SC&A Status Update: SEC-00219

CPP Class Definition Requiring Evidence of External Dosimetry (1963–1974) and Evaluation of Areas and Times that NIOSH has Determined Doses are Reconstructable

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Timeline of SEC 00219 Discussions

- INL Work Group Discussions
  - April 22, 2015 – Clarification and Technical Teleconference between the Work Group, NIOSH, and SC&A (not open to the public)
  - July 8, 2015 – Work Group Teleconference
  - November 10, 2015 – Work Group Meeting
- Advisory Board Discussions
  - March 26, 2015 – ABRWH Meeting 104 in Richland, WA
  - July 23, 2015 – ABRWH Meeting 105 in Idaho Falls, ID

SC&A Evaluation of CPP Class Definition Requiring Evidence of External Dosimetry (1963–1974)

SC&A Revision 01 Evaluation Approach

Purpose/Goal: Evaluate if the revised SEC Class definition may unintentionally exclude workers from the SEC Class due to current dosimetry requirements.

1. Review all currently available claimants with at least 250 Days of covered employment
   - Split original SEC period into two components based on dosimetry requirements
   - Identify claimants that did not meet dosimetry requirements in one or both SEC periods for further investigation
2. Investigate claimants who did not meet SEC dosimetry requirements to determine the potential for internal exposure to alpha-emitting contaminants at CPP

Overview of Claimant Population (both periods)

- At the time of its review, SC&A identified 898 total claimants with covered employment who worked in one or both portions of the SEC period.
  - 107 claims did not meet the 250-day criteria in either the SEC period or the two periods combined (note: SC&A still evaluated 61 of these claims).
  - 19 claims appear to only have worked at ANL-W and/or NRF (i.e. – no evidence of work at INL). 5 of these claims also did not have 250 days of employment.
  - 2 claims did not have DOE monitoring records, because the claims were filed too recently
  - 1 claim had been withdrawn prior to receiving DOE monitoring records.

Breakdown by SEC Period: Later Period (3/1/1970 – 12/31/1974)

Category	Number of Claims	Percent of Total
Total Claims Evaluated	710	–
Number of Claims Monitored	601	84.6%
Number of Claims Not Monitored	109	15.4%
Number with 250 Days or More	616	86.8%
Number with Less than 250 Days	94	13.2%
Number Meeting SEC Requirements	548	77.2%

Later Period (continued) (3/1/1970 – 12/31/1974)

SC&A had three observations based on it's review of claimants in the latter portion of the SEC period:

- Observation 1: While the class definition provides the example of "at least one film badge or TLD dosimeter," SC&A assumed in its review that any evidence of monitoring during the latter SEC period (3/1/1970–12/31/1974) will satisfy the intended criteria.
- Observation 2: SC&A identified a single claim that contained in-vivo dosimetry related to CPP, but did not have related external dosimetry. It is recommended that this claim be included with the claims requiring additional data capture at INL.

Later Period (continued) (3/1/1970 – 12/31/1974)

- Observation 3: Clarification is warranted to establish how "temporary" and/or "visitor badges" are utilized in the implementation of the class definition during the later SEC period (3/1/1970–12/31/1974).
  - Clarification was provided by NIOSH at the November 10, 2015 WG meeting - temporary and visitor badges and location file cards are adequate if 250 d requirement met
- Observations 1 and 2 raise questions about class implementation

Breakdown by SEC Period: Earlier Period (1/1/1963 – 2/28/1970)

Category	Number of Claims	Percent of Total
Total Claims Evaluated	219	–
Claims Meeting the SEC Requirements (Monitored at CPP)	67	30.6%
Claims Monitored but Did Not Meet SEC Criteria (No Evidence of CPP Exposure)	102	46.6%
Not Monitored	26	11.8%
Other	24	11.0%

Earlier Period (continued) (1/1/1963 – 2/28/1970)

SC&A had one additional observation related to the earlier SEC period:

- Observation 4: Absent additional information to the contrary, dosimetry associated with "CADRE" should be considered CPP for the purposes of determining SEC eligibility. Similar to the CPP dosimetry records, it is important to establish that "CADRE" badging records have all been captured from INL.
- At the November 10 2015 WG meeting, the meaning of CADRE was discussed but not defined. NIOSH will reach out to site personnel for clarification

NIOSH and SC&A Cases Identified for Further Evaluation with DOE/INL

- NIOSH's August 21, 2015, Work Group update identified 10 claims that required follow-up inquiries with INL
  - At the November 10, 2015, WG meeting NIOSH indicated that 3 of the 10 had external dosimetry in the later period and would therefore be included in the SEC and did not need further investigation
- Based on its independent review of the claimant population, SC&A identified 23 additional cases requiring follow-up
  - 11 of 23 recommended for follow-up with DOE/INL (Observation 6)

Summary and Path Forward

- Several Observations related to clarification of the SEC class definition:
  - Use of annual/career records as well as other records, such as in-vivo results in place of individual dosimeters (later SEC period)
  - Use of temporary and/or visitor badges
  - If current class accepted, implementation may be challenging
- A combined 18 claims were identified by NIOSH and SC&A for further investigation to validate the class definition
  - At the November 10, 2015, WG meeting it was determined that additional investigation for the 18 identified claims would be completed prior to the January 20, 2016 Board teleconference meeting

Evaluation of Areas and Times that NIOSH has Determined Doses are Reconstructable

Introduction and Background

Dose Reconstructability/Gap Analysis

- Approach: “Horizontal” and “Vertical” analysis
  - Horizontal – examine the DR methodology applied by NIOSH for all INL personnel – cross cutting
  - Vertical – specific characteristics of the individual areas at the INL site
- 6 areas of investigation:
  1. Reactor Modeling (horizontal)
  2. Test Area North (TAN) (vertical)
  3. Central Facilities Area (CFA) (vertical)
  4. Fission and Activation Product (FAP) Bioassay Indicator Radionuclides (horizontal)
  5. Burial Grounds (vertical) pended
  6. Chemical Processing Plant (CPP) Pre-1963 (vertical) pended

INL Test Reactor Area Nuclear Modeling

- This investigation examines one aspect of the dose reconstructability assumption for one of the several major site areas, the Test Reactor Area (TRA)
- Based on SC&A report, *NIOSH SEC-00219 Test Reactor Area Modeling*, SCA-SEC-2015-0074-C, Rev. 0, 9/28/15)
- Applicability of ORAUT-OTIB-0054 to the more "exotic" reactors at Test Area North (TAN) is addressed in a separate report

TRA Overview

- Does the methodology of ORAUT-OTIB-0054 (*Fission and Activation Product Assignment for Internal Dose-Related Gross Beta and Gross Gamma Analysis*) adequately model the reactor characteristics and operations of the Test Reactor Area (TRA)?
  - Are the reactors and operating scenarios adequately enveloped by the OTIB cases so that the isotopic ratios are valid?
  - Have all off-normal operating scenarios been identified and are they adequately enveloped by the OTIB methodology?

ORAUT-OTIB-0054

- Frequently, air-sampling or urinalysis data on worker exposure to mixed fission and activation products associated with nuclear reactors or fuel are available only in the form of gross beta or gross gamma activity unattributed to specific radionuclides.
- The OTIB provides guidance on assigning radionuclide-specific intakes using ratios to Cs-137 or Sr-90 indicator radionuclides.
- The goal of the OTIB is to reduce a large amount of reactor fuel isotopic data into a simplified, representative set that could be used by dose reconstructors looking at actual claimant cases.

INL Test Reactor Area

Table 5-1 of the Evaluation Report lists the eight TRA reactors, only the first three of which were (or are, in the case of the ATR) high-power, high-flux reactors used for material testing. The remaining critical facilities were low-power reactors used for reactivity measurements and are not considered in this analysis.

SC&A examined whether ORAUT-OTIB-0054 adequately envelopes the parameters of the three materials testing reactors, including the fuel and cladding composition, power level profile, burnup, and decay time following removal from the core.

- **Advanced Test Reactor (ATR)**
- **Materials Test Reactor (MTR)**
- **Engineering Test Reactor (ETR)**

SC&A Evaluation – ATR

Advanced Test Reactor

- OTIB-0054 explicitly models the fuel characteristics and operations of the ATR, so it is expected that any workers exposed to ATR fuel during reactor operations or out of the reactor, but before any isotopic separation, would be adequately treated by the methodology in the OTIB in order to determine internal exposures.
- SC&A did not find material instances of the ATR operating outside of its design envelope.

SC&A Evaluation – MTR

The MTR fuel enrichment, cladding, and plate design were similar in important nuclear aspects to those of the ATR, and both reactors were light-water cooled and moderated, with beryllium and aluminum reflectors. Its power level and burnup, however, were considerably less than those of the ATR.

Hence, the OTIB-0054 methodology, which explicitly models the ATR, should also adequately envelope the MTR in considering internal exposures when the latter reactor operated with uranium fuel.

Although the MTR initially used uranium fuel, in 1958 it became the first reactor run with a Pu-239 core. Phoenix experiment with Pu core conducted from January to April 1970

How much different the Pu operations were, and whether the differences would be radiologically significant, would require detailed comparative ORIGEN runs, which were not done for this report.

Engineering Test Reactor – ETR

- The ETR achieved first criticality on September 19, 1957, and operated at a maximum power level of 175 MW until December 1981.
- The reactor was light-water cooled and moderated and uranium fueled. Beryllium and aluminum neutron reflectors were placed outside the core. Initially, a new core contained about 14 kg of U-235, which was increased to 23.7 kg in January 1963.
- As with the MTR operating with uranium fuel, the OTIB-0054 methodology, which explicitly models the ATR, should also adequately envelope the ETR in considering internal exposures.

Summary and Path Forward

- Resolve potential issues of applicability of ORAUT-OTIB-0054 to MTR operating with plutonium fuel.
- **Prepare a prioritized list of other reactors that may fall outside the envelope of the OTIB-0054 methodology (November 10, 2015, WG meeting)**

Review of NIOSH Strategy for Reconstructing Doses to Workers at Test Area North (TAN)

Based on SC&A report *Review of NIOSH Strategy for Reconstructing Internal Doses to Workers at Test Area North (September 2015)*

Scope of Programs, Campaigns, Research and Activities at Test Area North (TAN)

- Aircraft Nuclear Propulsion Program (ANP) (1952–1961)
  - Initial Engine Test (IET)
  - Heat Transfer Reactor Experiments (HTREs)
- Technical Support Facility (TSF)
  - TAN 607 Hot Shop
  - LOFT (TAN 650)
  - Storage Pool
  - Storage Pads (TAN 790 and 791)
  - Radwaste Liquid Disposal System
  - Storage Building
  - Radiography Facility (TAN 607)
- Water Reactor Research Test Facility (WRRTF)
  - Low Power Test Facility (LPTF)
  - Shield Test Pool Facility (STPF)
- Specific Manufacturing Capability (SMC)

Focus and Scope of TAN Review

- An evaluation of the completeness of the captured external dosimetry data for the various TAN facilities
- Applicability of ORAUT-OTIB-0054 and Tables 5-22 and 5-23 of internal dosimetry TBD to the performance of internal DR for facilities at TAN that handled and stored spent and irradiated fuel
- The unique circumstances associated with exposures to airborne effluents from the ANP, which are not addressed in OTIB-0054

Review of TAN External Dosimetry Data

- Although captured SRDB data represent only a sampling of site data, NIOSH nonetheless believes that they can reconstruct external doses at TAN – thus we reviewed the available data upon which this assertion rests
- Methods – Performed a search of SRDB records using search terms including: dosimetry, dosimeter, external, personnel, badge, exposure, and film
  - 37 documents
  - 12,177 pages of records
  - 181,183 beta/gamma readouts
  - 6,665 neutron readouts

Observations on External Dosimetry at TAN

- External dosimetry for TAN as a whole appears to be fairly complete from mid-1955 through part of 1970, with a small gap from June through December 1961. Neutron dosimetry data appears spotty.
- It is not possible to group the available data by subdivisions of TAN; i.e., the available data lack adequate granularity
  - Important because activities and research throughout TAN were extremely diverse. It will be difficult to build external dosimetry co-worker models for each subdivision of TAN.
- Additional data capture will be required if the Board determines that a full completeness study is warranted

Use of OTIB-0054 to Reconstruct Internal Doses at TAN – Applicability

- TAN opened in 1952 for ANP, with support facilities and programs including TSF, IET, WRRTF. These facilities handled irradiated and spent fuel.
- Irradiated fuel and components from reactors/research facilities were often stored at TAN hot cells, hot shop, and storage pool. All of these facilities had potential for internal exposures
- Irradiated and spent fuels included:
  - ANP Fuel
  - System for Nuclear Auxiliary Power (SNAP) and associated transients (SNAPTRAN)
  - Special Power Excursion Reactor Test (SPERT)
  - Loss of Fluid Test (LOFT) Facility
  - Fuel from Heat Transfer Reactor Experiment (HTRE)
  - Disassembly of SL-1
  - Storage of TMI fuel and debris

Methods*

- Performed ORIGEN simulations to determine if:
  - The ratio of inventories of reference FPs to other FPs, as used in OTIB-0054 are reasonable, if not bounding, as compared to these ratios for TAN irradiated fuel
  - The ratio of reference FPs to TRUs as in Tables 5-22 and 5-23 of the TBD are reasonable, if not bounding, as compared to these ratios for TAN irradiated fuel
- Evaluated for the purpose of internal DR based on gross beta/gamma urinalyses

*Use of ORIGEN simulation and/or Tables 5-22, 5-23 are not considered useful/appropriate for internal exposure assessment for workers handling spent/irradiated fuel associated with ANP.

Observations/Conclusions

- Based on ORIGEN modeling for conventional reactor fuel, OTIB-0054 is generally claimant favorable when the fuel is not highly enriched, maintains integrity following burn-up, and is at a high power level (e.g., 200 MW)
- Underscores the importance of limiting our observations to general trends and consistent behavior
  - For example, dose estimates based on a 200-day burn model will generally overestimate dose from actinides, when the actual reactor was operated for significantly less time
  - Modeling exercise does not always comport well with SC&A's analysis of actual measurements (bioassay indicator radionuclide study)

Aircraft Nuclear Propulsion Program - Heat Transfer Reactor Experiments (HTREs)

- To test viability of a reactor for aircraft propulsion, 3 different reactors were built (HTRE 1, 2, and 3)
- All 3 were direct cycle, air-cooled
  - Air from turbojet engine compressed and forced past wafer-thin concentric ribbons of nuclear fuel enriched to 93.4%
  - Air heated to 1,250 °F by fuel temps of up to 3,000°F powered turbine engine

Initial Engine Tests (IETs)

- Testing program for 3 HTRE assemblies designated as Initial Engine Tests (IETs), IET#1 through IET #26
- IETs #1, #2, #5, #7, and #9 did not require nuclear power, and had no potential for release of radioactivity or human exposure
- IETs #1 and #3 – plumes went offsite - issues closed in INL WG discussions
- IET #10 issues still open – NIOSH will prepare a white paper (November 10 2015 WG meeting)

Observations and Recommendations

- Independent analyses of airborne emissions associated with the major IETs performed by SC&A under contract to CDC revealed that the DOE significantly underestimated the airborne emissions for the IETs with the largest airborne emission
- Outdoor exposures associated with releases from the ANP need to consider the results of CDC's investigations into these source terms
- Challenges associated with reconstructing outdoor onsite exposures associated with these releases

Evaluation of Available Survey Data for the Central Facilities Area at Idaho National Laboratory

Based on the SC&A report*:*
Evaluation of Available Survey Data for the Central Facilities Area at Idaho National Laboratory (September 2015)

Introduction and Background

- At the July 8, 2015, INL WG Meeting, SC&A presented a status update on their evaluation of the INL SEC Petition Evaluation Report for SEC-00219, originally issued by NIOSH on March 14, 2015, and revised on July 21, 2015.
- SC&A recommended that the available survey data for the Central Facilities Area (CFA), both during operations and prior to demolition and dismantlement (D&D), be evaluated to determine the actinide to Sr-90 and actinide to Cs-137 ratios and compare these ratios to the values in Tables 5-22 and 5-23 of ORAUT-TKBS-0007-5.
- This presentation provides a summary of NIOSH's proposed methods for bounding operational period internal doses for the CFA, a review of the available survey data, and a comparison of the derived values to the values in Tables 5-22 and 5-23 of ORAUT-TKBS-0007-5.

Proposed Methodology to Assess Actinide Intakes

- Section 7.2.5.2, SEC-00219 ER - describes NIOSH's methods for bounding operational period internal dose for CFA
- Potential missed intakes of uranium, thorium, and plutonium for CFA workers are of particular interest
- Proposed method uses mixed fission product (MFP) and mixed activation product (MAP) intakes determined from the beta-gamma bioassay data to assess actinide intakes using the actinide to Sr-90 and actinide to Cs-137 ratios and Tables 5-22 and 5-23 of ORAUT-TKBS-0007-5

CFA Survey Data

- Conducted a search of the SRDB for radiological surveys of the CFA facilities
- 1954–1956 Contamination Surveys of CFA-669 Hot Laundry and CFA-674A Chemical Engineering Lab (SRDB 139224)
- Post D&D soil sample results from excavation of the contaminated sanitary sewer line on the north side CFA-669 (SRDB 088224)

Contamination Survey Data

- Only beta-gamma and alpha results greater than background levels (beta-gamma and alpha) at the same sample location were considered.
- Eighty-five contamination survey results were found that met our criteria (listed in Appendix A of report).
- Six smear results from April 12, 1954, are not consistent with the other results and may have the alpha and beta-gamma results transposed. They were not included in the analyses.
- Original survey results are given in units of cpm. Limited counter efficiency information was used to estimate activity

D&D Soil Samples

- 19 soil samples from the excavation of the contaminated sanitary sewer line on the north side CFA-669
- Analyzed for alpha and gamma spectrum and strontium-90
- The U-234 and Th-228 levels were not significantly different from environmental levels

CFA Summary

- Analyses of the smear data and soil sample results indicated general agreement in the magnitude of the maximum contamination ratios for U-234 and Pu-238 given in Tables 5-22 and 5-23 of ORAUT-TKBS-0007-5.
- There are several limitations in the data used:
  - The survey data found was very limited and from period of early operations.
  - The survey data is written given in units of cpm. Instrument parameters uncertain.
  - The soil samples were collected during D&D operations. Prefer characterization survey, prior to D&D.
- **SC&A data capture in January 2016 time frame will seek to resolve some of these uncertainties**

FAP and Actinide (Pu, U, etc.) Intakes per NIOSH's SEC ER

SEC ER: 4 Fundamental assumptions form the basis for NIOSH's ability to reconstruct internal doses

A. **FAP Bioassays** – Sufficient workers' records containing FAP bioassay (in-vitro and in-vivo) results are available to assign intakes and resulting doses from FAP (some periods/areas may need an FAP coworker model developed).

B. **FAP Intakes** – Except for special situations, all the dosimetrically significant FAP intakes are directly tied to an indicator radionuclide (Sr-90 or Cs-137). The FAP ratios and intake assignment methods provided in ORAUT-OTIB-0054 bound all FAP exposure potentials at INL.

FAP and Actinide (Pu, U, etc.) Intakes per NIOSH's SEC ER (cont'd)

C. **Actinide Intakes** – Except for special situations, the actinide (uranium, plutonium, thorium, etc.) intakes are directly tied (in a constant ratio) to the FAP; therefore, actinide intakes and resulting doses can be assigned using Table 5-22 (Sr-90 ratios) and/or Table 5-23 (Cs-137 ratios) of ORAUT-TKBS-0007-5 (TBD-5).

D. **Special Situations Actinides** – Personnel involved in operations and situations (planned or unplanned) with actinides present, that were not directly tied to an FAP in a constant ratio, were adequately monitored, and the results are available in the workers' records. Therefore, actinide intakes and resulting doses can be reconstructed in these special cases.

Item A - SC&A Review Approach

- Evaluate a semi-random* sample of INL claimants to assess the adequacy and completeness of individual records for the purposes of dose reconstruction
  - Were all relevant workers monitored for FAP?
  - Were monitored worker records complete?
  - Are coworker models appropriate for areas and time periods other than those already designated?

**Selected claimants were biased towards claims with multiple employment periods during SEC Evaluation period.*

Item A - SC&A Review Approach (cont.)

- SC&A determined that there were 973 claimants who had covered employment at INL during the evaluated SEC period (921 claims with SEC employment greater than 90 days)
- SC&A semi-randomly selected and reviewed 92 claimants from this population (roughly 10%)
- More than 60 percent were trades workers
  - This category had the largest number of employment periods per worker and are therefore over-represented in the sampling (semi random)

Item A - Summary Conclusions and Recommendation

Based on SC&A's review of 92 randomly selected claimants, it was evident that fission and activation product bioassay is generally available for a wide variety of job titles. Thus SC&A does not believe there are "completeness" issues with the dataset of fission and activation product bioassay that would preclude its use in developing coworker models. Nor was there any indication that specific job titles were systematically excluded from the internal monitoring program. However, it is SC&A's opinion that FAP coworker models should be evaluated and developed for each relevant INL site area beginning with the start of radiological operations for each individual location.

Item A - Issue Status Update

- The issue of coworker model applicability for years and areas not originally designated by NIOSH was discussed at the November 10, 2015 Work Group meeting.
- NIOSH agrees that coworker modeling may be appropriate and will assess coworker requirements and feasibility for the applicable INL site areas and years prior to 1967.

Items B-D Review - FAP and Actinide Intakes

Evaluation of Ratios using Actual Measurements

- NIOSH's ER recommends using Sr-90 and/or Cs-137 bioassay results in conjunction with ratios in OTIB-0054 to assign FAP intakes.
- NIOSH's ER recommends using Sr-90 and/or Cs-137 bioassay results in conjunction with ratios in TKBS-0007-5 to assign actinide intakes.
- The ratio values were derived mostly by computer simulation (ORIGEN)
- SC&A searched for documentation that would provide measured radionuclide ratios
    - NOCTS
    - SRDB
    - INL electronic bioassay database

Evaluation of Ratios (continued)

SC&A located measured quantitative radionuclide analyses of:

- Nasal swabs
- Urinalyses
- Fuel element scale
- Fuel storage contamination swipes
- Air filters

A total of 42 samples were located and analyzed for radionuclide ratios.

Summary of Results

1. **FAP** intakes assigned using NIOSH's recommendations in OTIB-0054 based on Sr-90 intake values are generally (but not always) equal to, or greater than, those derived from actual measured values.

2. **The Cs-137/Sr-90** ratios are not always 1:1 as assumed in OTIB-0054 and TKBS-0007-5; frequently, large variations in the ratio exist. This brings into question the validity of using an indicator radionuclide when deriving FAP and actinide intakes. This may be the most important result of this study, because a Cs-137/Sr-90 value of 1:1 is one of the cornerstones for use of the ratio method at the INL.

3. **Actinide** intakes assigned using NIOSH's recommendations in TKBS-0007-5, Table 5-22, based on Sr-90 intake values, or Table 5-23, based on Cs-137 intake values, are sometimes significantly less than those derived from actual measured values.

4. **Special bioassays.** It is difficult to evaluate when "special" (situations where actinides were not tied to a fission product in a given ratio) bioassays were needed, if they were performed, and if they are indicated as such in the bioassay records.

Recommendations and Path Forward

1. Determine if records of analyses of dissolver contents (containing the fuel elements) are available; preferably for a variety of INL reactor fuel elements, and also fuel elements from off-site reactors.
2. Conduct Further INL document research to evaluate NIOSH's recommended ratio values, especially for actinides and Cs-137/Sr-90. Records with quantitative radionuclides analyses are especially important.
3. Determine if special or non-routine bioassays were associated with special exposure events, such as are referred to in the ER, or if instead the term "special," or "non-routine," bioassay was applied to the priority of processing over "routine" bioassays.
4. **SC&A data capture trip in the January 2016 time frame will seek to address these concerns. The report will then be revised**

Burial Grounds and CPP Pre-1963 Analyses and Reports pended until data obtained from January 2016 capture can be analyzed

Recap of Concerns/Path Forward

Burial Grounds

Concerns

- Evidence exists that a “strict” contamination control program was not in place
- Site apparently lacked adequate smear counting capability for some length of time before early 1970s
- Radioactive waste was not specifically identified for most drums, boxes, and other containers in the early years
- Offsite waste received from commercial, university, ERDA, and military sources in 1960–1963 inadequately identified
- AEC concerned over conflicted role of health physicists at the Burial Grounds, who were responsible for much of its operation, as well as radiation protection
- Internal investigations and appraisals bring into question “robustness” of HP program and “defense-in-depth” approach for radiological controls, as cited in the ER

Burial Grounds (cont'd)

Path Forward

- **SC&A will conduct a data capture and worker interview trip to Idaho Falls in the late January 2016 timeframe**
- Conduct additional interviews with former Burial Grounds workers with experience during the time period in question (1952–1970); emphasis on radiological control program
- Conduct additional data capture with focus on the following:
  - Additional evidence of potential intakes to radwaste handlers
  - How contamination control was administered
  - Available routine and special air-sampling data
  - Robustness of health physics program: independence, resources, monitoring practices

Burial Grounds (cont'd)

Path Forward, Cont'd

- Evaluate dose assessment feasibility
  - Review external and internal dose electronic database when completed by NIOSH.
  - Review historic bioassay procedures and practices.
  - Can all Burial Grounds workers be identified?
  - Can all significant radioactive waste source terms be identified and addressed?

Chemical Processing Plant (Pre-1963)

Concerns and Focus of SC&A Investigation

- Evaluate contamination incidents and control program prior to 1963
- Assess internal dosimetry program for CPP workers
- Characterize temporal changes in source term and exposure potential

Status:

- SC&A has reviewed site records available on the SRDB and performed a partial claimant survey

Chemical Processing Plant (Pre-1963)

Status (cont.):

- Determined further data capture was warranted:
  - **Contamination surveys (specifically alpha surveys)**
  - **Incident reports**
  - **Radiation safety reporting and practices**
  - **Source and exposure potential documentation for alpha emitting material**
- **Interviews and data capture will be conducted during the January 2016 trip to INL to gain information on the potential for alpha-only internal exposures at CPP**

Questions Comments?