on the posterior).	Closed on February 5, 2013  Posterior to anterior (PA) DCFs are <u>not</u> routinely used in DRs. However, since PA DCFs could prove useful in some special exposure scenarios (if used correctly), the PA DCFs should be kept in Appendix B.

# IG-001, Rev 1 Review Findings

#	Finding	Resolution
13	IG-001, Appendix B, rotational and isotropic geometry DCFs are in error and underestimates dose.	Closed on August 25, 2006 / October 29, 2007  Revision 2 has introduced a discussion and table of correction factors to be applied to rotational and isotropic DCFs for bone (surface), bone (red marrow), esophagus, and lung.
14	Angular sensitivity not accounted for in 'correcting' measured film or TLD values.	Closed on August 25, 2006 / October 29, 2007  Revision 2 added a discussion on the angular response of dosimeters to Section 4, and guidance that directs the dose reconstructor to site specific documentation.

# IG-001, Rev 1 Review Findings

#	Finding	Resolution
15	No correction recommended for backscatter; may be significant factor for pre-1984 when calibrations were done 'in air' as opposed to 'on-phantom.'	Closed on July 27, 2006  Non-correction for backscatter only makes the reported film dose higher, building some conservativeness in early years.
16	Environmental uncertainty (i.e. heat, humidity, light, etc.) was not addressed IG.	Closed on February 5, 2013  IG-001 contains general guiding information, but does not provide specific instructions to follow during dose reconstruction. Specific instructions are provided in site-specific or issue-specific technical documents and workbooks.

# IG-001, Rev 1 Review Findings

#	Finding	Resolution
17	Guidance for the selection of uncertainty distributions for total organ dose raises question of consistency and requires professional judgment.	Closed on February 5, 2013  IG-001 contains general guiding information, but does not provide specific instructions to follow during dose reconstruction. Specific instructions are provided in site-specific or issue-specific technical documents and workbooks.

# IG-001, Rev 2 Review Findings

#	Finding	Resolution
18	SC&A's review of IG-001, Revision 1, identified several deficiencies regarding the clarity and structure of the document.	Closed on July 31, 2012  Revisions 2 & 3 eliminated much of the excessive data and generally improved the clarity of the document.
19	A deficiency (Finding 1) identified under the Revision 1 review was the fragmented structure and illogical sequencing of information.	Closed on November 1, 2012  What constitutes the logical, versus illogical, sequencing of information is a fairly subjective determination. Importantly, the sequence of information within the document is not a key factor in providing adequate guidance.

# IG-001, Rev 2 Review Findings

#	Finding	Resolution
20	Guidance was not provided regarding the methodology for the assessment of neutron doses using source term data.	Closed on November 1, 2012  IG-001 provides general principles, not specific guidance. Detailed implementation guidance and related information is found in other documents and procedures.
21	IG-001 does not consistently direct the dose reconstructor to technical and site-specific documents .	Closed on July 31, 2012  This finding is virtually identical to Finding 22.

# IG-001, Rev 2 Review Findings

#	Finding	Resolution
22	OCAS-IG-001 should (but does not) direct the dose reconstructor to technical and site-specific documentation, were the DR can find more specific guidance.	Closed on November 1, 2012  IG-001 provides general principles, not specific guidance. Detailed implementation guidance and related information is found in other documents and procedures.
23	No discussion added to this revision regarding neutron-to-photon ratios.	Closed on July 31, 2012  Revision 3 added a discussion to Section 2.2.2.2.1 to clarify the evaluation of missed neutron data, by recommending the use of site-specific neutron-to-photon dose ratios.

# IG-001, Rev 2 Review Findings

#	Finding	Resolution
24	<p>(1) All DCFs associated with PA geometries in Appendix B are in error and underestimate dose.</p> <p>(2) Environmental uncertainty associated with doimeters are not addressed.</p> <p>(3) Guidance for selection of uncertainty distributions raises questions of consistency and required professional judgment.</p>	<p>Closed on February 5, 2013</p> <p>Posterior to anterior (PA) DCFs are <u>not</u> routinely used in DRs. However, since PA DCFs could prove useful in some special exposure scenarios (if used correctly), the PA DCFs should be kept in Appendix B.</p> <p>IG-001 contains general guiding information, but does not provide specific instructions to follow during dose reconstruction. Specific instructions are provided in site-specific or issue-specific technical documents and workbooks.</p>

# Questions?