



Reactor Characterization Studies

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To the INL/ANL-W Work Group

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Background

- ◆ A primary tool NIOSH uses for internal dose reconstruction is ORAUT-OTIB-0054, “Fission and Activation Product Assignment for Internal Dose-Related Gross Beta and Gamma Analyses.”
- ◆ SC&A assessed in 2015 and 2016 whether the OTIB envelopes with sufficient accuracy the important-to-dose-reconstruction conditions of the INL and ANL-W reactors, and prioritized the reactors into High, Medium, and Low categories for further detailed investigations.
- ◆ NIOSH responded with “NIOSH Proposal for INL and ANL-W Reactor Prioritization for OTIB-0054 Evaluation” (July 28, 2016), containing a plan for several additional reactor evaluations.
- ◆ SC&A’s report, “INL SEC-00219 and ANL-W SEC-00224: SC&A Response to NIOSH Reactor Analysis Plan and Consolidation of All Reactor Modeling Comments” (December 8, 2016), addressed the NIOSH report and consolidated all SC&A comments related to reactor evaluation prioritization.
- ◆ The INL/ANL-W WG discussed reactor characterization on May 16, 2017.

ORAUT-OTIB-0054

- ◆ NIOSH uses OTIB-0054 to determine internal doses when only gross beta or gross gamma measurements are available by assigning fission and activation product intakes for different radioisotopes that are directly tied to an indicator radionuclide (strontium-90 or cesium-137).
- ◆ The OTIB generated, using output from the ORIGEN code, nine different representative cases based on four reactors, which are intended to envelope the range of reactor and nuclear fuel types and operating scenarios.

ORAUT-OTIB-0054 archetypes

Reactor type	Reactor
High flux reactors	Advanced Test Reactor (ATR)
Na-cooled fast reactors	Fast Flux Test Facility (FFTF)
Pu production reactors	Hanford N-Reactor
Research reactors	TRIGA with Stainless Steel Cladding

INL/ANL-W WG meeting, May 16, 2017: Reactor characterization

- ◆ **LOFT:** NIOSH will analyze this reactor as a site profile issue
- ◆ **OMRE:** NIOSH will analyze this reactor
- ◆ **PBF:** NIOSH will analyze this reactor
- ◆ **SPERT I–IV:** NIOSH will do preliminary analysis to select the most bounding case, then do a full analysis of that case
- ◆ **BORAX I–V:** NIOSH will analyze BORAX-IV
- ◆ **EBR-I:** NIOSH will analyze the most bounding core; probably the Mark-IV (Pu) core
- ◆ **EBR-II:** NIOSH will analyze this reactor
- ◆ **MTR:** NIOSH will analyze the Phoenix (Pu) core
- ◆ The WG directed that SEC issue resolution should take precedence over reactor characterization studies, delaying resolution of the latter