

Review of Professional Judgements in Dose Reconstruction

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Scope of Report

- Questions examined in this review included:
 - Where are professional judgements necessary in dose reconstructions (considering a DOE site and an AWE site)?
 - Could the professional judgements result in some inconsistencies?
 - What are possible approaches for assessing dose reconstructions (or portions of dose reconstructions) where professional judgments may result in significant inconsistencies.

Overview of Assessment

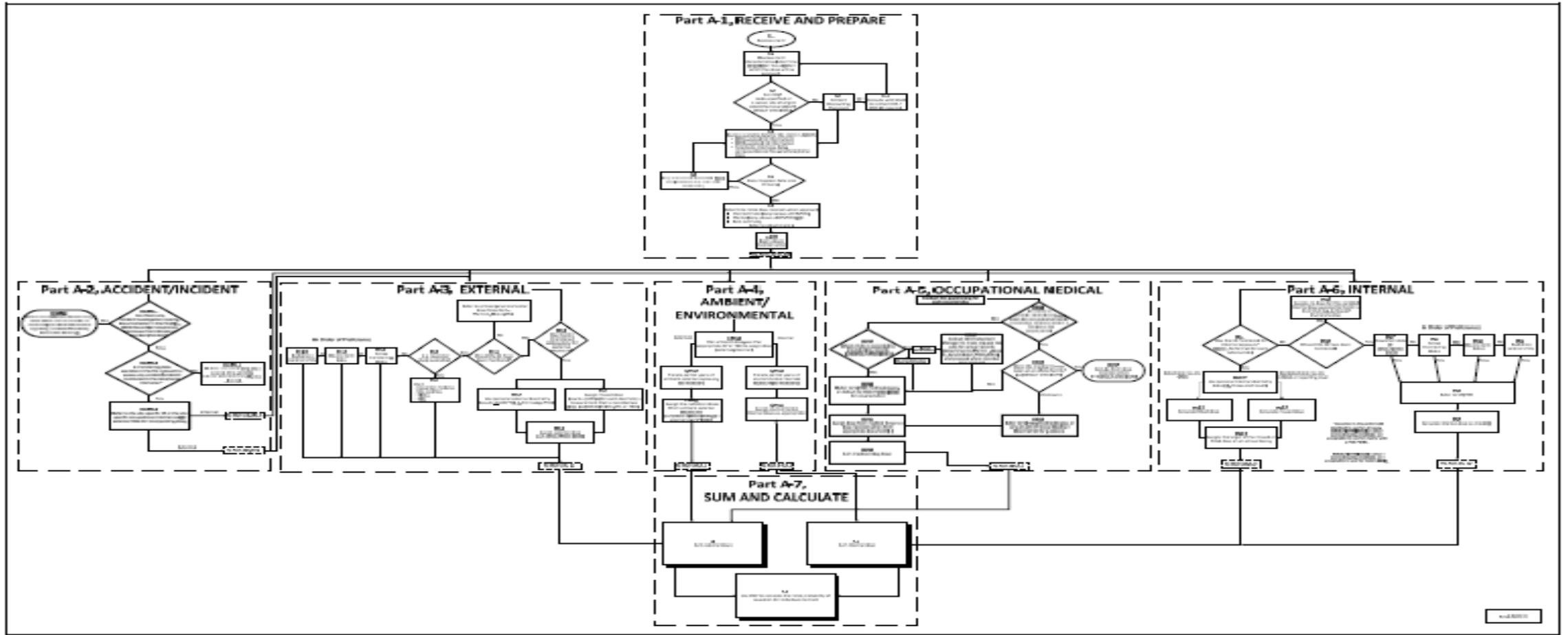
- Selected two sites to consider types of professional judgements involved in dose reconstruction for DOE cases and AWE cases
- Reviewed relevant TBDs, TIBs and procedures (both site specific as well as many of the overarching documents)
- Reviewed relevant SC&A review reports.
- Reviewed internal guidance documents associated with the example sites (e.g. DR guidelines for SRS site).
- Reviewed individual cases (from query of NOCTS database, ORAU QA database and cases reviewed by ABRWH)

Overview of Assessment, cont.

- Reviewed procedures mapping the DR process
 - ORAUT-PROC-0106 “Roadmap to reconstructing Dose”
- Reviewed QA/QC program
 - ORAUT-PROC-0059 – “Peer Review of DRs”
 - ORAUT-PROC-0077 – “DR Error Tracking and Reporting” (NIOSH / DOL comments)
 - OCAS-PR-07 “Dose Reconstruction Review”

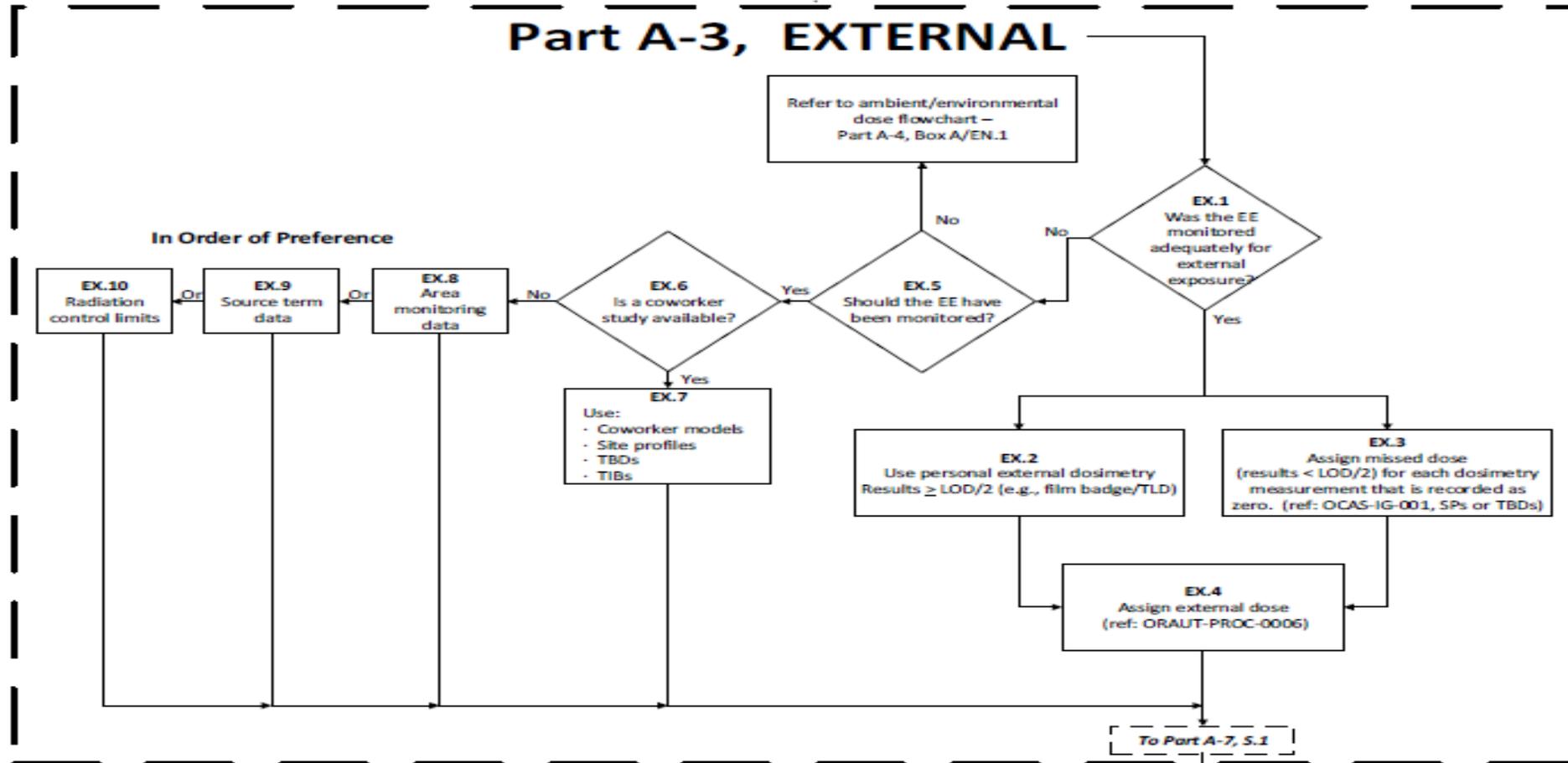
ORAUT-PROC-0106 – Roadmap to DR

ATTACHMENT A DOSE RECONSTRUCTION ROADMAP



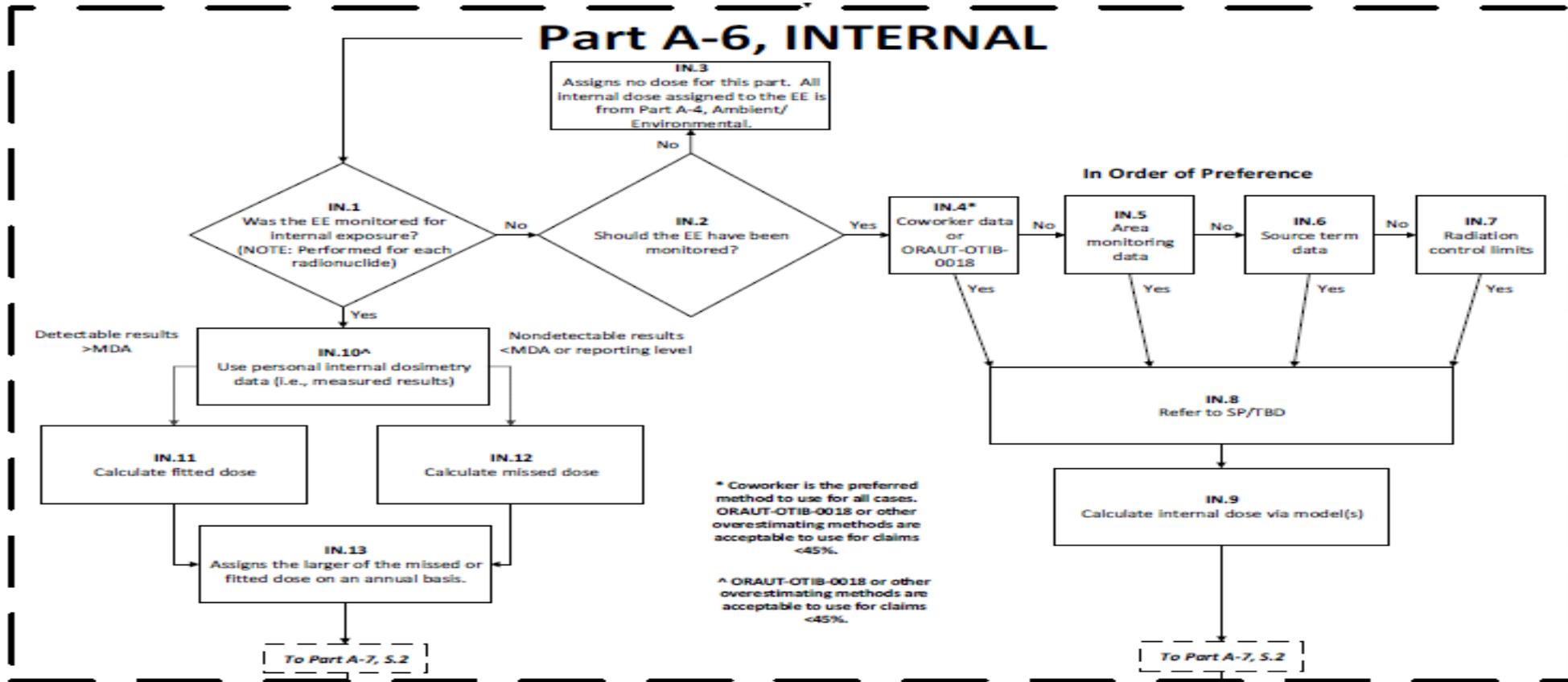
Roadmap, continued

ATTACHMENT A DOSE RECONSTRUCTION ROADMAP (continued)



Roadmap, continued

ATTACHMENT A DOSE RECONSTRUCTION ROADMAP (continued)



Personal vs Program judgements

- Personal judgements are defined as judgements which would have to be made by the staff person doing the individual dose reconstruction
- Program judgements are professional judgements but they are dealt with directly in procedures, technical basis documents or DR guidelines.

Personal Judgements

- Judgements regarding worker location for purposes of internal dose estimates and external dose estimates,
- Judgements regarding job title and the associated potential for exposure,
- Judgements in the calculation of missed external and internal dose,
- Judgements required in reconciling discrepancies in available dosimetry data (e.g., annual external summary data versus cycle data),
- Judgements in calculating internal dose based on in-vivo and/or in-vitro measurements for best estimate cases, and
- Judgements regarding calculating dose associated with incidents / events noted in the claimant interview or DOE records.

Effects of Judgements on dose assigned

Judgement	Specific Effects
Worker Location and / or Job	<ul style="list-style-type: none">• Effect on assignment of photon dose<ul style="list-style-type: none">• Assumed energy percentages• Assumption of glovebox work• Assumption regarding missed dose assignment (nearby dose assigned, co-worker, LOD/2, ambient)• Effect on assignment of neutron dose<ul style="list-style-type: none">• Assumption regarding n/p ratio• Assumption on energy percentages• Assumption regarding missed dose assignment (nearby dose assigned, co-worker, LOD/2, ambient)• Effect on assignment of internal dose<ul style="list-style-type: none">• Missed internal dose (e.g., potential exposure to fission products depends on location – reactor / non-reactor area)

Effects of Judgements on dose assigned, cont.

Judgement	Specific Effect
Filling gaps for 'missed' or 'un-monitored' periods	<ul style="list-style-type: none">• External Dose<ul style="list-style-type: none">• Use limit of detection (LOD/2)• Use coworker data (50% or 95%)• Use nearby data• Internal Dose<ul style="list-style-type: none">• Estimate dose based on MDAs• Estimate based on ratio with other monitored nuclides• Co-worker data• Extension of the missed dose estimate (based on MDA values) beyond the last bioassay result

Effects of Judgements on dose assigned, cont.

Judgement	Specific Effect
Calculating internal dose based on bioassay results	<p data-bbox="1289 439 2237 539">Judgement regarding type of intake(s) and intake period(s)</p> <p data-bbox="1289 611 2262 768">Judgement regarding use of in-vivo (e.g. urinalysis results) or in-vitro (e.g. lung count results) to determine intakes and organ doses</p> <p data-bbox="1289 839 2351 939">Judgement regarding the type of material (e.g., Pu/Am ratios, solubility)</p>

Effects of Judgements on dose assigned, cont.

Judgement	Specific Effect
Estimating doses associated with incidents / accidents noted in claimant interview	<p>Judgement whether available data account for noted incidents / events</p> <p>Judgements on how to estimate dose related to noted incident / event</p> <p>Judgement on whether further follow-up is necessary (e.g., follow-up requests for additional records, follow-up with claimant, follow-up with noted co-workers)</p>

Program Judgements

- Reconstructing dose from 'residual' contamination
- Reconstructing dose due to highly insoluble plutonium
- Estimating uncertainty for internal and external doses
- Estimating exposures at sites lacking individual monitoring records
- Establishing the appropriate neutron / photon ratio to use to estimate neutron doses

Example: External Dose Uncertainty

- Guidance in OCAS-IG-001 “External Dose Implementation Guide”
- ORAUT-PROC-006 “External Dose Reconstruction”
- ORAUT-OTIB-012 “Monte Carlo Methods for Dose Uncertainty Calculations” (cancelled)
- ORAUT-TKBS-0003 “SRS Technical Basis Document”

Uncertainty for measured dose is estimated based on the equation in the IG (Section 2.1.1.3.3 Simplified Dosimetry Uncertainty); equation depends on site specific information – L_c (critical limit), σ^* (estimated percent standard error)

Professional Judgement Recommendations

Recommendation 1

- Assessments should be performed in the areas identified where personal professional judgements were made by individual dose reconstruction staff to determine consistency of judgements or assumptions.
 - ORAU and/or NIOSH blind and/or focused reviews
 - ABRWH blind and/or focused reviews
 - Refine current approach for peer review by NIOSH

Professional Judgement Recs - continued

Recommendation 2

- A summary document should be developed for several of the program assumptions, including but not limited to what NIOSH has defined as global issues. A document similar to that produced by NIOSH regarding the treatment of residual contamination seems appropriate(*).

Recommendation 3

- Since site matrices for several AWE sites, in addition to Linde Ceramics are based on similar types of underlying data a review and comparison for consistency in methods may be useful.

* Advisory Board Review of Residual Period (002), NIOSH, Dr. James Neton, November 15, 2016.

Professional Judgement Recs - continued

- Recommendation 4 – Consider more standardized approach for site specific DR notes or guidelines
- Recommendation 5 – Consider whether re-evaluation of cases could be triggered by changes in DR guidelines
- Recommendation 6 – Consider requiring inclusion of a timeline and/or a case narrative within each case file
 - Detail professional judgements and basis for each judgement
 - Include in complex cases – all best estimate cases

Additional Recommendations

- Tracking System (combined error tracking system)
- Increased level of peer review for Best Estimate cases or cases with “significant” professional judgement
- Consider more systematic use of CATI and other interview information in aggregate form for DR

Conclusion

- Options to consider for both internal and external assessment of judgements that could result in significant inconsistencies
 - Focus on how to reduce inconsistencies
- Other recommendations that could improve the DR peer review process