Bounding Stable Metal Tritide (SMT) Exposures at the Mound Laboratory

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Stable Metal Tritide (SMT) Overview

- Most forms of tritium (e.g., HTO, OBT) are relatively soluble in the body
- SMTs are tritium-metal compounds that are chemically unreactive (i.e., do not dissociate easily)
- The most unreactive forms (e.g., HfT) have very long biological clearance times in the body
  - Are considered ICRP solubility type S
- Urinalysis is ineffective for quantifying intakes of SMTs in the presence of other more soluble forms

SMT Overview—cont.

- Tritium research occurred at Mound in the SW/R tritium Complex (SRTC)
- Operations started in the 1960s and continued beyond the 1990s
- Workers could have handled and been exposed to both soluble and insoluble forms of tritium
  - All workers in SRTC on a routine tritium bioassay program
  - Workers who directly handled SMTs were relatively few
  - NIOSH has established identity of these workers
- Method needed to evaluate SMT exposures for support workers

Approach to SMT Exposure Evaluation Support Staff

- Routine tritium contamination surveys taken in the SRTC
- NIOSH collected and reviewed survey data from >10,000 documents
  - Resulted in >69,000 smears taken in 4 rooms between 1968 and 1989
  - Probability distributions of the contamination levels in the rooms were established

Approach to SMT Exposure Evaluation Support Staff—cont.

- Using the 95th percentile values and a claimant favorable resuspension factor (5E-05/m), the intake for a support worker can be calculated
- Intakes assume that worker is exposed to this value for the entire work year
  - Also assumes that the intake is to SMTs
- Dose calculation:
  - Use urine data for estimating systemic organs doses
  - Calculate lung dose using both SMT resuspension model and urinary excretion values

Doses to Workers

- Applying the bounding approach to support workers results in relatively small lung doses
- Values vary depending on specific exposure scenario
  - Annual lung doses using the 95th percentile contamination values are in the several mrem range.
- Methodology demonstrates that potential doses to support workers (i.e. those that did not directly handle SMTs) are low and can be bounded