Hanford Update

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National Institute for Occupational Safety and Health (NIOSH)

Hanford Work Group Meeting

6/11/2026

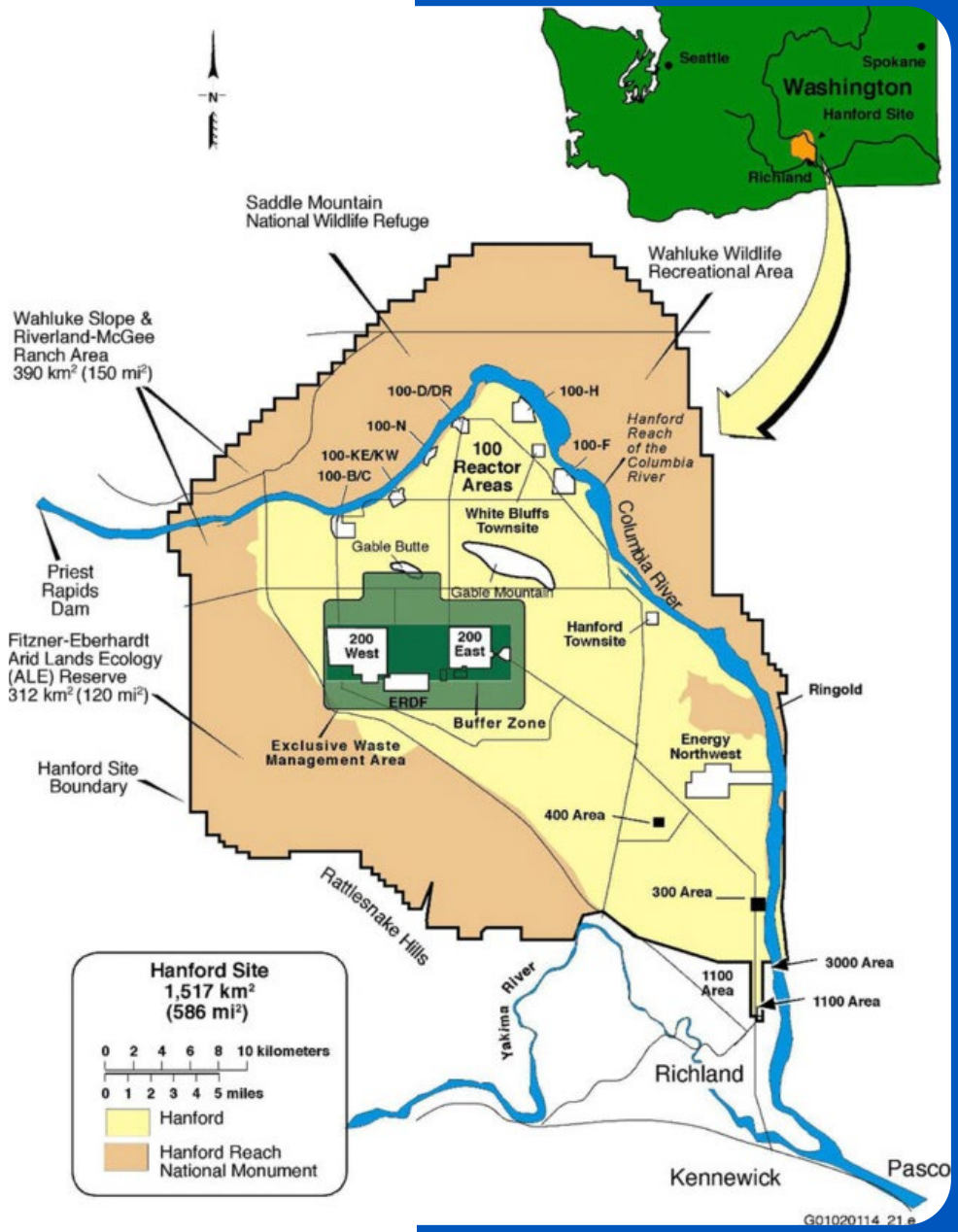
Meeting Overview

- How we got here?
- What is happening now?
- Where are we heading?

- Special Exposure Cohort (SEC)-00057, 00152, 00201, 00226 review
- Recap: Last Hanford Work Group (WG) meeting August 13, 2020
- Hanford Co-Exposure (CX) Study Efforts
- Monitoring Completeness
- Data Completeness

Site Information:

- Site encompasses roughly 600 square miles on the west bank of the Columbia River in southeastern Washington state
- Three principal operating areas:
  - 100 Area: plutonium production reactors and fuel storage basins
  - 200 Area: chemical separations plants, plutonium and uranium production facilities and associated liquid waste storage
  - 300 Area: fuel fabrication operations, research and development and support facilities
  - 400 Area: Fast Flux Test Facility (FFTF)- research activities only



HOW WE GOT HERE

SEC Recap:

- SEC-00057(1/1/1942-12/31/1990):
  - Qualified 21 November 2006
  - Evaluation Report (ER) 31 March 2008
  - Redesignated covered periods:
    - 300 Area (fuel fabrication): 10/1/1943-8/31/1946
    - 200 Area (plutonium separations): 11/1/1944-8/31/1946
    - 100 B, D, and F (reactors): 9/1/1944-8/31/1946
    - 300 Area: 9/1/1946-12/31/1961
    - 200 Area (East & West): 9/1/1946-12/31/1968
- SEC-00152 (83.14)
  - ER 28 September 2009
    - All employees: 10/1/1943-6/30/1972

HOW WE GOT HERE

SEC Continued:

- SEC-00201 (83.14)
  - ER 31 May 2012
    - All employees: 7/1/1972-12/31/1983
- SEC-00226 (83.14)
  - Qualified 15 March 2015
  - ER 16 March 2015
    - All non-prime contractor employees: 1/1/1984-12/31/1990
      - Battelle Memorial Institute
      - Rockwell Hanford
      - Boeing Computer Services
      - United Nuclear Corporation Nuclear Industries (UNI)
      - Westinghouse
      - Hanford Environmental Health Foundation

HOW WE GOT HERE

Previous WG Meetings:

- April 2020:
  - NIOSH White Paper: “Assessment of Certain Special Exposure Cohort-Related Issues for the Hanford Site”
  - WG Closed SEC Matrix Issues: 3, 4, 9, 10, 20, 22
  - Non-CX issues 7 and 27 remained open- concerning potential uranium-233 intakes and high-level liquid waste leaks in operating cells of Building 324, respectively
- May 2020:
  - NIOSH issued a memorandum providing additional information related to ^{233}U work at Hanford
- August 2020:
  - SC&A Memorandum to NIOSH White Paper recommending closure of all non-CX SEC issues
  - Issues 7 and 27 were closed by the WG

Outstanding SEC-00057 Issues:

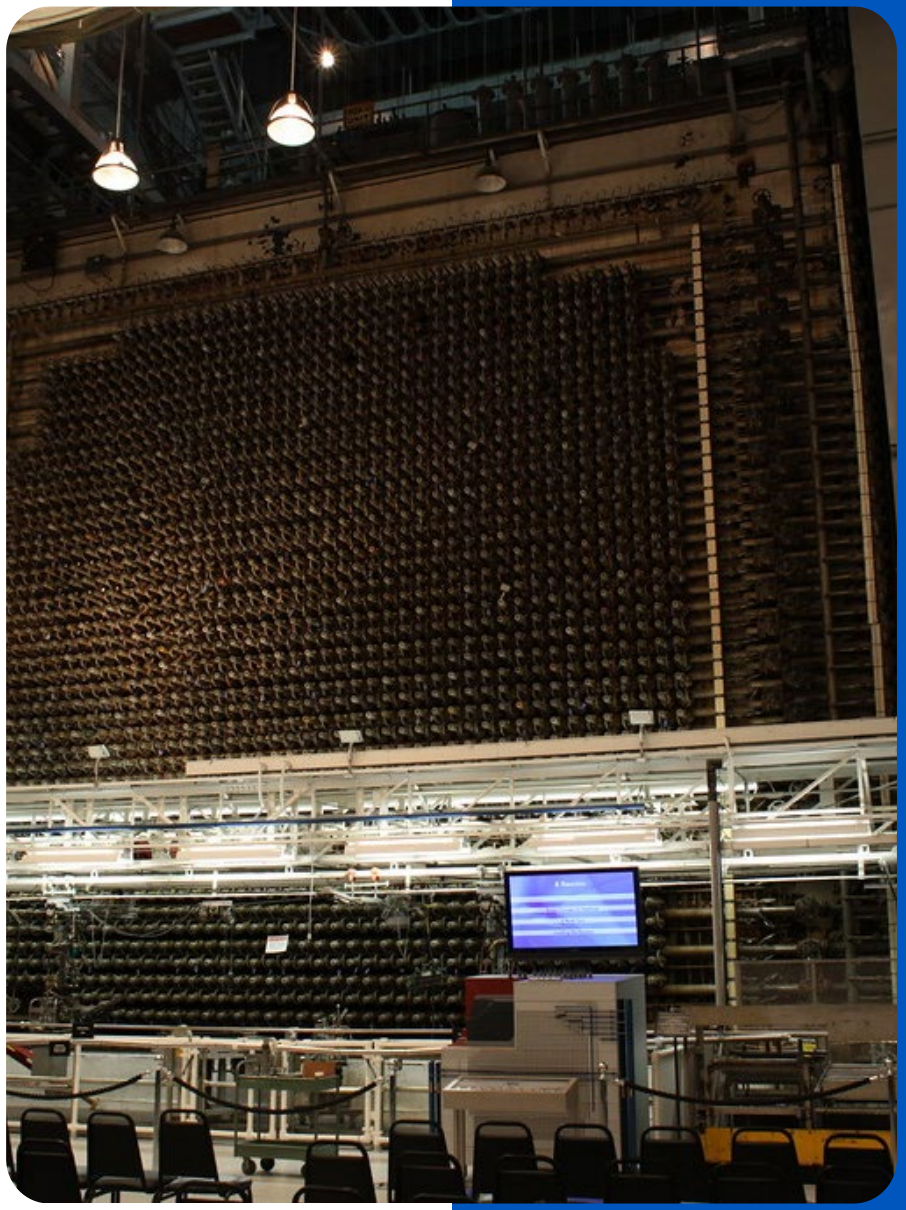
- SEC Matrix Issue 14: Plutonium Intake Estimation
  - Remains open pending verification that the data used to develop CX model for Pu intakes meets DCAS-IG-006 (Criteria for the Evaluation of and Use of Co-Exposure Datasets) data adequacy guidance
- SEC Matrix Issue 23: Adequacy of the Radiological Exposure (REX) database for coworker models
  - Remains open pending demonstration REX database meets data adequacy guidance for DCAS-IG-006

Status Update:

- Evaluation of Co-Exposure datasets applicable to 1984-1990 period is in progress
- Availability of data led to extending CX study to include years 1991-1993
- Formal data completeness testing completed for 1984-1990 identified no completeness issues

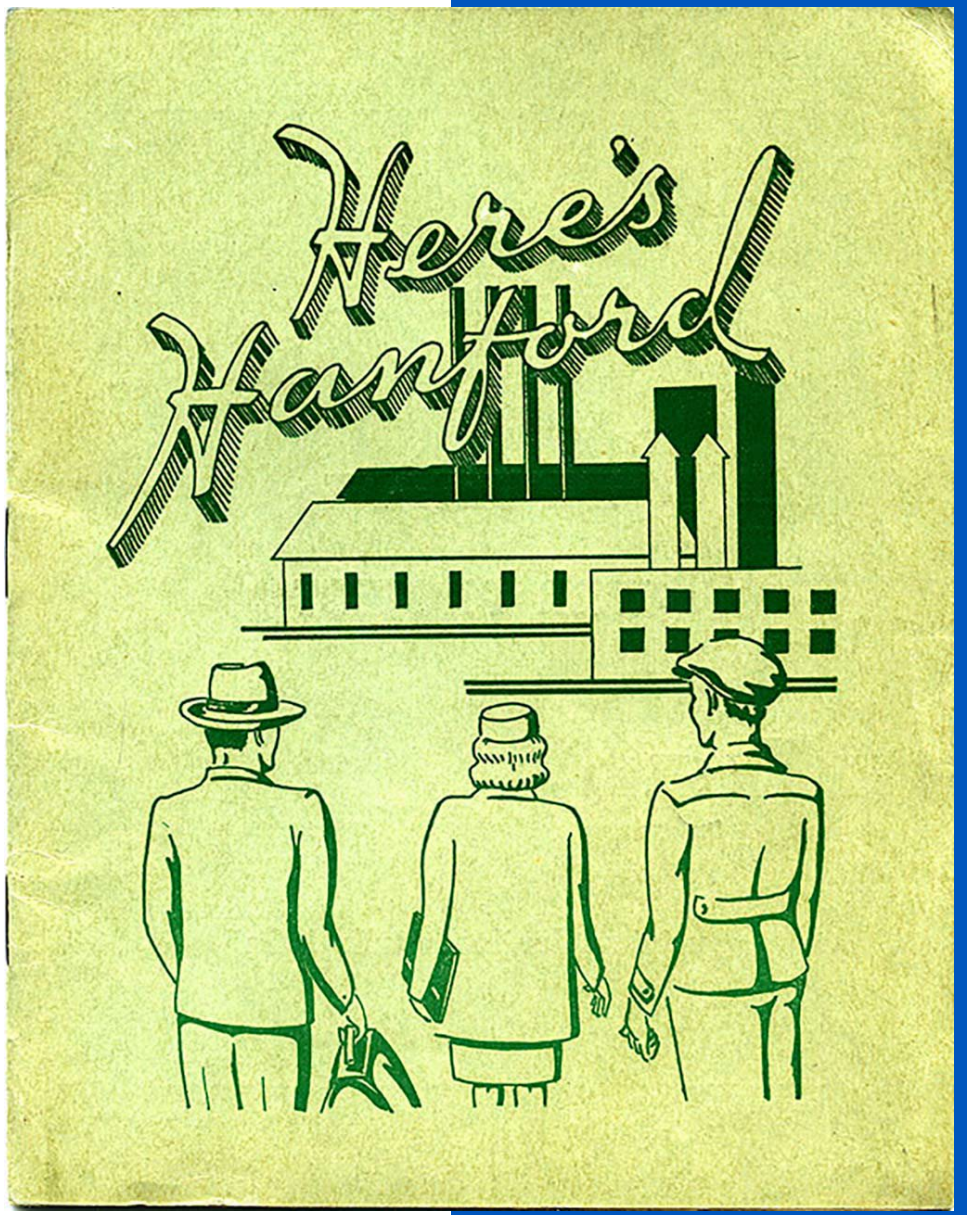
Effort to Close Issues 14 & 23

- Efforts to close CX related issues were on hold, pending the approval of DCAS-IG-006 (Criteria for the Evaluation and Use of Co-Exposure Datasets)
- In the interest of timeliness, Hanford CX models were limited to the period defined by SEC-00226: 1984-1990, to specifically address the two remaining SEC-00057 issues



Data Collection Efforts:

- Since the approval of DCAS-IG-006, NIOSH/Oak Ridge Associated University (ORAU) has conducted significant records collection:
  - ORAU Team reviewed listings of over 126,000 boxes managed by the Hanford Records Holding Area (RHA) to source contractor radiation control program information
  - Site visits to review individual boxes were delayed, in some cases by years, due to unavailability of resources at Hanford to support data capture
  - Federal travel and budget restrictions severely hampered these efforts.
  - Classification reviews were significantly delayed due to personnel turnover at Department of Energy (DOE) Richland

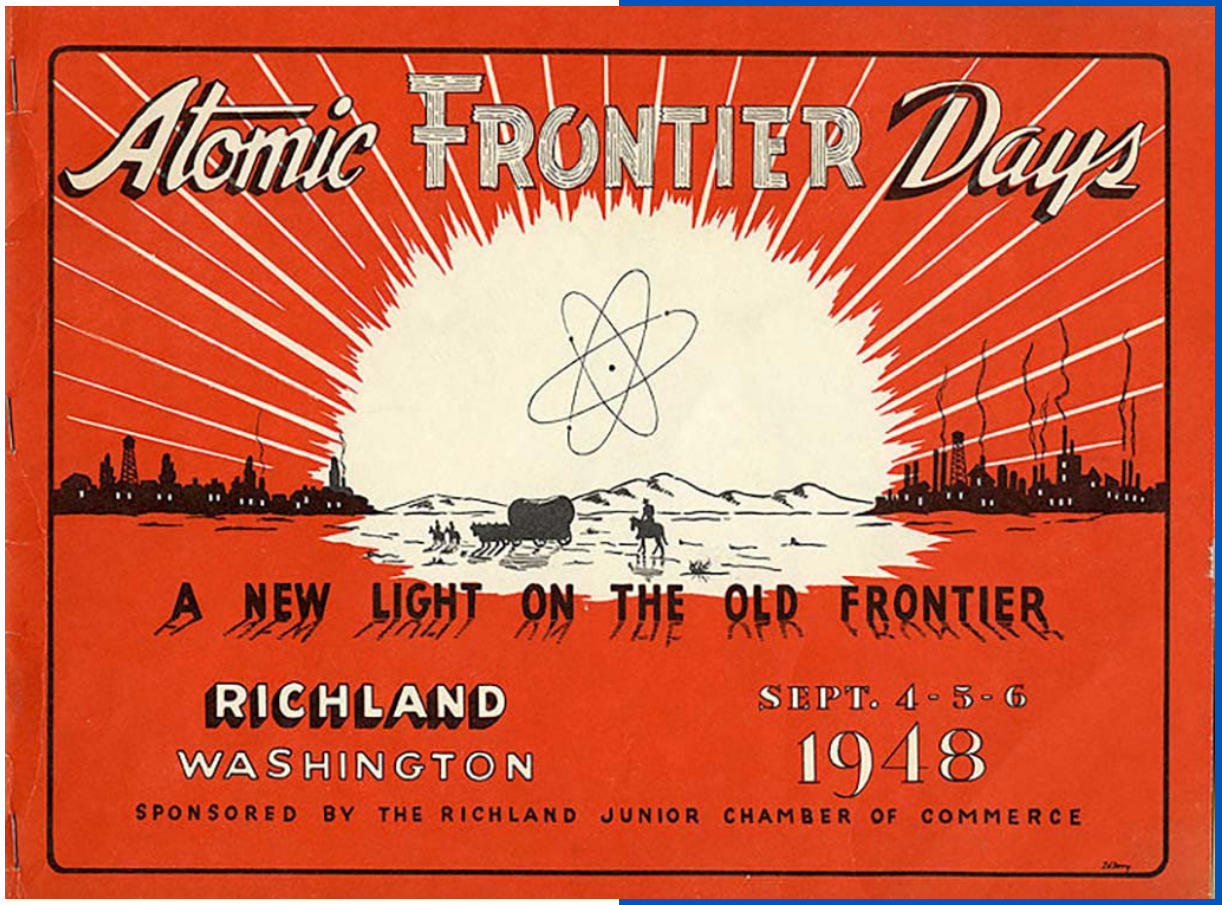


Completeness in Co-Exposure Studies:

- Monitoring Completeness:
  - Requires an assessment of the monitoring program and its capabilities and evaluation of intent to monitor to answer:
    - Is the radiation protection program sufficient to adequately quantify the hazards encountered in the workplace?
    - Did workers comply?
    - Were the highest exposed individuals monitored?
- Data Completeness:
  - Once the data has been determined to be technically acceptable, the amount of data must be evaluated to determine if there are sufficient measurements to ensure that a bounding or representative sample of the exposure potential for each job/exposure category at the facility can be produced
  - Default minimum of 30 person measurements is recommended per each discrete time interval and/or stratum being evaluated

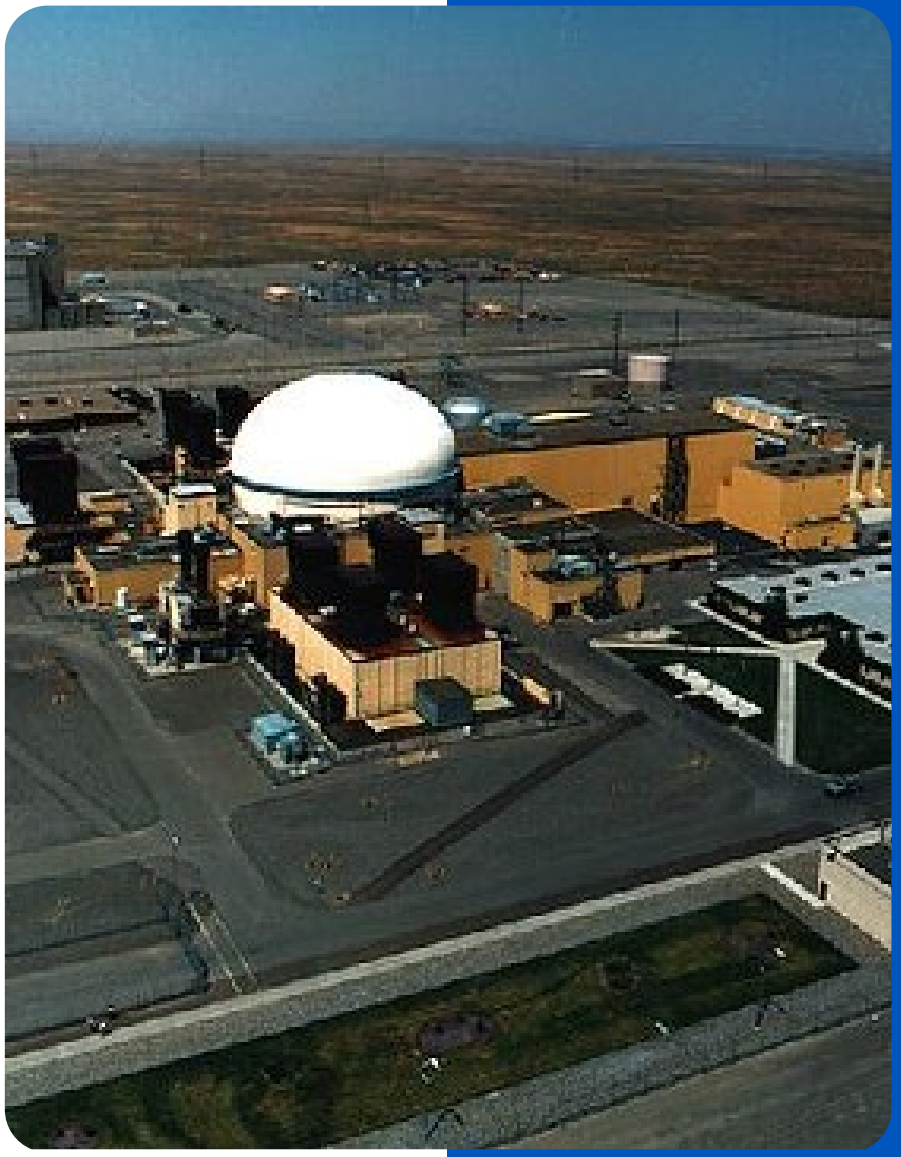
Monitoring Completeness:

- Sitewide radiological support services have been provided by Pacific Northwest National Laboratory (PNL) since 1965
- Services included external dosimetry, in vitro and in vivo bioassay, instrument calibration, and dosimetry recordkeeping
- PNL provided guidance to Hanford Site contractors for establishing routine monitoring programs and associated administrative functions, including:
    - scheduling of bioassay sampling
    - distribution/collection of sampling kits
    - sample delivery to analysis lab.
    - managing sample results
    - conducting internal exposure evaluations



PNL Monitoring Guidance:

- Hanford Dosimetry Evaluation Manual Appendix B:
  - Evaluation of routine surveillance scheduling was required for all Hanford contractors whose job assignments involve work with radioactive material having a potential for becoming airborne
  - Enrolled workers submitted baseline, routine and termination samples
  - Diagnostic samples were often used to estimate retention of material and post-incident
  - Includes nuclide-specific evaluations of missed dose and recommended sampling intervals for each nuclide of concern
  - Monitoring data show that bioassay sample frequencies were appropriate for the given source terms and in consideration of different material solubility



Hanford CX Models:

- NIOSH is currently evaluating 5 internal CX models for 1984-1993:
  - Uranium urinalysis
  - Plutonium urinalysis
  - Strontium urinalysis
  - Tritium urinalysis
  - Cesium whole body counts (WBC)
- Models will be stratified by construction trades workers (CTW)/non-CTW from 1991-1996
- Prior to 1991, bioassay results were not coded by job type

CTW Job Codes:

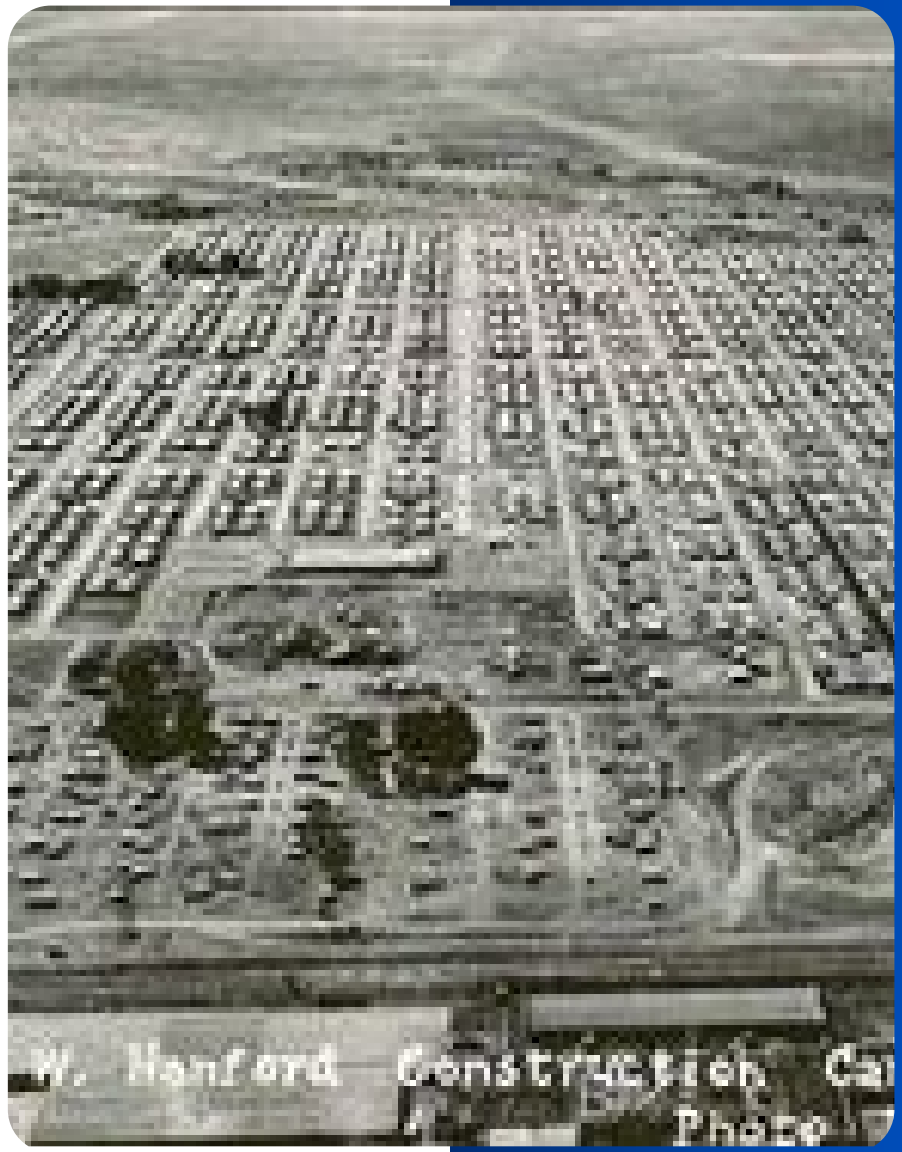
- For 1991-1996, CTWs are identified by any of the occupation codes shown
- Workers who had a CTW status change mid-year were included in both models (as if they were separate individuals)

Table 3-1. CTW worker history occupation codes

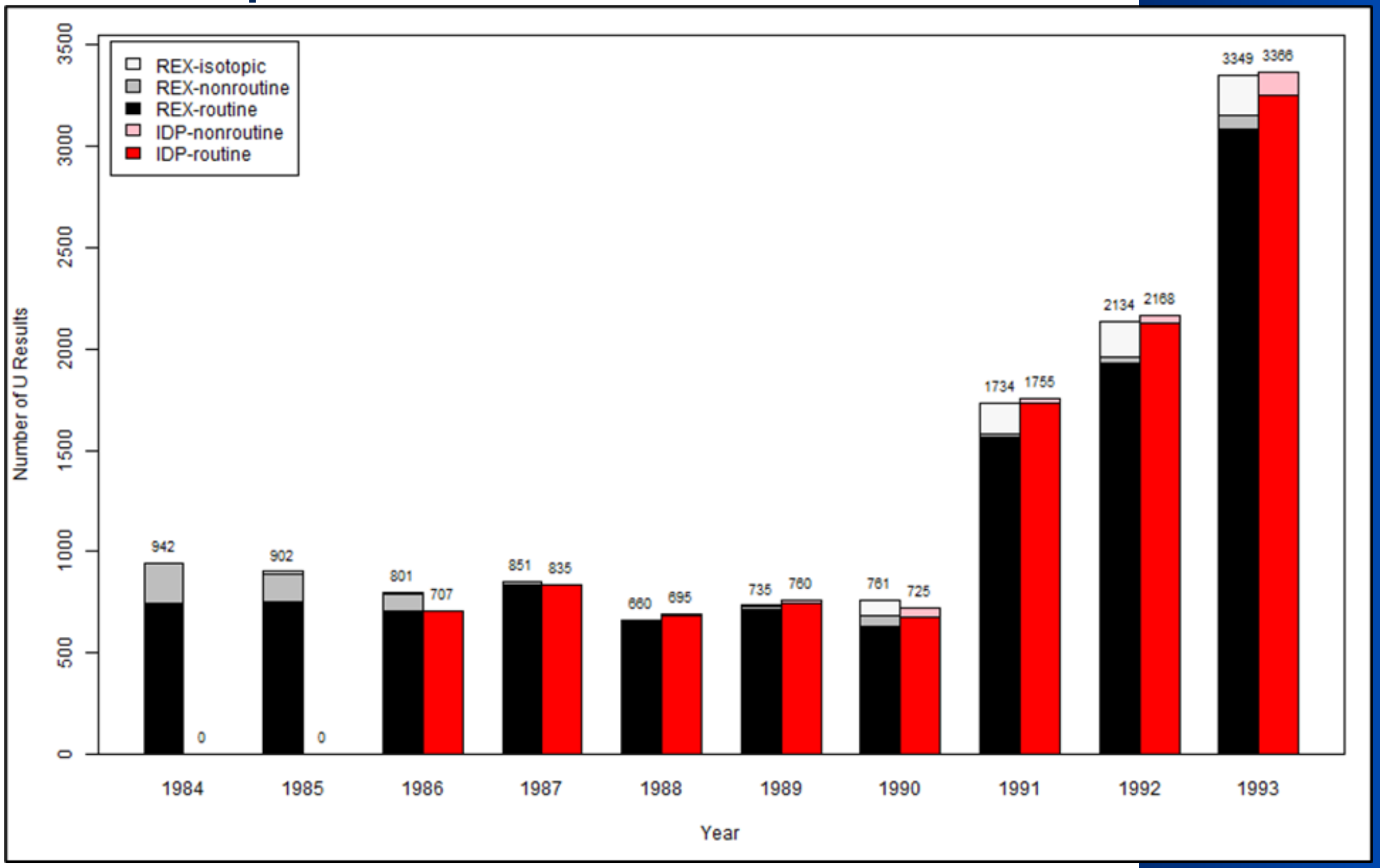
Code	Description
610	Mechanics/repairers
641	Masons
642	Carpenters
643	Electricians
644	Painters
645	Pipefitters
660	Misc repair/construction
682	Sheet metal workers
771	Welders and solderers
850	Handlers/laborers/helpers

Data Completeness

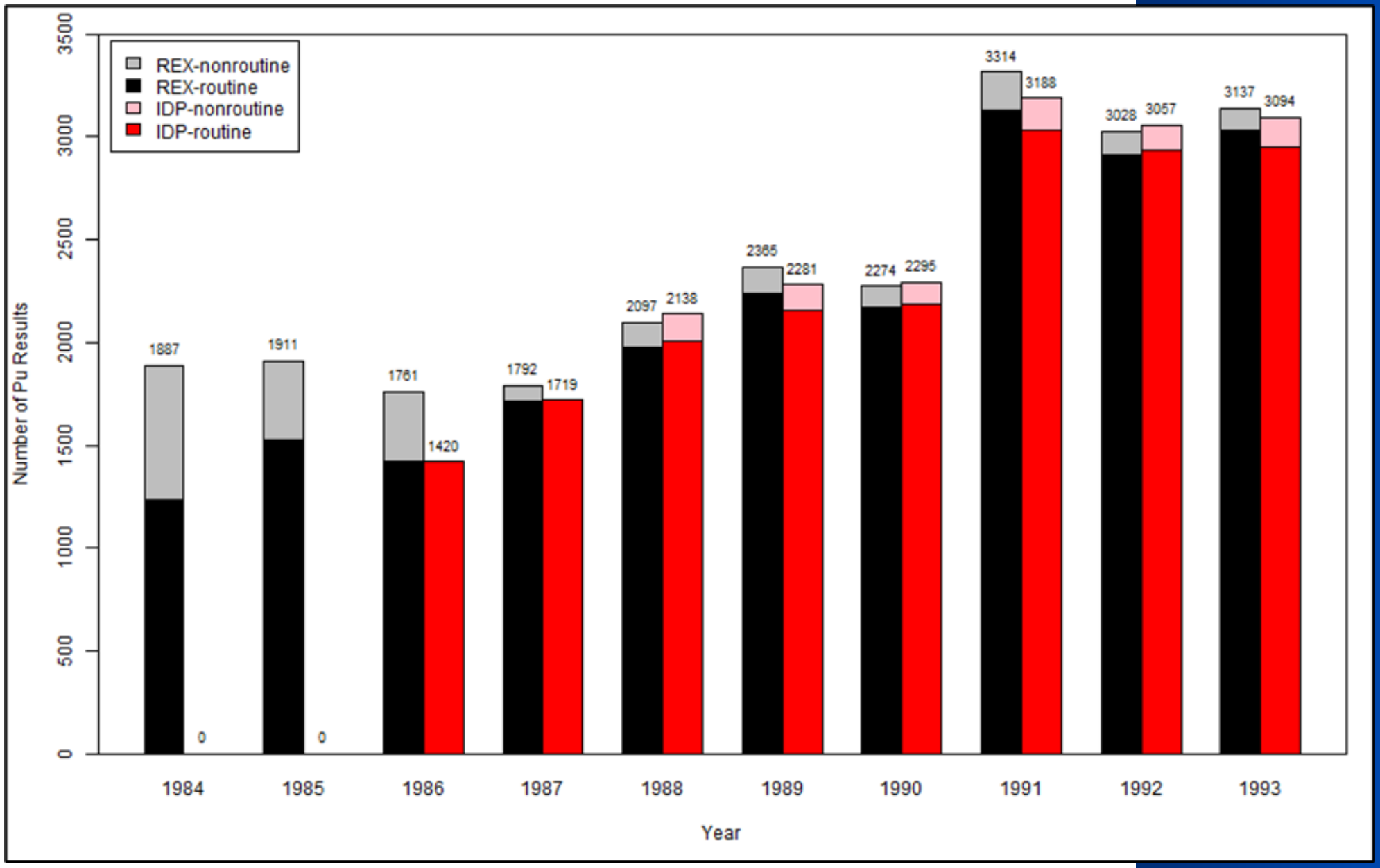
- The Hanford CX datasets were verified through internal and external data completeness checks to explore any missing data
- Internal checks within the CX dataset verify the data are consistent with each other, i.e.,- the types and quantity of samples is consistent
- External checks compare the results in the REX database to external sources: Hanford Internal Dosimetry Program (IDP) Annual Reports



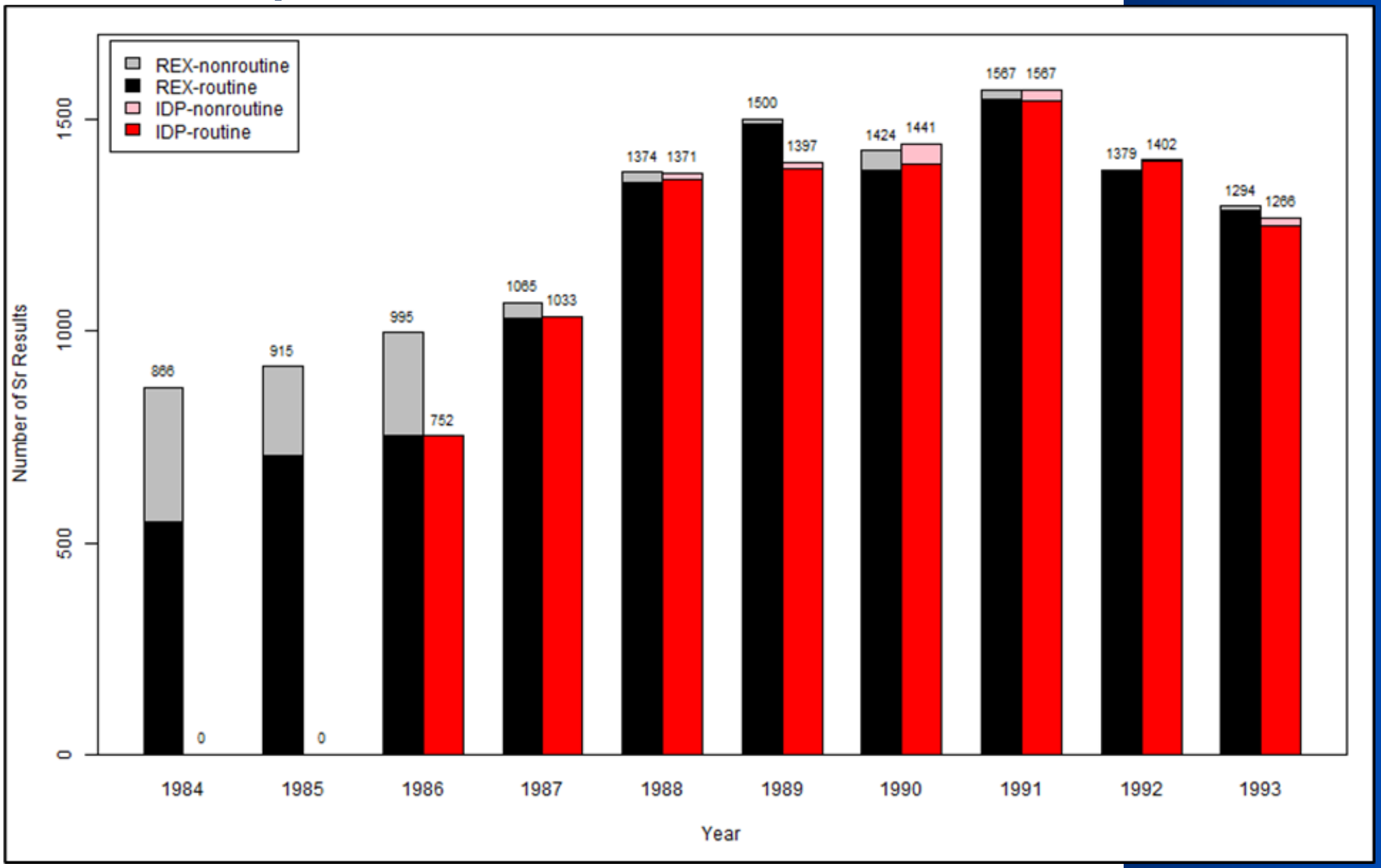
Uranium Data Comparison:



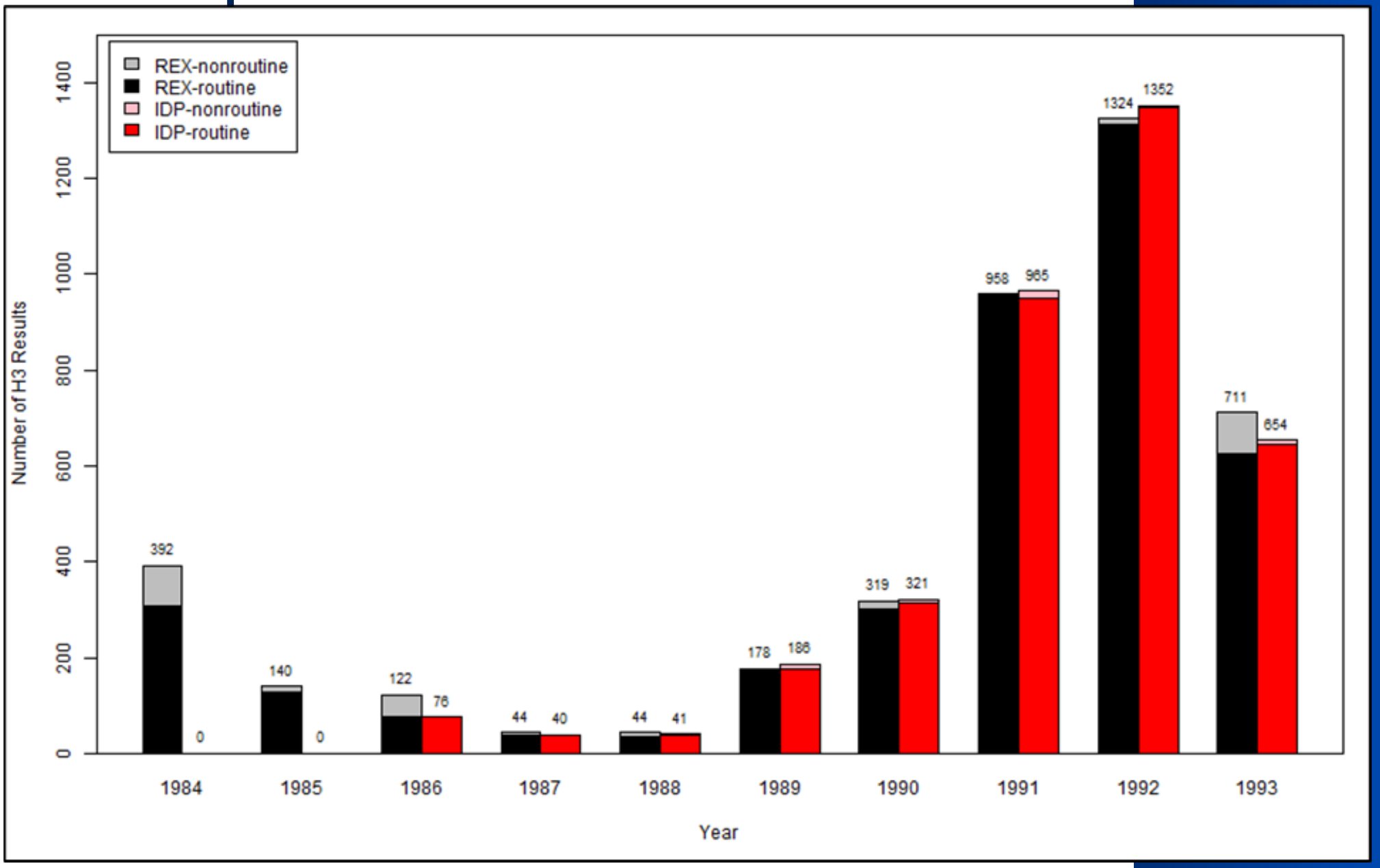
Plutonium Data Comparison:



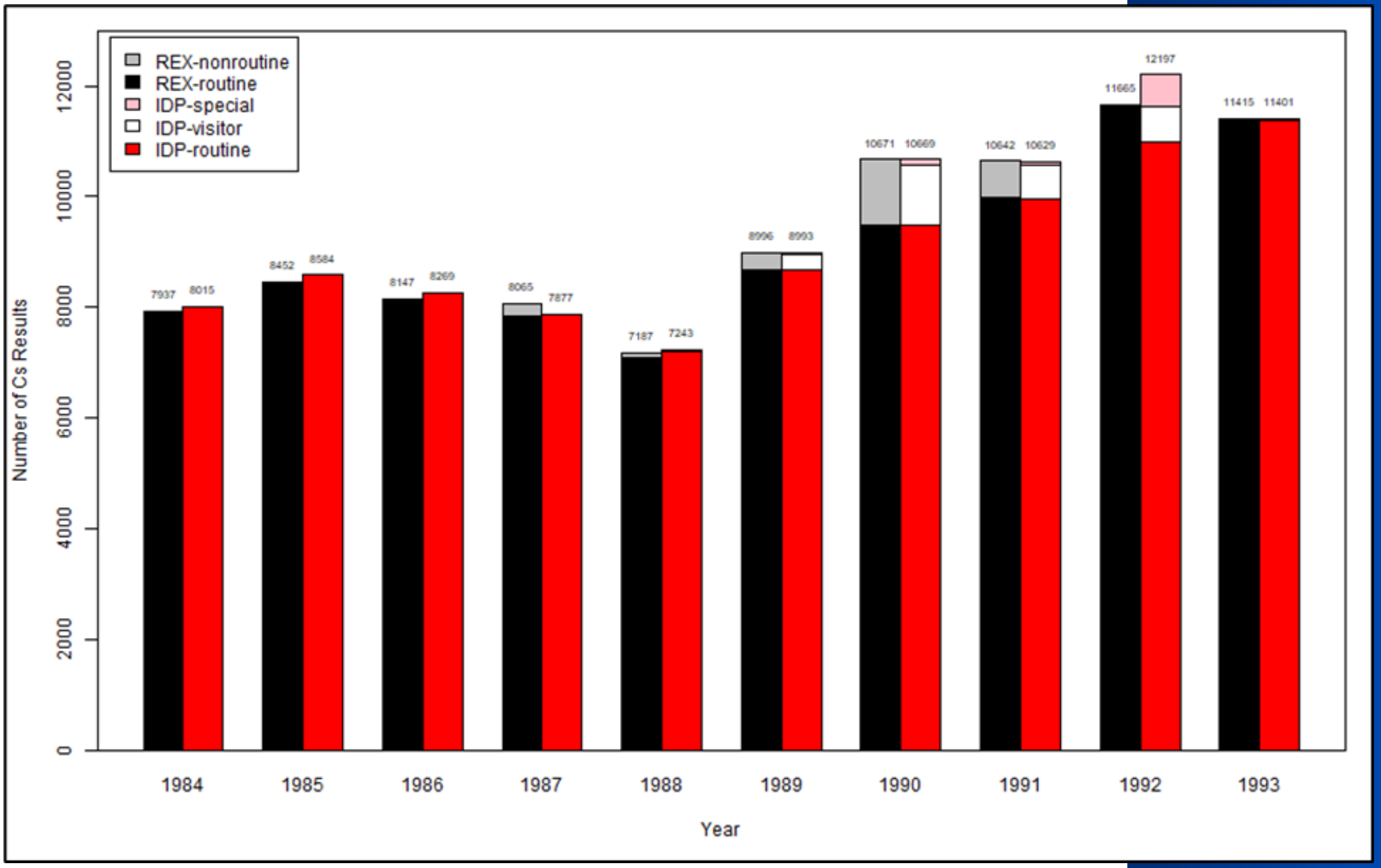
Strontium Data Comparison:



Tritium Data Comparison:



Cesium Data Comparison:



Recommend Closure of Issues 14 & 23

- SEC Matrix Issue 14: Plutonium Intake Estimation
  - Remains open pending verification that the data used to develop the CX model for Pu intakes meets DCAS-IG-006 data adequacy guidance
- SEC Matrix Issue 23: Adequacy of the REX database for coworker models
  - Remains open pending demonstration REX database meets data adequacy guidance for DCAS-IG-006
- Based on results of formal completeness testing on the Hanford CX datasets, NIOSH recommends closure of SEC Matrix Issues 14 & 23
- Formal statistical testing has shown the Hanford CX datasets are sufficient to develop models for Pu intakes consistent with the data adequacy guidance from DCAS-IG-006
- Statistical testing also shows that the REX database meets the data adequacy guidance from DCAS-IG-006

Where We Are Heading:

- Formal statistical testing of the Hanford CX datasets is complete, with no data adequacy issues identified
- Bioassay reporting data are being examined to ensure raw analytical results are properly converted to correct units for statistical analysis
- Finalized CX models for 1984-1993 are expected to be completed at the time of this meeting

Thank you.

For more information, contact CDC
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