OCAS-PER-031, Subtasks 1–3
EVALUATION OF THE NATIONAL SECURITY COMPLEX (Y-12) TBD
REVISIONS


Presented to the
Advisory Board’s Procedures Review Subcommittee
November 7, 2013
OCAS-PER-031 Summary

• The Y-12 TBD (six volumes numbered ORAUT-TKBS-0014-1 through ORAUT-TKBS-0014-6) was revised numerous times between 2003 and 2012.

• OCAS-PER-031 (2007) was issued due to the TBD change in the Th-228/Th-230 ratio from 1:1 to 0.8:1.
NIOSH’s Issue

• NIOSH stated that this change would result in an increase in assigned dose.
NIOSH’s Number of Claims

• NIOSH identified 693 Y-12 claims that were completed prior to the date of issuance of PER-031 (December 18, 2007) and had a probability of causation (POC) below 50%.
NIOSH’s Corrective Action

• NIOSH will review the DR for each of these 693 claims to determine if the evaluation of dose involved exposure to, and intake from, purified thorium.
SC&A’s Subtasks 1 & 2

- SC&A performed a paragraph-by-paragraph comparison of the first three revisions (up to and including Rev. 1 PC-2 dated January 12, 2006, that was used in OCAS-PER-031) of ORAUT-TKBS-0014-5 (referred to as TBD-5) to identify changes that could potentially impact the assigned dose.
SC&A’s Subtasks 1 & 2 (continued)

• SC&A’s comparison of the different Y-12 TBD-5 versions did not identify any changes that would impact the assigned doses, except for the method of determining purified thorium (Th-232 and Th-228) body burdens.
SC&A Finding #1

• **Finding #1: Change in Assigned Dose** – The change in the Th-228/Th-232 ratio would actually **reduce** the assigned dose, **not increase** it, if thorium intakes and resulting doses are based on recorded mg values of thorium from chest counts, as was observed in the case files SC&A has reviewed to date.
Finding #2: Chest Counts Conversion to Th-232 Body Burden – The method NIOSH uses (in both the old and new TBD-5) to assign Th-232 body burden assumes that the gamma counts obtained during the chest counts are directly related to Th-232 (in mg) in the lungs, using an empirically derived calibration factor that applies to all Y-12 workers at all times.
Finding #2 (continued)

- This assumption is incorrect because the gammas from Ac-228 and Pb-212 are being counted, and (1) Ac-228 is not in equilibrium with Th-232, (2) Pb-212 is not in equilibrium with Th-228, and (3) Th-228 is not in equilibrium with Th-232. Additionally, a given equilibrium cannot be assumed because it is constantly changing for many years after the purification of thorium.
Finding #3

• Finding #3: Different Solubility of Thorium and Decay Products in the Lung – The lung may retain thorium, being relatively insoluble, longer than the more soluble decay products in some cases. Therefore, a lung count based on the decay product (i.e., Ac-228 and/or Pb-212) would not necessarily have a consistent relationship to the thorium (Th-232 and/or Th-228) body burden.
Finding #3 (continued)

• Additionally, the solubility of the decay products themselves (inhaled or formed in the lungs) may have different solubility and not have consistent ratios.
Finding #4

• **Finding #4: MDA or LOD Value** – NIOSH assumed an Ra-228 to Th-232 ratio of 0.6 (page 31 of ORAUT-TKBS-0014-5, 2006) for determining the minimum detectable activity (MDA) of 0.6 nCi; this would require approximately 8 years from purification to counting. This is not a valid assumption for almost all workers and is not constant between each chest count.
Finding #4 (continued)

• The limit of detectability (LOD) value was not directly based on counting statistics, but it was empirically derived and meant to be used only as a screening tool, not to accurately assign dose (West 1965, Scott 1961).
SC&A’s Subtask 3 (Number of claims)

• At the time that OCAS-PER-031 was issued (12/18/2007), NIOSH identified 693 Y-12 claims that were completed prior to that date and had a POC below 50%. This establishes an upper-bound estimate of the number of claims that may be impacted. NIOSH intends to screen these claims.
SC&A’s Subtask 3 (# of claims) (continued)

- The application of these screening criteria will undoubtedly exclude many of the 693 potential claims from impacts associated with OCAS-PER-031 and the need for the reconstruction of the organ dose. However, until NIOSH reviews all of these claims, the actual number of cases that will be affected by OCAS-PER-031 and require a new dose assessment remains unknown.
SC&A’s Subtask 3 (# of claims) (continued)

• In addition, based on the outcome of the findings identified as a result of our technical review of ORAUT-TKBS-0014-5, there may be a need to cancel OCAS-PER-031 and reissue a PER after appropriate changes have been made to the Occupational Internal Dose TBD.
SC&A’s Subtask 4
Selection of DRs to audit

• SC&A identified four findings that question the technical merit of the Y-12 Occupational Internal Dose TBD and corrective actions taken by NIOSH in OCAS-PER-031.

• SC&A recommends that the selection of Subtask 4 cases be delayed until the Subcommittee on Procedures Review can further investigate SC&A’s findings and concerns.
Questions?