SEC Petition Evaluation Report

Petition SEC-00238

Report Rev Number:	0
Report Submittal Date:	July 20, 2017
Subject Expert(s):	Mitch Findley
Site Expert(s):	None

Petition Administrative Summary

Petition Under Evaluation

Petition Number:	SEC-00238
Petition Type:	83.14
Petition A Receipt Date:	March 16, 2017
DOE/AWE Facility Name:	Idaho National Laboratory

Petition Class

NIOSH-Proposed Class Definition:	All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Idaho National Laboratory (INL) in Scoville, Idaho, and who were monitored for external radiation at the Idaho Chemical Processing Plant (CPP) (e.g., at least one film badge or TLD dosimeter from CPP) between January 1, 1975 and December 31, 1980 for a number of work days aggregating at least 250 work days, occurring solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees in the Special Exposure Cohort.

Related Petition Summary Information

SEC Petition Tracking Number(s):	SEC-00219
Petition Type:	83.13
DOE/AWE Facility Name:	Idaho National Laboratory
Petition Status:	Class added to the SEC: March 1, 1970 through December 31, 1974. (January 1, 1963 through February 28, 1970 to be determined.)

Related Evaluation Report Information

Report Title:	SEC Petition Evaluation Report for Petition SEC-00219
DOE/AWE Facility Name:	Idaho National Laboratory

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Evaluation Report Summary: SEC-00238, Idaho National Laboratory

The National Institute for Occupational Safety and Health (NIOSH) prepared this evaluation report in response to a petition to add a class of workers at the Idaho National Laboratory to the Special Exposure Cohort (SEC). The *Energy Employees Occupational Illness Compensation Program Act of 2000*, as amended, (EEOICPA) and 42 C.F.R. pt. 83, *Procedures for Designating Classes of Employees as Members of the Special Exposure Cohort under the Energy Employees Occupational Illness Compensation Program Act of 2000*, describe the process for adding new classes to the SEC.

NIOSH-Proposed Class Definition to be Added to the SEC

All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Idaho National Laboratory (INL) in Scoville, Idaho, and who were monitored for external radiation at the Idaho Chemical Processing Plant (CPP) (e.g., at least one film badge or TLD dosimeter from CPP) between January 1, 1975 and December 31, 1980 for a number of work days aggregating at least 250 work days, occurring solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees in the Special Exposure Cohort.

Feasibility of Dose Reconstruction Findings

NIOSH lacks sufficient information, which includes biological monitoring data and air monitoring data, to allow it to estimate with sufficient accuracy the potential internal exposures to transuranic radionuclides to which the proposed class may have been subjected. NIOSH finds that it has sufficient information to reconstruct other potential internal exposures, external exposures, and occupational medical dose for CPP employees at INL with sufficient accuracy.

The NIOSH dose reconstruction feasibility findings are based on the following:

- NIOSH has determined that the internal dose potential at CPP during the period under evaluation was related to its primary function of processing spent fuel elements containing enriched uranium in order to recover un-fissioned uranium. The uranium was separated from fission products by a continuous liquid-liquid extraction process. Although much of the processing equipment was heavily-shielded and remotely operated, the plant design was based on a direct-contact maintenance philosophy. Principal sources of internal radiation for members of the proposed class may have included exposures to uranium, mixed fission and activation products (MFP/MAP), exotic radionuclides (produced from, or as a result of, reactor neutron irradiation), and transuranic radionuclides. Potential exposures would likely be from inhalation and ingestion during processing operations.

- NIOSH has determined that there are insufficient internal dosimetry data or air monitoring data available to bound intakes of transuranic radionuclides for the period from January 1, 1975 through December 31, 1980.

- NIOSH has determined that a routine bioassay program for transuranic radionuclides was established at CPP in 1981. NIOSH has not found any data that indicate significant operational transuranic exposures after 1980 that cannot be bounded. Therefore, NIOSH has established an end date of December 31, 1980 for this SEC class.

- NIOSH has determined that the beta-gamma external dose potential at CPP during the period under evaluation was associated with the handling and storage of spent fuel, fuel reprocessing, laboratory analyses of product streams, and disposal of process wastes. The neutron external dose potential at CPP during the period under evaluation was associated primarily with the handling of transuranic radionuclides and spontaneous fission of radionuclides. Principal sources of external exposure for members of the proposed class included exposures to beta, photon, and neutron radiation. Monitoring data are available for CPP in the form of individual dosimetry records and area exposure reports.

- Consistent with the findings in its SEC-00219 INL evaluation report, NIOSH finds that it is able to reconstruct external and medical X-ray dose for all INL employees for all periods at the site. This includes CPP employees from January 1, 1975 through December 31, 1980.

- Pursuant to 42 C.F.R. § 83.13(c) (1), NIOSH determined that there is insufficient information to either: (1) estimate the maximum radiation dose, for every type of cancer for which radiation doses are reconstructed, that could have been incurred under plausible circumstances by any member of the class; or (2) estimate the radiation doses of members of the class more precisely than a maximum dose estimate.

Although NIOSH found that it is not possible to completely reconstruct radiation doses for the proposed class, NIOSH intends to use any internal and external monitoring data that may become available for an individual claim (and that can be interpreted using existing NIOSH dose reconstruction processes or procedures). Therefore, dose reconstructions for individuals employed at CPP during the period from January 1, 1975 through December 31, 1980, but who do not qualify for inclusion in the SEC, may be performed using these data as appropriate.

Health Endangerment Determination

The NIOSH evaluation did not identify any evidence supplied by the petitioners or from other resources that would establish that the class was exposed to radiation during a discrete incident likely to have involved exceptionally high-level exposures. However, the evidence reviewed in this evaluation indicates that some employees in the class may have accumulated chronic radiation exposures through episodic intakes of radionuclides and from direct exposure to radioactive materials. Therefore, 42 C.F.R. § 83.13(c) (3) (ii) requires NIOSH to specify that health may have been endangered for those employees covered by this evaluation who were employed for a number of work days aggregating at least 250 work days within the parameters established for this class or in combination with work days within the parameters established for one or more other classes of employees in the SEC.

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Acronyms

ABRWH	Advisory Board on Radiation and Worker Health
ACC	Allied Chemical Corporation
ADAMS	Agency-wide Documents Access and Management (NRC database)
AEC	Atomic Energy Commission
ALARA	As Low As Reasonably Achievable
ANC	Aerojet Nuclear Company
ANL-W	Argonne National Laboratory-West
APPR	Army Package Power Reactor
ATLAS	Automatic Thermoluminescence Analyses System
ATR	Advanced Test Reactor
ATR-XA	Advanced Test Reactor – XA (re: fuel element type)
AWE	Atomic Weapons Employer
BML	Battelle Memorial Laboratory (re: fission disc)
BMI	Battelle Memorial Institute (re: reactor in Columbus, Ohio)
Co	Cobalt
CP-5	Chicago Pile No. 5
CPP	Chemical Processing Plant (INL)
Cs	Cesium
CX	CPP Construction Code
D&D	Decontamination and Decommissioning
DBFE	Design Basis Fuel Element
DCAS	Division of Compensation Analysis and Support
DD&D	Deactivation, Decommissioning, and Demolition
DHHS	Department of Health & Human Services
DOE	Department of Energy
DOL	Department of Labor
EBR-II	Experimental Breeder Reactor No. 2
EEOICPA	Energy Employees Occupational Illness Compensation Program Act of 2000
ERDA	Energy Research and Development Administration
ETR	Engineering Test Reactor
ETRC	Engineering Test Reactor Critical Facility
GETR	General Electric Test Reactor
HEPA	High Efficiency Particulate Air (filter)
HHS	Health & Human Services (Department of)
HP	Health Physics or Health Physicist
HSL	Health Services Laboratory
HTGR	High Temperature Gas-Cooled Reactors
HTRE	Heat Transfer Reactor Experiments
ICPP	Idaho Chemical Processing Plant
INEEL	Idaho National Engineering and Environmental Laboratory
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
JMTR	Japan Materials Test Reactor
JRR	Japanese Research Reactor
KUR	Kyoto University Research Reactor
LiF	Lithium Fluoride

LPT	Low Power Test
LPTR	Livermore Pool Type Reactor
MFP/MAP	Mixed Fission and Activation Products
Mn	Manganese
MPC	Maximum Permissible Concentration
mrem	millirem
MTR	Materials Test Reactor
NASA	National Aeronautics and Space Administration
NIOSH	National Institute for Occupational Safety and Health
NOCTS	NIOSH DCAS Claims Tracking System
NRC	Nuclear Regulatory Commission
NRF	Naval Reactor Facility
OMRE	Organic Moderated Reactor Experiment
ORAU	Oak Ridge Associated Universities
ORAUT	Oak Ridge Associated Universities Team
ORNL	Oak Ridge National Laboratory
OSTI	Office of Scientific and Technical Information (DOE)
OWR	Omega West Reactor (Los Alamos)
PBF	Power Burst Facility
PIF	Process Improvement Facility (also known as the Low-Bay Laboratory)
Pu	Plutonium
PWR	Pressurized Water Reactor
R	Roentgen equivalent man (Rem)
RCG	Radiation Control Guides
RESL	Radiological and Environmental Sciences Laboratory
SC&A	Sanford Cohen & Associates
SEC	Special Exposure Cohort
SER	Sandia Engineering Reactor
SOP	Standard Operating Procedure
SPERT	Special Power Excursion Reactor Tests
Sr	Strontium
STIR	Shielding Tests Irradiation Reactor
TLD	Thermoluminescent Dosimeter
TRA	Test Reactor Area
TRU	Transuranic Radionuclides
UCLA-MTR	University of California Los Angeles–Materials Test Reactor
Zr	zirconium

SEC Petition Evaluation Report for SEC-00238

ATTRIBUTION AND ANNOTATION: This is a single-author document. All conclusions drawn from the data presented in this evaluation were made by the ORAU Team Lead Technical Evaluator: Mitch Findley, MJW Corporation. The rationales for all conclusions in this document are explained in the associated text.

1.0 Purpose and Scope

This report evaluates the feasibility of reconstructing doses for employees who worked at the Idaho Chemical Processing Plant at the Idaho National Laboratory (referred to as CPP throughout the remainder of this report) from 1975 through 1980. It provides information and analysis germane to considering a petition for adding a class of employees to the Congressionally-created SEC.

This report does not make any determinations concerning the feasibility of dose reconstruction that necessarily apply to any individual energy employee who might require a dose reconstruction from NIOSH, with the exception of the employee whose dose reconstruction could not be completed, and whose claim consequently led to this petition evaluation. The finding in this report is not the final determination as to whether or not the proposed class will be added to the SEC. This report will be considered by the Advisory Board on Radiation and Worker Health (the Board) and by the Secretary of Health and Human Services (HHS). The Secretary of HHS will make final decisions concerning whether or not to add one or more classes to the SEC in response to the petition addressed by this report.

This evaluation, in which NIOSH provides its findings both on the feasibility of estimating radiation doses of members of this class with sufficient accuracy and on health endangerment, was conducted in accordance with the requirements of EEOICPA and 42 C.F.R. § 83.14.

2.0 Introduction

Both EEOICPA and 42 C.F.R. pt. 83 require NIOSH to evaluate qualified petitions requesting that the Department of Health and Human Services add a class of employees to the SEC. The evaluation is intended to provide a fair, science-based determination of whether it is feasible to estimate, with sufficient accuracy, the radiation doses of the proposed class of employees through NIOSH dose reconstructions.[1]

NIOSH is required to document its evaluation in a report, and to do so, relies upon both its own dose reconstruction expertise as well as technical support from its contractor, Oak Ridge Associated Universities (ORAU). Once completed, NIOSH provides the report to both the petitioners and the Advisory Board on Radiation and Worker Health. The Board will consider the NIOSH evaluation report, together with the petition, comments of the petitioner(s) and such other information as the Board considers appropriate, to make recommendations to the Secretary of HHS on whether or not to

[1] NIOSH dose reconstructions under EEOICPA are performed using the methods promulgated under 42 C.F.R. pt. 82 and the detailed implementation guidelines available on the NIOSH Radiation Dose Reconstruction Program page.

add one or more classes of employees to the SEC. Once NIOSH has received and considered the advice of the Board, the Director of NIOSH will propose a decision on behalf of HHS. The Secretary of HHS will make the final decision, taking into account the NIOSH evaluation, the advice of the Board, and the proposed decision issued by NIOSH. As part of this final decision process, the petitioner(s) may seek a review of certain types of final decisions issued by the Secretary of HHS.[2]

3.0 NIOSH-Proposed Class Definition and Petition Basis

In Rev. 2 of the SEC-00219 Petition Evaluation Report for INL (NIOSH, 2017), NIOSH determined that it could not estimate radiation doses with sufficient accuracy for CPP employees for the period from January 1, 1963 through December 31, 1974. NIOSH's decision was primarily based on a lack of internal monitoring data for individuals potentially exposed to transuranic radionuclides without mixed fission products present. However, NIOSH determined that it could reconstruct external dose, including occupational medical dose, for the period from January 1, 1949 through December 31, 1970. In June 2016, the Department of Health and Human Services (DHHS) issued a letter designating the March 1, 1970 through December 31, 1974 period for inclusion in the SEC. The period from January 1, 1963 through February 28, 1970 is still under active review by the Advisory Board on Radiation and Worker Health.

This evaluation responds to Petition SEC-00238, which was submitted by an EEOICPA claimant whose dose reconstruction could not be completed by NIOSH due to a lack of sufficient dosimetry-related information. NIOSH's determination that it is unable to complete a dose reconstruction for an EEOICPA claimant is a qualified basis for submitting an SEC petition pursuant to 42 C.F.R. § 83.9(b).

For this evaluation, the NIOSH-proposed class includes all employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Idaho National Laboratory (INL) in Scoville, Idaho, and who were monitored for external radiation at the Idaho Chemical Processing Plant (CPP) (e.g., at least one film badge or TLD dosimeter from CPP) between January 1, 1975 and December 31, 1980 for a number of work days aggregating at least 250 work days, occurring solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees in the Special Exposure Cohort. During this period, employees were involved in the handling and storage of spent fuel, fuel reprocessing, laboratory analyses of product streams, and disposal of process wastes in order to support the primary mission of CPP in recovering enriched uranium from spent reactor fuels.

4.0 Radiological Operations Relevant to the Proposed Class

The following subsections summarize radiological operations at CPP from January 1, 1975 through December 31, 1980 and the information available to NIOSH to characterize particular processes and radioactive source materials. Using available sources, NIOSH has attempted to gather process and source descriptions, information regarding the identity and quantities of radionuclides of concern, and

[2] See 42 C.F.R. pt. 83 for a full description of the procedures summarized here. Additional internal procedures are available on the NIOSH Radiation Dose Reconstruction Program page.

information describing processes through which the radiation exposures of concern may have occurred and the physical environment in which they may have occurred. The information included within this evaluation report is meant only to be a summary of the available information.

4.1 Operations Description

The Idaho National Laboratory was known by several names throughout its history [i.e., National Reactor Testing Station (1949–1973), Idaho National Engineering Laboratory (1974–1996), Idaho National Engineering and Environmental Laboratory (1997–2004), and Idaho National Laboratory (2005–Present)]. Throughout the rest of this evaluation report, the site will be referred to as the Idaho National Laboratory or INL (with the exception of source document titles).

The Idaho National Laboratory is an 890-square-mile complex located in the high desert of eastern Idaho, west-northwest of the city of Idaho Falls. While other facilities at INL conducted various reactor research and development activities, the primary purpose of CPP was to reprocess spent nuclear fuel from naval propulsion, test, and research reactors to recover enriched uranium for reuse in nuclear fuel and nuclear weapons production. Figure 4.1 shows the location of CPP on the INL reservation.

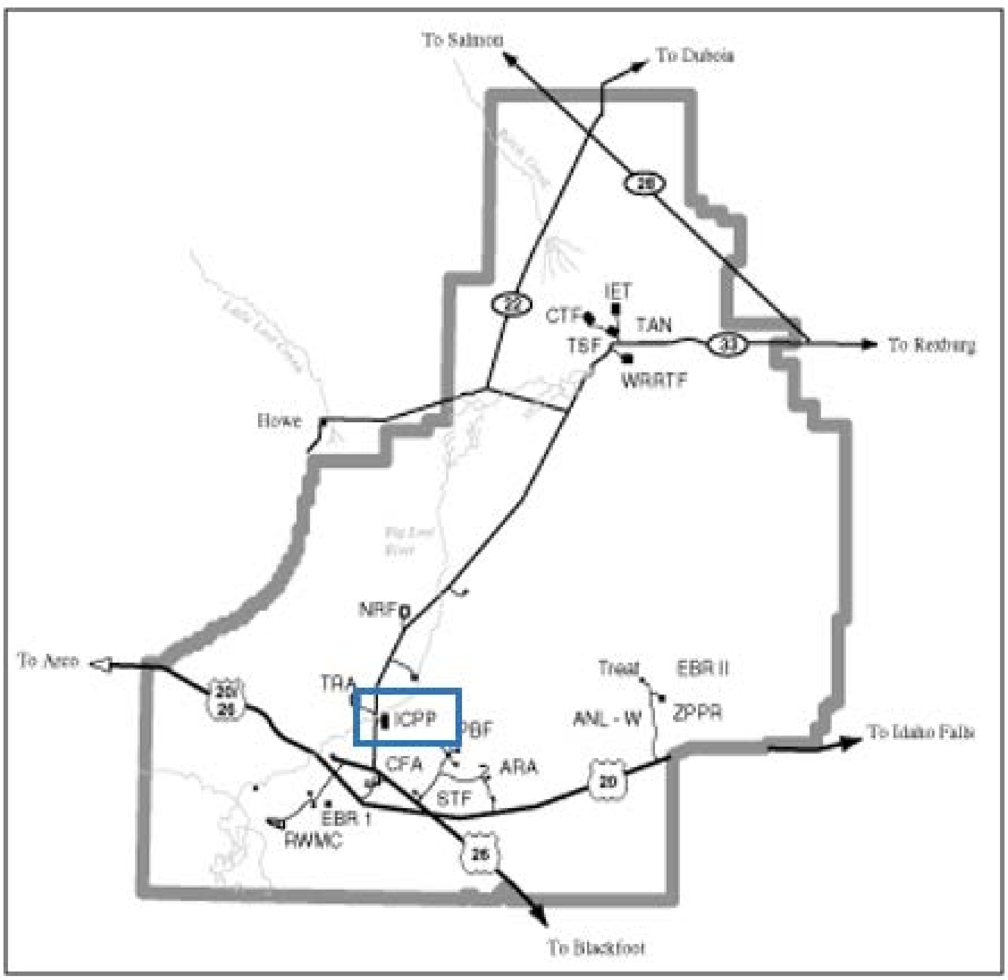


Figure 4-1: Location of CPP on the INL Reservation

The years 1975 through 1980 marked a period of change in regulatory bodies at INL and also a change of prime contractor at CPP. The Energy Research and Development Administration (ERDA) replaced the Atomic Energy Commission (AEC) as the INL regulatory body between 1975 and 1977 before the Department of Energy (DOE) was created as a cabinet-level department of the federal government in 1977. DOE has remained as the INL regulatory body to the present. Allied Chemical took over CPP operations from the Phillips Petroleum Company in 1971. Allied ran CPP operations until it completed its contract in late 1979 and was replaced by Exxon Nuclear Idaho (Occupational Exposure History, 1993, PDF p. 53).

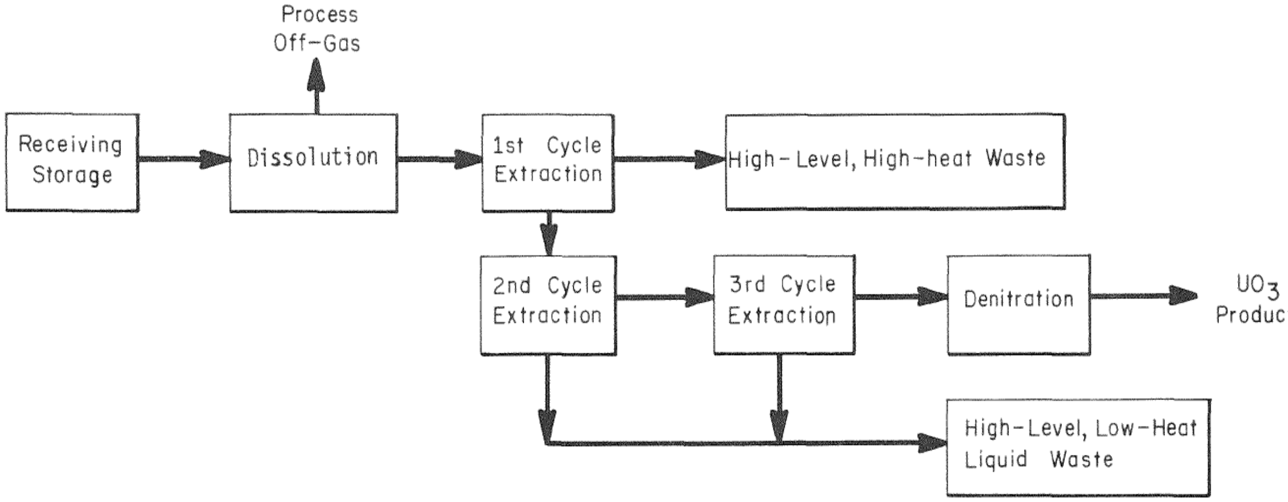
In contrast to the years prior to 1974, NIOSH has concluded that definitive historical site population numbers are quite good for the years 1975 through 1980 (Occupational Exposure History, 1993, PDF p. 43). This is largely due to the data compiled for the annual reports on radiation exposure reports for ERDA and its contractor employees and DOE and its contractor employees for the years 1975 through 1980 (Occupational Exposure History, 1993, PDF p. 82). Table 4-1 lists the site population numbers for the 1975-1980 period under evaluation. The numbers presented in the table are inclusive of AEC/DOE and contractor personnel engaged only on contracts administered by the Idaho operations office; they do not include visitors or personnel employed on contracts administered by other AEC operations offices. These counts do not appear to include workers employed by minor subcontractors (e.g., construction subcontractors), which only appear to be included when visitors are counted. Counting visitors likely would greatly expand the population count. For the period under evaluation, the CPP workforce population can be determined by external dosimetry use because external dosimetry was required for entry into the CPP fenced area. Section 5.6 of this report provides the monthly external dosimetry usage for CPP and CX (the CPP construction code).

Table 4-1: INL Site Population (1975-1980)

Year	INL Site Population
1975	6,338
1976	6,762
1977	7,748
1978	8,935
1979	9,471
1980	9,930

Source: Occupational Exposure History, 1993, PDF p. 82

CPP was a multipurpose plant designed specifically to recover uranium from a wide variety of highly-enriched uranium spent nuclear reactor fuels (20 to 93% U-235). In addition to fuel from INL's test and research reactors, CPP received fuels from the U.S. Navy's ship propulsion reactors at the Naval Reactor Facility (NRF), foreign research reactors, and civilian power reactors (CPP Safety Review, 1974, PDF p. 14). Fuels to be processed were received in the CPP-603 Fuel Storage Facility, where they were stored for months or years until enough fuel of a particular type was accumulated to make a processing run economical. Nuclear reactor fuel processed at CPP consisted of uranium clad in aluminum, zirconium, and stainless steel alloys. These fuels were dissolved in the main processing building, CPP-601, by headend[3] methods involving dissolution in nitric or hydrofluoric acid or by an electrolytic aqueous process. CPP-601 was a large rectangular building with its primary operations carried out in 25 shielded cells which housed the process equipment. Figure 4-2 provides a general schematic diagram of fuel reprocessing steps at CPP.



Source: CPP Safety Review, 1974, PDF p. 17

Figure 4-2: CPP Fuel Reprocessing Schematic

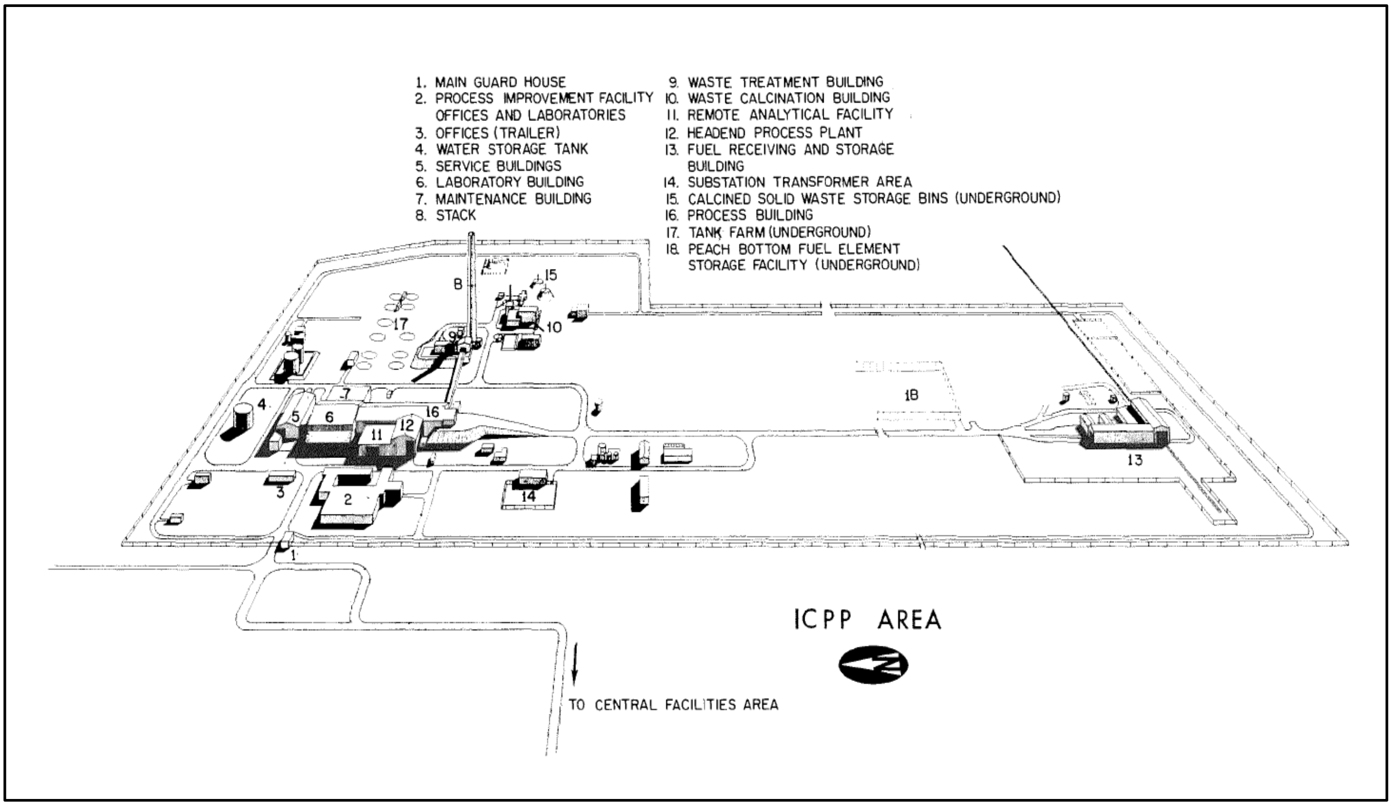
The work at CPP required a variety of support facilities. Attached to CPP-601 were buildings containing offices, multiple analytical laboratories, and maintenance shops. Ventilation ducts connected these buildings to waste treatment buildings which contained ventilating exhaust fans and filters for discharging waste gases to a 250-foot-high stack. There was a tank farm for interim storage of high-level radioactive liquid wastes from the spent-fuel processing. During periodic "campaigns" to reduce the quantities, these liquid wastes would be converted to more stable solid granules at the Waste Calcining Facility (CPP-633). Calcining resulted in an eight-fold reduction in waste volume with the resultant calcine stored in stainless steel bins in underground concrete vaults (NIOSH, 2005, PDF p. 247).

In addition to fuel reprocessing and support facilities, CPP had a number of facilities dedicated to process testing and improvement. The CPP-620 Chemical Engineering/High-Bay Laboratory was a chemical engineering laboratory facility used primarily for non-radioactive testing of plant processes, and for the development and improvement of new processes. Process support and pilot plant studies were also carried out in the labs of the Process Improvement Facility (PIF, also known as the Low-Bay Laboratory). CPP-640, originally known as the Hot Pilot Plant, was renamed the Headend Processing Plant in 1973. It was used to test new equipment and chemical flowsheets in support of

[3] Headend is the first process step of fuel reprocessing. The headend comprises all process stages of mechanical sectioning of fuel elements up to chemical dissolution of the spent fuel in order to prepare extraction. It is the stage in which spent fuel is received and a dissolved product solution of standard composition is produced. The headend process does not produce a final product; it provides the feeds for the next process stages.

the fuel-processing operations in CPP-601. A shielded Mechanical Handling Cave was added in CPP-640's process-makeup area in the late 1970s for processing graphite fuels.

Figure 4-3 shows the location of the major CPP buildings. Table 4-2 lists CPP key process and support buildings with a brief description of each building's function.



Source: CPP Safety Review, 1974, PDF p. 16

Figure 4-3: Schematic of CPP Buildings in March 1974

Table 4-2: Descriptions of Key CPP Process and Support Buildings

Bldg. No.	Building Name	First Used	Last Used	Building Function
CPP-601	Main Processing Building	1953	1992	A five-story building, with four stories underground, where spent reactor fuel was reprocessed. The dissolution of spent fuel and recovery of enriched uranium was performed in various steps by equipment housed in shielded cells.
CPP-602	Laboratory	1952	2009	Attached to CPP-601 building; contained a series of laboratories to provide analytical support.
CPP-603	Fuel Storage Building	1953	Present	Designed to receive and store irradiated fuel elements. Located one-third of a mile away from the CPP-601 Building. The fuel elements were moved to CPP-601 via shield cask, truck, or rail car.
CPP-604/605	Waste Disposal Building and Rare Gas Plant	1953	ND	A building dedicated to processing liquid and gaseous wastes. Liquid wastes were evaporated and then sent to the liquid waste tank for storage. Gaseous waste were processed in the CPP-605 building which had the ability to recover krypton and xenon, if desired.
CPP-620	Chemical Engineering Laboratory	1968	ND	Primarily used for non-radioactive testing of plant processes and for development and improvement of new processes.

Bldg. No.	Building Name	First Used	Last Used	Building Function
CPP-627	Remote Analytical Facility and Multi-Curie Cell	1955	1997	Supplied continuous analytical services in support of the CPP-601 and CPP-633 buildings. Primary constituents were two lines of shielded cells as well the Shift Lab, which provided a bench and hood.
CPP-630	Mass Spectrometry Facility	1956	2009	Primarily used to perform mass measurements on final product samples.
CPP-633	Waste Calcining Facility	1963	1981	Converted aqueous nuclear fuel reprocessing waste into granular calcine solids.
CPP-637	Process Improvement Facility	1959	ND	Support facility using a chemical engineering laboratory for testing of plant processes with non-radioactive materials and un-irradiated uranium.
CPP-640	Hot Pilot Plant/Headend Process Plant	1963	1981	Support facility for testing new equipment and chemical flowsheets in support of the spent reactor fuel processing operations in CPP-601.
CPP-709	Eastside Service Waste Monitoring Station	1952	1990	Wastewater from floor drains, steam-condensate lines, equipment-cooling jackets, and the process-equipment-waste evaporator were routed through the basin of this building and pumped to an injection well.
CPP-734	Westside Service Waste Monitoring Station	1960	1989	The normally-uncontaminated wastewater from steam condensate and equipment-cooling lines was routed to the basin of this building for monitoring and then flowed by gravity into an injection well.

Section 5.1.2 in Rev. 2 of the SEC-00219 INL Evaluation Report contains detailed information on CPP buildings and operations (NIOSH, 2017). The following discussion addresses facility operations and modifications of interest for this evaluation.

By 1975, CPP had been operating for almost 25 years as a full-scale fuel-reprocessing facility with increased production requirements that resulted in almost continuous plant operations. In 1975, a campaign (Run #30) to co-process zirconium and aluminum fuels to recover uranium was completed, as well as a second electrolytic-processing campaign to convert recovered and purified uranyl nitrate solution to UO_3 (Idaho Chemical Programs, 1976, PDF p. 3). Table 4-3 provides details of processing runs at CPP from 1975 through 1980 (Stacy, 2000, PDF pp. 285-286). Four operating periods of the Rare Gas Plant to recover Kr-85 and xenon isotopes were also successfully completed that year. These recoveries from the off-gas produced from dissolution of aluminum-clad fuel took place in specialized equipment located within the CPP-604 Waste Disposal Building (Fuel Reprocessing Complex, 2006, PDF p. 42).

Table 4-3: Chronology of CPP Processing Runs (1975-1980)

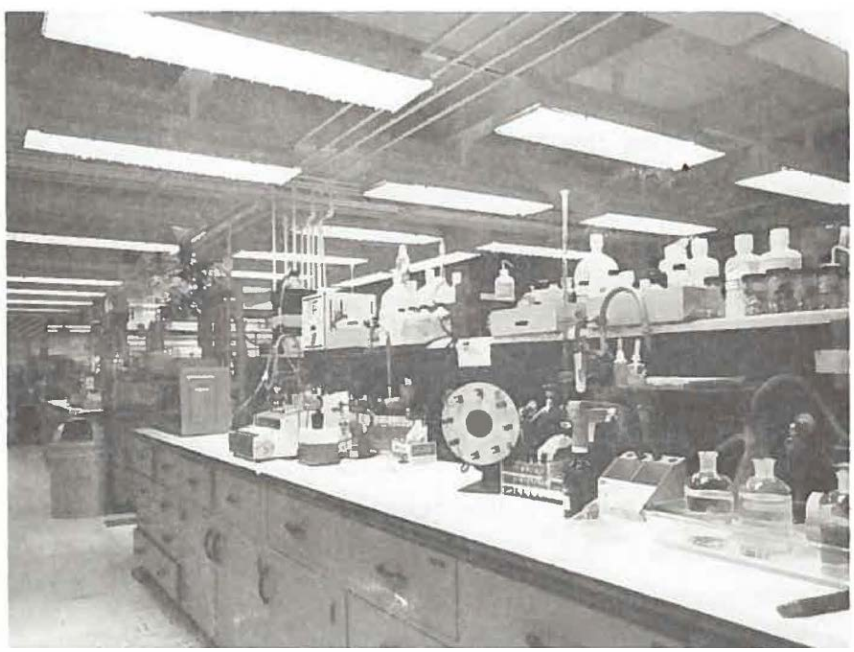
Run #	Process Period	Fuel Type
30	2/74 to 1/75	Zr, GETR, ATR, MTR, MTR 20%, TRA scrap, JRR, ETR, CP-5, OWR, JMTR, Juggernaut, KUR, Um, SER, LPTR, EBR-II Vycor glass, G.G.A.Thermionic, ETRC plates, University of Wyoming UO_2SO_4, Atomics International fission disc, HTRE scrap, Walter Reed Army Hospital, Nuclear Test Gauge/Split Table Reactor, HTGR secondary burner ash leaching, BMLfission disc
31	2/75 to 5/75	EBR-II, APPR cold fuel scrap
32	5/76 to 9/76	Zr, PWR
33	3/77 to 6/77	Godiva reactor fuel, HTRE, ATR, MTR, LPT, ETR, GETR
34	8/77 to 9/77	EBR-II, OMRE, SPERT, ORNL-17-1, BMI, Kinglet, Sandia (Godiva reactors), PBF metallurgical samples
35	7/78 to 3/79	Zr, custom
36	9/80 to 3/81	Zr, Rocky Flats U3O8, GETR, OWR, STIR, LPTR, UCLA-MTR, ATR, ETR, ATR-XA

After a lengthy maintenance and decontamination period, the Waste Calcining Facility resumed operations in May 1975. Calcining a fluoride waste stream had not been considered in the original facility design. The processing of zirconium fluoride waste solutions amplified a condition of increased radioactive contamination depositing on the scratched and pitted surfaces of metal vessels and pipes (INEEL, 1997, PDF p. 48). Decontamination became steadily more difficult and residual radiation rates continued to rise over time (Decontamination, 1978, PDF p. 34). Also in 1975, funds to design a new calcining facility were authorized; the new facility was completed in 1982. Table 4-4 provides details of the campaign runs at the Waste Calcining Facility from 1975 through 1980 (INEEL, 1997, PDF p. 64).

Table 4-4: Chronology of Waste Calcining Facility Campaigns (1975–1980)

Campaign No.	Campaign Dates	Waste Solution Calcined	Liquid Waste Calcined (Gallons)
7	May 1975 – Jan 1977	Zirconium Fluoride	375,300
8	Aug 1977 – Sep 1978	Zirconium Fluoride	267,500
8	Aug 1977 – Sep 1978	Sodium Bearing	193,400
9	Jun 1979 – Mar 1981	Zirconium Fluoride	454,600
9	Jun 1979 – Mar 1981	Sodium Bearing	22,300

The CPP analytical laboratories had been a source of contamination issues at CPP due to the nature of the work performed (primarily analysis of process samples) as well as poor housekeeping. Contamination incidents were fairly common occurrences, especially in the Shift Lab (see Figure 4-4) in the Remote and Service Analytical Laboratory (CPP-627) (Norman, 1979).



Source: CPP Safety Review, 1977, PDF p. 46

Figure 4-4: Laboratory Bench in the Shift Lab in 1977

As a result of the ongoing contamination issues, plus an extended production outage in 1978 due to a small criticality in H-Cell of CPP-601, modifications were made in many of the CPP analytical laboratories. Modifications included the following (Dykes, 1981, PDF p. 2):

CPP-602:

- Locker room modified and cafeteria relocated (1977)
- Old exhaust HEPA filter boxes replaced with new bag-out type housings (1979)

CPP-627:

- New lab benches installed in the West End of the Shift Lab (1978)
- Isolation room built for warm work in the East End of the Shift Lab (1980)
- Lab benches in the East End of the Shift Lab replaced by open-front boxes (1980)
- Prototype master/slave manipulators installed in an isolation box (1980)
- System compatible with CPP Operations procedures installed to receive hot samples directly into the Remote Analytical and Service Laboratory (1980)

The initial phase of compiling the *ICPP Decontamination Manual*[4] was completed in 1975. The manual contained 12 sections, each dealing with a specific group of plant vessels and equipment having a common contamination history. The sections covered all equipment used in fuel reprocessing and radioactive material handling that was subject to decontamination and contact maintenance (Idaho Chemical Programs, 1976, PDF p. 4). The importance of the effort to reduce radiation and contamination problems at CPP was evidenced in the decontamination and decommissioning (D&D) of process cells A, B, C, D, and L in the CPP-601 Main Processing Facility. These five process cells contained process equipment previously used for fuel reprocessing but categorized as surplus in 1978. The D&D operations began in July 1980 and were completed in June 1984. The radioactive waste volume generated included 1024 ft^3 of transuranic waste and 16,180 ft^3 of non-compactible low-level waste (Process Cells, 1984, PDF p. 7).

Major decontamination efforts were also performed in other CPP buildings, including the CPP-603 Fuel Storage Building. The facility had a number of contamination-control issues, including excess basin contamination levels, elevated general area radiation rates, and frequent personnel contamination incidents, including visitors (Rich, 1974a, PDF pp. 2-3). While the clean-up efforts were ongoing, it was not until 1977 that substantial results were realized after priority attention was given to reducing the radioactivity levels in the basin and improving the chemical make-up of the basin water (CPP Rad Controls, 1977, PDF pp. 2-3).

Beginning in 1978, a portion of the Hot Pilot Plant (CPP-640) was modified to support headend processing of graphite-based fuel. The name of the building was changed to the Headend Process Plant. Much of the fuel for this work came from a joint AEC and National Aeronautics and Space Administration (NASA) Rover project for developing a nuclear-powered rocket. When the project was abandoned, fuel was sent to ICPP for processing; however, graphite-based fuel processing did not begin until 1983 (Fuel Reprocessing Complex, 2006, PDF p. 39).

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[4] ICCP stands for Idaho Chemical Processing Plant. CPP stands for Chemical Processing Plant. Both acronyms were used interchangeably at the site and are employed within this report as well, depending on the source document.

4.2 Radiation Exposure Potential from Operations

Based on the site operations outlined in Section 4.1, sources of external exposure at CPP were primarily attributed to photon and beta radiation. Neutron radiation was present due to spontaneous fissions and alpha-neutron reactions, but only at insignificant levels during the period under evaluation (Szulinski, 1980, PDF pp. 7 and 14). The potential for external radiation dose was primarily due to the presence of mixed fission and activation products from the reactor fuels processed at CPP. The majority of radioactivity in process raffinate solutions and calcined wastes were from the long and medium half-life fission products. In addition to the products present in the reactor fuels, activation of fuel cladding and structural materials (e.g., Mn-54 and Co-60) would also be present, but would vary depending on the type of fuel processed. Beta emissions would be present because most fission products are initially rich in neutrons and undergo beta decay to dissipate energy.

The primary sources of internal radiation exposure at CPP were related to its primary function of processing spent fuel elements containing enriched uranium in order to recover un-fissioned uranium. While the reprocessing itself was performed remotely in heavily-shielded cells, maintenance for the entire plant was performed via direct contact (CPP Safety Review, 1974). In addition, there was a large process sampling program that took raffinate samples from all three cycle extractions for laboratory analysis. Another potential source of internal radiation exposure was during waste-calcining operations where liquid wastes were converted into solid granules for long-term storage. The primary radionuclides likely present throughout most CPP facilities during the period under evaluation would include uranium, mixed fission and activation products, radioactive noble gases, radioiodines, plutonium, and neptunium.

4.3 Time Period Associated with Radiological Operations

The first year of CPP radiological operations was 1951. CPP was used for reprocessing of spent nuclear fuel until 1992, when the Department of Energy (DOE) announced that the CPP reprocessing function would be phased out (Wagner, 1999, PDF p. 9). CPP was re-tasked with a mission focused on fuel-storage technologies and waste management. CPP was renamed the Idaho Nuclear Technology and Engineering Center (INTEC) in 1998 when the fuel reprocessing mission was officially over. At that time, DOE identified the Main Processing Building (CPP-601) for removal, along with the Fuel Storage Building (CPP-603), and several support structures. In 2005, DOE identified the remaining ICPP structures as obsolete; deactivation, decommissioning, and demolition (DD&D) of its buildings and structures began, including those associated with spent fuel reprocessing (Fuel Reprocessing Complex, 2006, PDF pp. 11 and 58).

As presented in Section 3.0 of this report, DHHS has already included CPP employees in the SEC for the period from March 1, 1970 through December 31, 1974 due to the lack of transuranic bioassay monitoring. The period from January 1, 1963 through February 28, 1970 is still under active review by the Advisory Board on Radiation and Worker Health. Further evaluation has revealed that it was not until 1981 that CPP implemented a routine transuranic bioassay program. Due to the date of this monitoring change, NIOSH has since determined that it cannot estimate internal radiation doses from exposures to transuranic radionuclides separated from mixed fission products with sufficient accuracy for employees who worked in any area of CPP from January 1, 1975 through December 31, 1980.

4.4 Site Locations Associated with Radiological Operations

NIOSH has determined that CPP-specific and claimant-specific data available for the period from January 1, 1975 through December 31, 1980 allow NIOSH to identify workers entering the CPP fenced area, but not worker movement within CPP. Although transuranic materials without mixed fission products present were located only in a few specific areas at CPP (primarily in the processing facility hot cells, the Multi-Curie Cell, and the analytical laboratories), there is no way to determine which CPP workers accessed those areas. NIOSH is therefore unable to define individual employee exposure scenarios based on specific work locations within CPP during the period under evaluation.

4.5 Job Descriptions Affected by Radiological Operations

NIOSH has determined that the site-specific and claimant-specific data available for CPP for the time period under evaluation (January 1, 1975 – December 31, 1980) are insufficient to allow NIOSH to determine that any specific work group was not potentially exposed to radioactive material releases or possible subsequent contamination.

NIOSH has insufficient information associating job titles and/or job assignments with specific radiological operations or conditions. Without such information, NIOSH is unable to define potential radiation exposure conditions based on employee job descriptions.

5.0 Summary of Available Monitoring Data for the Proposed Class

The primary data used for determining internal exposures are derived from personal monitoring data, such as urinalyses, fecal samples, and whole-body counting results. If these are unavailable, the air monitoring data from breathing zone and general area monitoring are used to estimate the potential internal exposure. If personal monitoring and breathing zone area monitoring are unavailable, internal exposures can sometimes be estimated using more general area monitoring, process information, and information characterizing and quantifying the source term.

This same hierarchy is used for determining the external exposures to the cancer site. Personal monitoring data from film badges or thermoluminescent dosimeters (TLDs) are the primary data used to determine such external exposures. If there are no personal monitoring data, then area and environmental dosimeter data, exposure rate surveys, process knowledge, and source term modeling can be used to reconstruct the potential exposure.

A more detailed discussion of the information required for dose reconstruction can be found in OCAS-IG-001, *External Dose Reconstruction Implementation Guideline*, and OCAS-IG-002, *Internal Dose Reconstruction Implementation Guideline*. These documents are available on the Radiation Dose Reconstruction Program (DR) page.

5.1 Data Capture Efforts and Sources Reviewed

As a standard practice, NIOSH completed an extensive database and Internet search for information regarding Idaho National Laboratory. The database search included the DOE Legacy Management Considered Sites database, the DOE Office of Scientific and Technical Information (OSTI) database, the Energy Citations database, and the Hanford Declassified Document Retrieval System. In addition to general Internet searches, the NIOSH Internet search included OSTI OpenNet Advanced searches, OSTI Information Bridge Fielded searches, Nuclear Regulatory Commission (NRC) Agency-wide Documents Access and Management (ADAMS) web searches, the DOE Office of Human Radiation Experiments website, and the DOE-National Nuclear Security Administration-Nevada Site Office-search. Attachment One contains a summary of Idaho National Laboratory documents. The summary specifically identifies data capture details and general descriptions of the documents retrieved.

In addition to the database and Internet searches listed above, NIOSH identified and reviewed numerous data sources to determine information relevant to determining the feasibility of dose reconstruction for the class of employees under evaluation. This included determining the availability of information on personal monitoring, area monitoring, industrial processes, and radiation source materials. The following subsections summarize the data sources identified and reviewed by NIOSH.

5.2 Previous Dose Reconstructions

NIOSH reviewed its NIOSH DCAS Claims Tracking System (referred to as NOCTS) to locate EEOICPA-related dose reconstructions that might provide information relevant to the petition evaluation. Table 5-1 summarizes the results of this review. (NOCTS data available as of June 5, 2017).

Table 5-1: No. of INL Claims Submitted Under the Dose Reconstruction Rule

Description	Totals
Total number of claims submitted for dose reconstruction	**1928**
Total number of claims submitted for energy employees who worked during the period under evaluation (January 1, 1975 through December 31, 1980).	**1015**
Number of dose reconstructions completed for energy employees who worked during the period under evaluation (i.e., the number of such claims completed by NIOSH and submitted to the Department of Labor for final approval).	**957**
Total number of claims submitted for energy employees who started their employment during the period under evaluation (January 1, 1975 through December 31, 1980)	**567**
Number of claims for which internal dosimetry records were obtained for the identified years in the evaluated class definition	**308**
Number of claims for which external dosimetry records were obtained for the identified years in the evaluated class definition	**605**

5.3 Employee Interviews

To obtain additional information about INL, NIOSH interviewed a large number of current and former INL employees during the SEC-00219 INL evaluation. Those interviews included both in-person and telephone interviews. An additional joint interview (2016a below) was conducted with two former INL employees for the specific purpose of supporting this SEC-00238 evaluation because these individuals were considered likely to have new information on the CPP for the period under evaluation. A review of all SEC-00219 interviews identified the following 21 interviews as germane to the CPP focus in this SEC-00238 evaluation.

- Personal Communication, 2014a, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS, ORAU Team, ABRWH, and SC&A; June 24, 2014; SRDB Ref ID: 142401

- Personal Communication, 2014b, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS and SC&A; June 24, 2014; SRDB Ref ID: 142397

- Personal Communication, 2014c, *Personal Communication with former Department of Energy-Idaho Office [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH, ABRWH, and SC&A; June 24, 2014; SRDB Ref ID: 142359

- Personal Communication, 2014d, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS, ORAU Team, ABRWH, and SC&A; June 25, 2014; SRDB Ref ID: 142404

- Personal Communication, 2014e, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by ORAU Team, ABRWH, and SC&A; June 25, 2014; SRDB Ref ID: 142364

- Personal Communication, 2014f, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS, ORAU Team, ABRWH, and SC&A; June 25, 2014; SRDB Ref ID: 142387

- Personal Communication, 2014g, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH, ORAU Team, ABRWH and SC&A; June 26 2014; SRDB Ref ID: 142362

- Personal Communication, 2014h, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS, ORAU Team, ABRWH, and SC&A; September 10, 2014; SRDB Ref ID: 142398

- Personal Communication, 2014i, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH and SC&A; November, 2014; SRDB Ref ID: 141472

- Personal Communication, 2014j, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS, ORAU Team, ABRWH, and SC&A; November 17, 2014; SRDB Ref ID: 159717

- Personal Communication, 2014k, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH, ORAU Team, ABRWH, and SC&A; November 18, 2014; SRDB Ref ID: 141477

- Personal Communication, 2014l, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH, ORAU Team, ABRWH, and SC&A; November 18, 2014; SRDB Ref ID: 141478

- Personal Communication, 2014m, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH, ORAU Team, ABRWH and SC&A; November 18, 2014; SRDB Ref ID: 142363

- Personal Communication, 2014n, *Personal Communication with current Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH and SC&A; November 18, 2014; SRDB Ref ID: 141480

- Personal Communication, 2014o, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH, ORAU Team and SC&A; November 19, 2014; SRDB Ref ID: 142360

- Personal Communication, 2014p, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS, ORAU Team, and SC&A; November 19, 2014; SRDB Ref ID: 142405

- Personal Communication, 2014q, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS, ORAU Team, ABRWH, and SC&A; November 19, 2014; SRDB Ref ID: 159715

- Personal Communication, 2014r, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH and ORAU Team; December 11, 2014; SRDB Ref ID: 141471

- Personal Communication, 2016a, *Personal Communication with former Idaho National Laboratory [job title redacted]and a DOE Idaho Operations [job title redacted]*; In-person interview at Idaho Falls, Idaho by ORAUT and DCAS; January 27, 2016; SRDB Ref ID: 167245

- Personal Communication, 2016b, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS, ABRWH, and SC&A; January 27, 2016; SRDB Ref ID: 159731

- Personal Communication, 2016c, *Personal Communication with former Idaho National Laboratory [job title redacted]*; Phone interview by ABRWH, and SC&A; February 16, 2016; SRDB Ref ID: 159716

- Personal Communication, 2016d, *Personal Communication with former Idaho National Laboratory [job title redacted]*; Phone interview by DCAS, ABRWH, and SC&A; April 5, 2016; SRDB Ref ID: 159718

5.4 Incidents

The CPP was especially designed for the dissolution of a wide variety of spent reactor fuels for the principal purpose of recovering enriched uranium. Because its primary activities involved the handling and storage of spent fuel, chemical separation, and disposal of process wastes, radiological incidents did occur. However, during the period under evaluation (1975-1980), most of these incidents were minor in nature (CPP West Gate, 1975; Contamination Incidents, 1978). INL's monitoring and analytical programs were designed to initiate an investigation of any potential internal intake that was indicated by off-normal workplace indicators, such as personnel contamination or positive air sampling. NIOSH found extensive personal monitoring data for mixed fission and activation products (beta/gamma); therefore, only two external radiation events of interest plus the criticality in H-Cell in 1978 are discussed below.

- Plutonium Spill in CPP-602 (February 1975): A plutonium spill occurred in CPP-602, Room 703. No detectable personnel exposures (Condotta, 1981).

- Exposure Limit Exceeded During CPP-603 Basin Filters Change-Out (June 16-21, 1976): Exposures to [number redacted] CPP operations personnel during basin filter backwashing operations at the CPP-603 Fuel Storage Building resulted in exceeding the quarterly skin exposure limit of 5 rem for second quarter 1976 (Exposures, 1973, PDF p. 182). The basin wash filters were originally supplied with an automatic backwashing system but this was abandoned after problems were encountered. Subsequently, a manual system was adopted even though it was known that higher personnel exposures would result. The overexposure was primarily the result of not reviewing exposure histories prior to work. The overexposures also pointed out the need for the much-needed basin filtration system which was in the process of being installed at the time of the incident.

- Radiation Incident at CPP-603 (November 27, 1976): During routine duties at the CPP-603 Fuel Storage Building, it was reported that a canister of material was floating on the surface of the basin water (Storms, 1976, PDF p. 2). Radiological measurements indicated a 3 R/hr direct radiation dose rate but no airborne activity. Personnel exposures from the dosimeters of [number redacted] workers in the affected area indicated a maximum whole body dose of 70 mrem. The incident was another indicator of needed operational safety upgrades to the CPP-603 facility.

- Criticality Accident (October 17, 1978): The accident occurred in a shielded operation of the first-cycle solvent-extraction columns in CPP-601, which were designed to remove fission products from dissolved irradiated reactor fuel in order to recover enriched uranium. The criticality occurred in the H-100 column (in the H Cell) after a dilute solution containing increased uranium levels (due to a leaking water valve on a make-up tank) caused an increase in the uranium inventory of the column until the excursion occurred (1979 CPP Criticality, 2000, PDF p. 59). Radiation alarms alerted CPP workers to the increased radiation rates resulting from the criticality. The extraction columns were shut down and the plant evacuated. Forty five operations personnel and 35 construction personnel were evacuated. Personnel and the environment were monitored to determine the extent of radiation exposure and contamination. [Number redacted] construction workers and 11 operations personnel received whole-body counts as follow-up bioassay. The results showed no internal deposition of radioactive material due to the accident. Personnel radiation dosimeters were pulled and processed. The maximum whole-body dose to any individual was less than 130 mrem (Note: This dose also included the previous two weeks exposure accumulated on the dosimeter) (DOE, 1978, PDF p. 43). No contamination attributable to the incident was found on or near the CPP site or in the environment. There were no significant personnel exposures and no damage to process equipment as a result of the criticality. However, as a direct result of this event, the plant entered an "extended and expensive" shutdown (1979 CPP Criticality, 2000, PDF p. 59).

- CPP Shift Lab (1981): Although there was not a contamination event of dosimetric consequence during the period under evaluation, there were a series of contamination control problems in the CPP Shift Lab, sometimes involving alpha-emitting radionuclides. In 1981, this culminated in the identification (via routine *in-vivo* bioassay) of uranium and plutonium intakes for a number of Shift Lab radioanalysts.

5.5 Internal Monitoring Data

A class of CPP workers was added to the SEC as a result of the SEC-00219 evaluation that discovered a lack of transuranic bioassay data from 1963 through 1974 despite new activities that involved separating certain transuranic radionuclides from the mixed fission products. The October 1974 report entitled *Preliminary ICPP Health Physics Upgrade Program* stated that an improved bioassay program was necessary due to the increase in routinely encountered alpha activity plausibly attributable to plutonium (ICPP HP Upgrade, 1971-1980). At the time of the report, CPP workers were only required to have a whole-body count every four years with urinalysis required, as deemed necessary by CPP Health Physics, depending on radiological conditions. This monitoring program was inadequate for transuranic materials such as plutonium. In an effort to rectify this deficiency, a routine *in-vitro* bioassay program was planned. Also planned were upgrades to the existing chest-counting program to "state of the art detection capabilities believed to be essential for plutonium lung counting support of the ICPP internal dosimetry program" (ICPP HP Upgrade, 1971-1980, PDF p. 113). Endeavors to improve calibration methods and lower the *in-vivo* detection limit for transuranic radionuclides of interest were undertaken. A systematic investigation into uncertainties associated with chest-counting, such as chest-wall thickness, calibration uncertainty, and subject background was also undertaken so that the propagated uncertainty with chest-counting for transuranic materials could be better understood.

The upgrades in the CPP bioassay program were slow to be implemented. In February 1975, an initial request was made to the Health Services Laboratory (HSL) for support of a routine CPP bioassay program that would include *in-vitro* (urine and feces) and *in-vivo* bioassay. It was requested that plutonium, uranium, and strontium-90 analyses be performed on 150-200 urine samples, with a like number of plutonium analyses performed on fecal samples. There is an indication that the substantial workload resulting from such a large number of time-consuming analyses could not be supported at that time (Anderson, 1975, PDF pp. 3-4).

While the requested analytical services were not implemented for CPP in 1975, the Analytical Chemistry Branch of the HSL performed some investigatory work on plutonium analyses of feces. This work indicated that this type of analysis would be the preferred matrix for plutonium bioassay. Additional work was done on screening fecal samples to determine the severity of a potential inhalation intake of insoluble plutonium. As a result of this work, the HSL offered (in 1977) to provide support for 50 fecal analyses for plutonium, 50 fecal analyses for gamma-emitters and strontium-89/90, 50 urinalyses for gamma-emitters and strontium-89/90, 50 urinalyses for isotopic uranium, and 50 urinalyses for natural uranium (Williamson, 1976, PDF pp. 2-3).

The beginnings of the routine bioassay program were implemented in 1978. The sampling program was limited, but it indicated that low-level plutonium exposures were occurring at CPP. The initial bioassay program focused on chemists, analysts, operations personnel, decontamination technicians, and instrumentation personnel (Bioassay, 1978, PDF p. 2). In November 1980, a planned substantial upgrade in the "ICPP Internal Dose Monitoring Program" was announced. The upgrade involved an increase in the number of *in-vivo* and *in-vitro* bioassays, including plutonium, uranium, and strontium *in-vitro* analyses. The program consisted of a staggered schedule of annual *in-vitro* bioassay and annual or semi-annual *in-vivo* bioassay for selected organizations or groups of employees deemed to have the highest internal exposure potential. Supervisors were required to provide lists of employees scheduled for *in-vivo* bioassay to the Radiological and Environmental Sciences Laboratory (RESL)[5] a month in advance. Likewise, a list of employees scheduled to submit *in-vitro* bioassay samples was generated with notices provided to affected workers a month in advance. Instructions on sample collection and sample collection kits were distributed by the CPP Dispensary (CPP Program Upgrade, 1980, PDF pp. 2-3).

[5] Health Services Laboratory was renamed the Radiological and Environmental Sciences Laboratory in 1978.

The gradual implementation of a routine bioassay program for plutonium analysis is reflected in the *in-vitro* bioassay data in the possession of NIOSH. Table 5-2 provides the annual number of plutonium bioassays performed in both urine and fecal matrices from 1970 through 1986. The limited analyses in 1978 and the full implementation of a plutonium *in-vitro* bioassay program in January 1981, as described in INL documentation, are reflected in these data.

Table 5-2: Plutonium *In-vitro* Bioassay Analyses by Year for CPP (1970-1988)

Year	Urine	Fecal
1970*	1	0
1971*	0	0
1972*	86	0
1973*	55	0
1974*	29	0
1975*	7	0
1976	0	0
1977	0	0
1978	3	8
1979	14	11
1980	36	1
1981	214	278
1982	180	226
1983	220	357
1984	209	314
1985	369	300
1986	137	324

Source: Bioassay, 1958-1986
Note: * means that values for that year are from NIOSH, 2017, Table 7-6

The plutonium *in-vitro* analyses performed by month in 1981 were reviewed to ensure that the routine program was fully implemented at the beginning of the year as indicated. Table 5-3 presents these data. The substantial increase in analyses beginning in July 1981 are the result of follow-up monitoring of personnel after a routine positive bioassay for a Shift Lab radioanalyst detected an intake in May 1981 (Shift Lab Intakes, 1981). The analyses per month remain elevated until returning to routine levels in October 1981.

Table 5-3: Plutonium *In-vitro* Bioassay Analyses by Month for CPP in 1981

Month/Year	Urine	Fecal
Jan-1981	4	0
Feb-1981	18	3
Mar-1981	9	2
Apr-1981	7	2
May-1981	17	1
Jun-1981	10	15
Jul-1981	80	166
Aug-1981	23	56
Sep-1981	16	25
Oct-1981	10	6
Nov-1981	10	2
Dec-1981	10	0
Total	214	278

Source: Bioassay, 1958-1986

5.6 External Monitoring Data

In January 1975, INL returned to a “one badge, one area” policy for external dosimetry. The appeal for returning to this policy is captured in the following memo excerpt from the Director of the INL Security Division in November 1974:

> *It is the desire of the ID Health Services Laboratory, Aerojet Nuclear Company, and Allied Chemical Corporation to return to the original concept of one badge for one area. The present multi-area badge system was initiated in 1969 on a recommendation by [name redacted] then of Idaho Nuclear Corporation, at a time when INC controlled all of the areas concerned. Now that the area responsibilities are divided between ANC and ACC, and because of the frequent interchange of personnel between the areas, the multi-area badge system is no longer adequate for the necessary radiation exposure control and the identification of the location of the radiation source. These capabilities are extremely important now due to the inception of the "as low as practicable" concept in personnel radiation exposure.* (Dosimetry, 1972-1981, PDF p. 145)

The implementation of the ALARA (As Low As Reasonably Achievable) concept to reduce radiation exposures was led by the Health Physics Group at the Idaho Nuclear Corporation, which introduced new administrative controls in 1974. Each branch manager was required to set annual exposure goals below 3 rem per year for each radiation worker who had received an annual exposure greater than 0.5 rem for the previous year. These controls resulted in the use of added shielding in operating areas and hot cells, a clean-up of plant areas having elevated radiation levels, and a more even distribution of exposures among people in the same maintenance crafts. Each succeeding year, the exposure experience was reviewed by branch management and efforts were made to lower the exposure goal for each individual (Occupational Exposure History, 1993, PDF p. 54).

ALARA was especially important in the mid- to late-1970s. In 1975, CPP had a low plant collective dose of about 340 person-rem because almost continuous fuel reprocessing allowed only for minimal direct maintenance. However, the following year extensive upgrading and expansion of the plant and construction staffs resulted in a near doubling of the collective dose. By 1978, due to a comprehensive facility clean-up, CPP comprised about 70% of the total INL collective exposure (Occupational Exposure History, 1993, PDF p. 53).

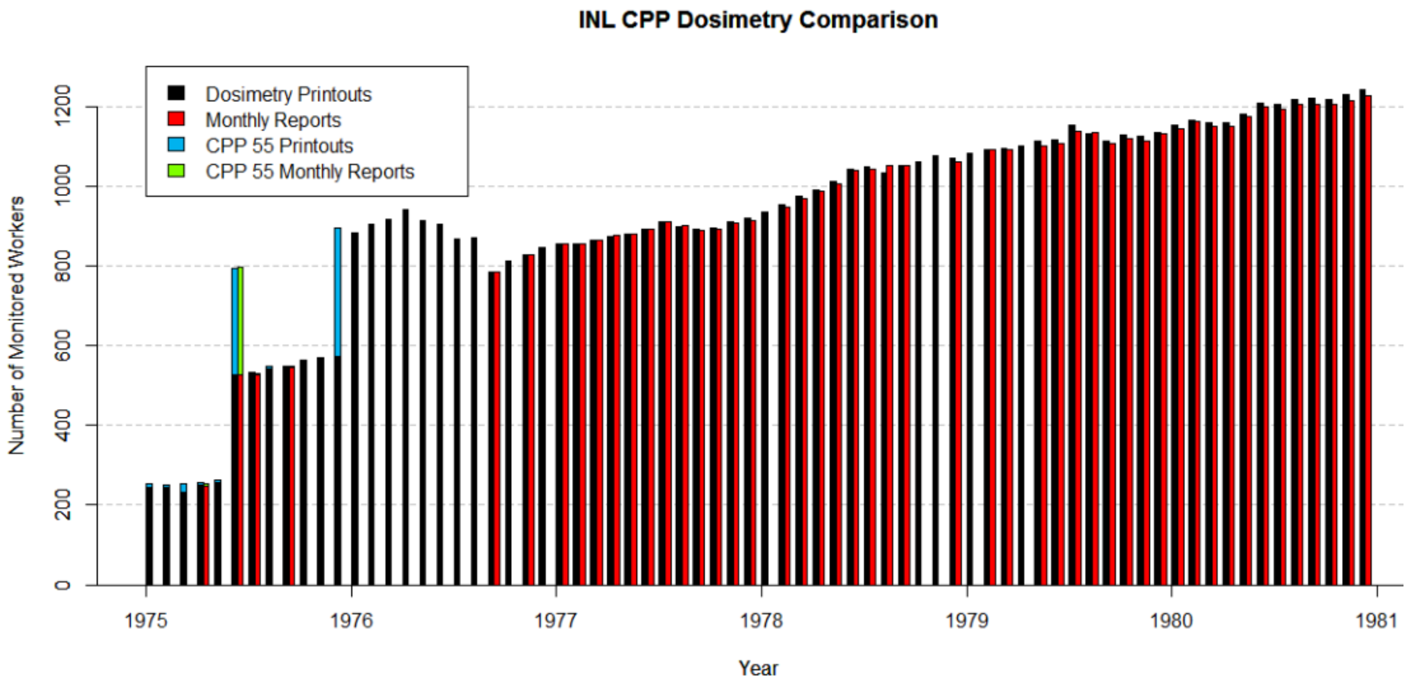
In February 1974, a locally researched and developed dosimetry system was implemented for all INL areas except for the Naval Reactor Facility. This system, called ATLAS (Automatic Thermoluminescence Analyses System), used lithium fluoride (LiF) in a Teflon matrix that was the identical shape and size as the film packet it was to replace. However, the ATLAS system proved to be problematic for use in a large occupational dosimetry program due to the inconsistent and unpredictable nature of its TLD response. The variations observed in comparison tests between the ATLAS dosimeters and direct-reading dosimeters demonstrated the ATLAS system "exceeded tolerable limits for use in our radiation protection program" according to a December 1974 memo from the Director of the INL Safety Division (Dosimetry, 1972-1981, PDF p. 277).

In December 1974, the CPP dosimetry program began an upgrade to a two-chip LiF dosimeter by having a small group of workers wear the LiF chip dosimeter, the ATLAS LiF Teflon dosimeter, and a Savannah River Site dosimeter that had been requested for testing (Dosimetry, 1972-1981, PDF p. 38). The two-chip LiF dosimeter was selected and a Harshaw Model 2000 TLD system was implemented at INL. By May 1975, all INL areas were using the Harshaw TLDs (Dosimetry Branch Changes, 1978, PDF p. 3).

Other changes to the INL external dosimetry program that are of interest for the period under evaluation included a change to TLD-700 chips for use as extremity dosimeters. The TLD disc that had been in use delivered an erratic response to high-energy beta fields and also reduced manual dexterity. The change to TLD-700 chips led to increased usage by INL personnel (Dosimetry Program, 1974, PDF p. 41; Dosimetry Branch Changes, 1978, PDF p. 5). In October 1976, INL began testing a new albedo neutron dosimeter. This dosimeter consisted of an outer cadmium case and an inner polyethylene shield with TLD-700 and TLD-600 chips; this dosimeter replaced the NTA neutron film badges in 1977 (Aoki, 1979, PDF p. 4).

Access to the CPP operating area was controlled by an outer security fence and security-controlled gates. In addition, all personnel entering the CPP operating area were required to be monitored for external dose via a dosimeter (i.e., by film badge or TLD). Due to this entry requirement, individuals who entered the CPP operating area can be identified by their external dosimetry, which also indicates when they were there. In an effort to provide a review of the completeness of the CPP area external dosimetry records for 1975 through 1980, the CPP and CX (CPP Construction) area exposure reports, which contain individual dosimeter results, were compared to the dosimeter processing numbers reported in the INL Dosimetry Branch monthly reports. Not all of the Dosimetry Branch monthly reports during the evaluation period were found.

Figure 5-1 provides a comparison of the monthly totals reported in the Dosimetry Branch monthly reports that were found and the monthly CPP area exposure reports. NOTE: The bars for 1975 also represent data from CPP 55 printouts and CPP 55 monthly reports (see Table 5-1 Note).

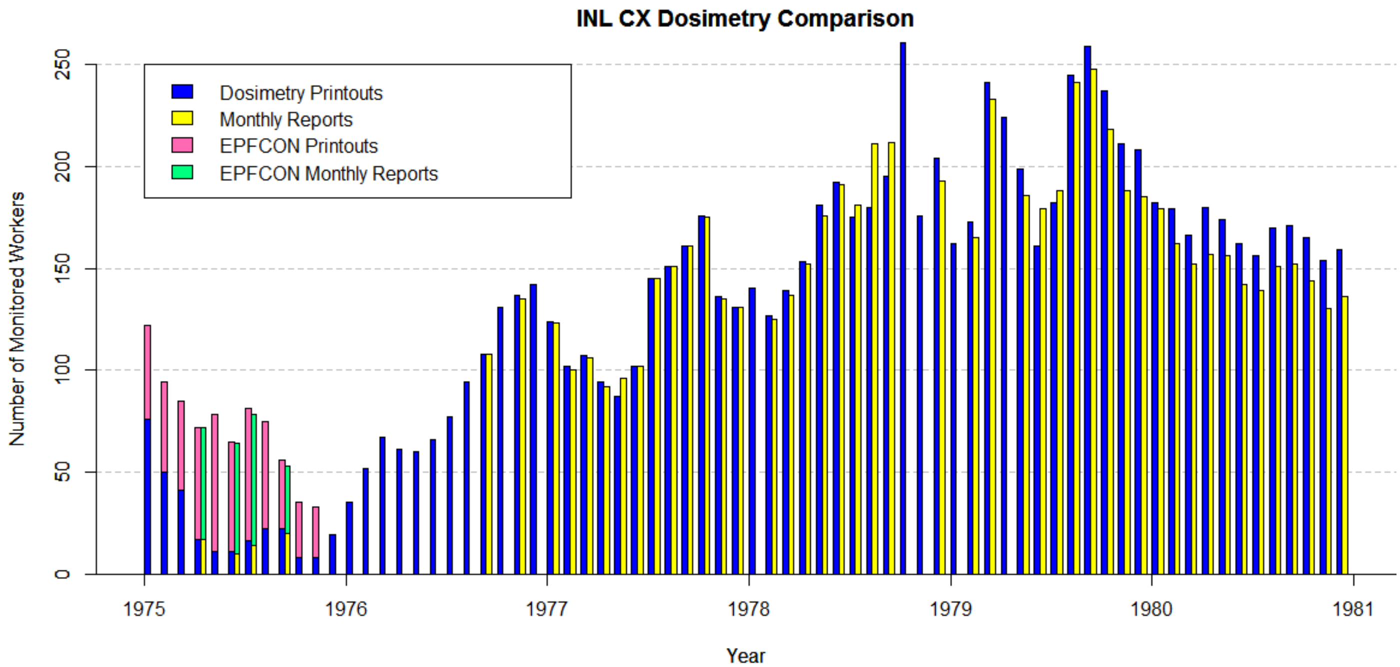


Source: Exposure Reports, 1975; CPP Area Exposures, 1976; CPP Area Exposures, 1977; CPP Area Exposures, 1978; CPP Area Exposures, 1979; CPP Area Exposures, 1980; DOE Idaho Summaries, 1975; DOE Idaho Summaries, 1978; DOE Idaho Summaries, 1979; DOE Idaho Summaries, 1980; ERDA Idaho Summaries 1976; ERDA Idaho Summaries 1977

NOTE: CPP 55 was the code used to designate annual TLD exchange.

Figure 5-1: Comparison of Number of Personnel Monitored on Monthly CPP Area Exposure Reports vs. Dosimetry Branch Monthly Reports for 1975-1980

Figure 5-2 provides a comparison of the monthly totals reported in the Dosimetry Branch monthly reports that were found and the monthly CX area exposure reports. NOTE: The bars for 1975 also represent data from EPFCON printouts and EPFCON monthly reports (see Table 5-2 Note).



Source: CXM Area Exposures, 1975; CXM Area Exposures, 1976; CXM Area Exposures, 1977; CXM Area Exposures, 1978; CXM Area Exposures, 1979; CXM Area Exposures, 1980; DOE Idaho Summaries, 1975; DOE Idaho Summaries, 1978; DOE Idaho Summaries, 1979; DOE Idaho Summaries, 1980; ERDA Idaho Summaries 1976; ERDA Idaho Summaries 1977

NOTE: NIOSH has been unable to confirm the full definition of the acronym "EPFCON." However, it has been confirmed that "CON" refers to construction. EPFCON was the designator used for a series of exposure reports that broke out exposures both by construction company and by area. It appears that INL generated these reports only in 1974 and 1975.

Figure 5-2: Comparison of Number of Personnel Monitored on Monthly CX Area Exposure Reports vs. Dosimetry Branch Monthly Reports for 1975-1980

5.7 Workplace Monitoring Data

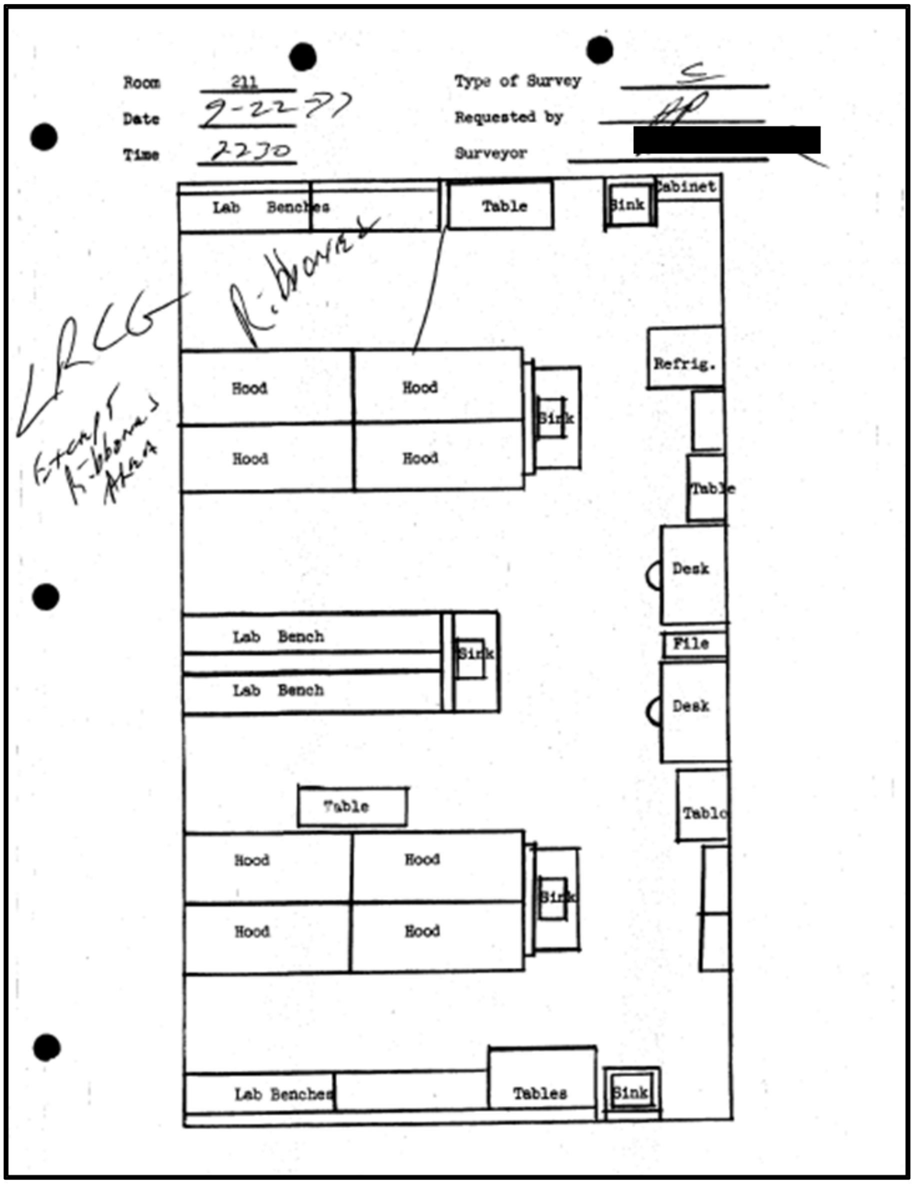
NIOSH has access to workplace air, surface, and environmental monitoring data for CPP. The CPP Health Physics program records include limited air sample data for alpha-emitters but more complete records for beta/gamma-emitters. This difference is primarily due to the widely-held belief that beta/gamma-emitters would always be present as an indicator of contamination. In 1975, CPP facility surveys were performed with large area survey pads because the standard disc smears were ten times less sensitive and also gave a poor measure of "sandy" particulate contamination. It was felt that this use of large pads more realistically represented what could "rub off" onto clothing, and also accounted for the "mysterious" source of activity on people who claimed to have never been in a "contaminated" area. As a result of the surveys, cleaning of facility buildings from "top down" was recommended (Contamination Surveys, 1975).

In 1976, a "red-white-blue" contamination control program was initiated with the long-term goal of decontaminating CPP to essentially "non-detectable" levels through removal or isolation of the contamination source. Color codes were used to identify areas by contamination levels. In 1978, the "red-white-blue" program was replaced with one that segregated the plant into three zones in order of increasing contamination severity. These zones were designated: (1) "clean areas" for radioactively-clean plant areas; (2) clean laboratories handling small quantities under stringent control measures; and (3) controlled areas for those plant areas known to contain smearable contamination on accessible surfaces. While the program resulted in major accomplishments in upgrading the CPP Health Physics program, improvements were still needed, as succinctly captured in the following statement from the 1978 Health Physics Annual and Upgrade Status Report (Rich, 1979):

> *Though the plant is undergoing major construction and upgrading, the record indicates that contamination and radiation have been controlled and reduced, indicating that ALARA efforts have been successful to a degree. It is equally obvious from a casual site inspection that the anticipated end goals have not yet been achieved. Much improvement is to be expected in the areas of job planning as it pertains to radiation exposure reduction and overall plant discipline in housekeeping and the related "crispness" in controlling contamination at the boundary barricades isolating areas of known or potential contamination.*

The criticality in H-Cell of CPP-601 in October 1978 resulted in an extended production outage that was used to perform a wide-scale decontamination program at CPP. In addition to decontamination, sources of contamination were removed and needed facility modifications were made to improve contamination containment. The decontamination efforts were documented in at least one personnel interview as well **(**Personal Communication, 2014n).

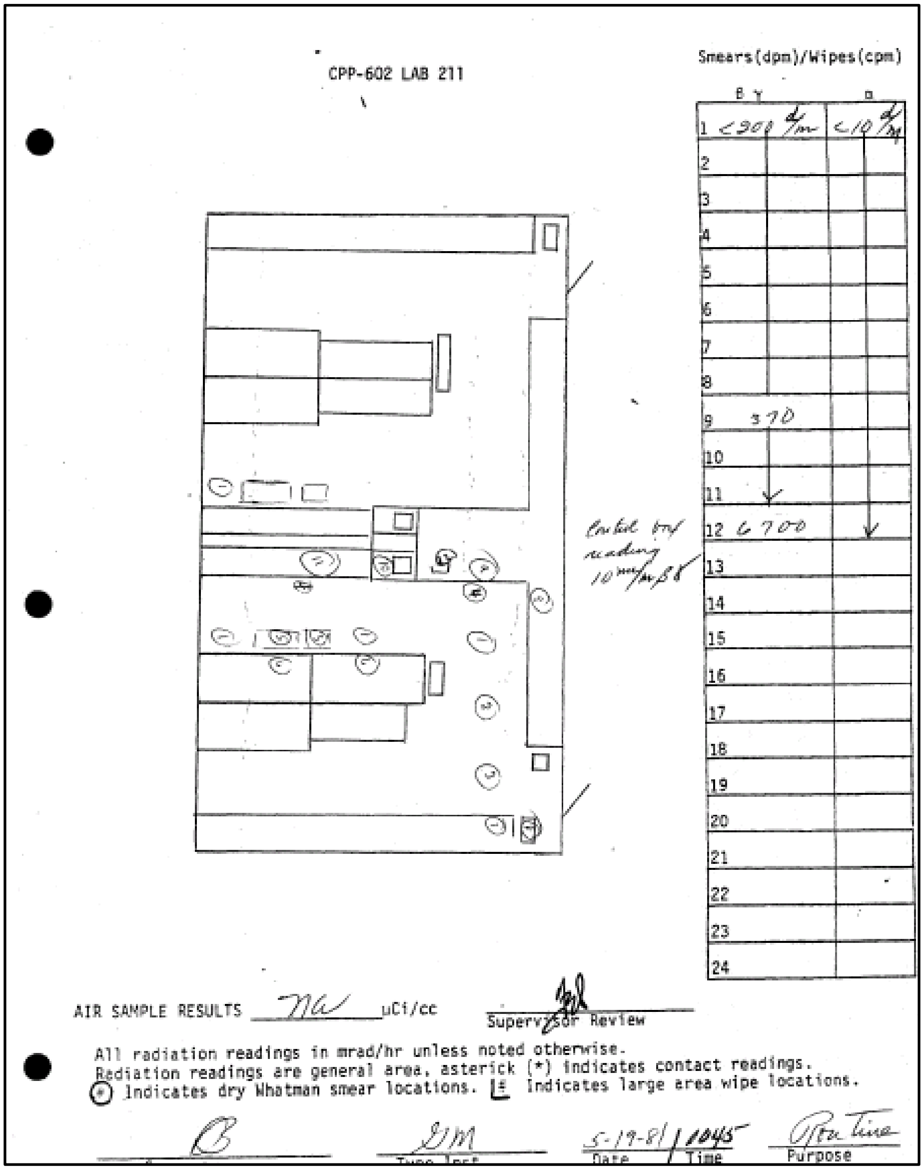
Over time, the contamination control program continued to improve with the growing importance of alpha monitoring becoming integrated into the program. Figures 5-3 and 5-4 provide contrasting visual examples of this integration. Figure 5-3 shows a contamination survey of CPP-601 Lab 211 in 1977. The survey reports the contamination levels as less that radiation control guides "<RCG" except for posted "Ribboned Area."



Source: CPP Contamination Surveys 1977, PDF p. 16

Figure 5-3: Example of Contamination Survey of CPP-602 Lab 211 in 1977

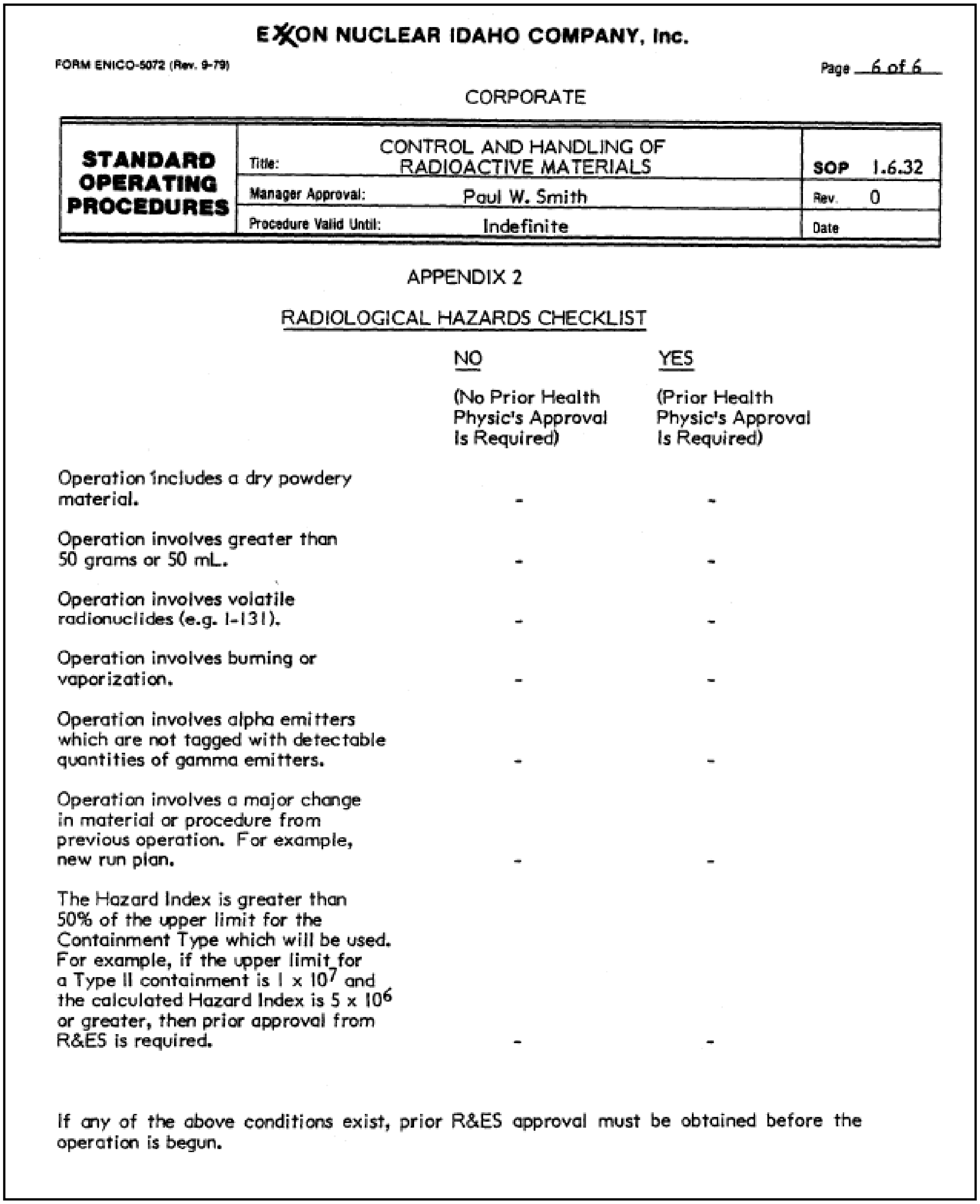
Figure 5-4 shows a contamination survey of CPP-602 Lab 211 in 1981. In contrast to the 1977 survey, this survey provides both beta-gamma and alpha contamination levels for each location smeared within the lab.



Source: CPP Contamination Surveys 1981, PDF p. 132

Figure 5-4: Example of Contamination Survey of CPP-602 Lab 211 in 1981

An additional example of the emphasis on control and handling of alpha-emitting radionuclides is found in the 1982 Standard Operating Procedure, *Control and Handling of Radioactive Materials*. The included Radiological Hazards Checklist specifies "operation involves alpha emitters which are not tagged with detectable quantities of gamma emitters" as a condition that requires Health Physics approval prior to work (see Figure 5-5) (SOP, 1982, PDF p. 11).



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CORPORATE

STANDARD OPERATING PROCEDURES	Title: CONTROL AND HANDLING OF RADIOACTIVE MATERIALS	SOP 1.6.32
	Manager Approval: Paul W. Smith	Rev. 0
	Procedure Valid Until: Indefinite	Date

APPENDIX 2

RADIOLOGICAL HAZARDS CHECKLIST

	NO (No Prior Health Physic's Approval Is Required)	YES (Prior Health Physic's Approval Is Required)
Operation includes a dry powdery material.	-	-
Operation involves greater than 50 grams or 50 mL.	-	-
Operation involves volatile radionuclides (e.g. I-131).	-	-
Operation involves burning or vaporization.	-	-
Operation involves alpha emitters which are not tagged with detectable quantities of gamma emitters.	-	-
Operation involves a major change in material or procedure from previous operation. For example, new run plan.	-	-
The Hazard Index is greater than 50% of the upper limit for the Containment Type which will be used. For example, if the upper limit for a Type II containment is 1×10^7 and the calculated Hazard Index is 5×10^6 or greater, then prior approval from R&ES is required.	-	-

If any of the above conditions exist, prior R&ES approval must be obtained before the operation is begun.

Source: SOP, 1982, PDF p. 11

Figure 5-5: Radiological Hazards Checklist from CPP Procedure, *Control and Handling of Radioactive Materials* (1982)

ORAUT-TKBS-0007-4, Table 4-13 provides a summary of the annual environmental external doses for each major operating area at INL. For the years 1975-1980, facility fence-line TLD measurements were read on a six-month basis and recorded in Environmental Monitoring Data reports. Because all the workers in INL's radiological areas were monitored for external dose, and because the DOE provides each worker's dosimeter data for NIOSH dose reconstruction, the only doses that need to be assigned for the unmonitored workers at INL are onsite ambient (environmental) external doses. Because the control dosimeters at INL were likely exposed to elevated levels of onsite ambient radiation due to being located at the entrances of the major operating areas, onsite ambient doses are also assigned to all monitored INL workers to account for any radiation dose that may have been inappropriately subtracted from their dosimeter results as background radiation (ORAUT-TKBS-0007-6). To bound any onsite ambient dose when an energy employee's work location for a given year was unknown (often the case for unmonitored workers), the highest onsite ambient dose for any operating area can be assigned for that year.

For INL EEOICPA claims, environmental internal doses are only assessed for certain unmonitored workers, as discussed in the guidance in ORAUT-TKBS-0007-5, Section 5.6. ORAUT-TKBS-0007-4 and its supplement (Peterson, 2004) provide the historical background, rationale, and environmental intake data for reconstructing occupational environmental internal doses at the INL site. In summary, ORAUT-TKBS-0007-4 provides annual environmental intakes of the significant radionuclides for each major operating area on the INL site.

5.8 Radiological Source Term Data

The diverse fuel reprocessing, analytical, process testing and improvement, waste storage, and waste treatment operations at CPP resulted in potential exposures to various radionuclides. The radiological source term is described in detail in Rev. 2 of the SEC-00219 INL Evaluation Report (NIOSH, 2017). This evaluation for SEC-00238 identifies radionuclides of concern in fuel-reprocessing operations areas and in support areas. Of particular interest for the period under evaluation are the transuranic radionuclides, especially plutonium-238. Although most of the fission products appeared in the first-cycle waste at CPP, transuranic radionuclides tended to carry through the first-cycle separation process and appear in the second- and third-cycle waste. This resulted in a changing ratio of transuranics-to-fission products throughout fuel reprocessing. In practice, this meant that fission products were a very effective tracer early in the separation process; however, the relative hazard of the transuranic component became dominant over the fission product activity later in the process. While this phenomenon was very well known among CPP's professional staff, this information was not effectively communicated to the workforce, including the radiological control staff.

The relative hazard associated with plutonium was presented in a 1980 document by dividing the typical concentrations of radionuclides found in the co-processing feeds by the maximum permissible concentration (MPC) to determine the percentage that each radionuclide contributes to the total hazard (Szulinski, 1980, PDF p. 11). Table 5-4 presents the results, which show that 58% of the hazard came from Pu-238 and 35% came from Sr-90.

The processing of higher burnup fuels at CPP was expected to exacerbate the plutonium/mixed fission product ratios. Due to increased concentrations in plutonium, the hazard was not only present as a result of fuel reprocessing but also present in analytical samples and waste streams including the solid content generated by the calcining of liquid waste.

Table 5-4: Relative Hazard in CPP Fuels by Radionuclide in 1980

Radionuclide	Percent of Total Hazard for Co-processing*	Percent of Total Hazard for FAST DBFE**
Sr-90	35.3	24.7
Cs-134	0.6	0.3
Cs-137	0.6	0.4
Cs-144	2.4	8.6
Pu-238	58.8	59.1
Pu-239	0.4	1.2
Pu-240	0.4	0.8
Pu-241	0.9	3.7
Sum f.p.	38.9	34.0
Sum TRU	60.5	64.8
Sum Total	99.4	98.8

Source: Szulinski, 1980, PDF p. 12
Notes:
* Co-processing = Co-processing fuels (aluminum and zirconium)
** FAST DBFE = FAST Design Basis Fuel Element

Another change to the CPP transuranic source term during the period under evaluation involved the disposal of neptunium concentrate in 1977. Neptunium recovery from the CPP raffinate ceased in 1973, but the accumulated neptunium concentrate was not disposed of until March 1977. The major reason for termination of neptunium recovery and the subsequent disposal of the concentrate was the alpha-handling concerns associated with the material (Dickey, 1977, PDF p. 2).

In the absence of employee or workplace-monitoring data, the source term and activity data available to NIOSH are not adequate to reconstruct radiation doses with sufficient accuracy.

6.0 Feasibility of Dose Reconstruction for the Proposed Class

42 C.F.R. § 83.14(b) states that HHS will consider a NIOSH determination that there was insufficient information to complete a dose reconstruction, as indicated in this present case, to be sufficient, without further consideration, to conclude that it is not feasible to estimate the levels of radiation doses of individual members of the class with sufficient accuracy.

In the case of a petition submitted to NIOSH under 42 C.F.R. § 83.9(b), NIOSH has already determined that a dose reconstruction cannot be completed for an employee at the DOE or AWE facility. This determination by NIOSH provides the basis for the petition by the affected claimant. Per § 83.14(a), the NIOSH-proposed class defines those employees who, based on completed research, are similarly affected and for whom, as a class, dose reconstruction is similarly not feasible.

In accordance with § 83.14(a), NIOSH may establish a second class of co-workers at the facility for whom NIOSH believes that dose reconstruction is similarly infeasible, but for whom additional research and analysis is required. If so identified, NIOSH would address this second class in a separate SEC evaluation rather than delay consideration of the claim currently under evaluation (see Section 10). This would allow NIOSH, the Board, and HHS to complete, without delay, their consideration of the class that includes a claimant for whom NIOSH has already determined a dose reconstruction cannot be completed, and whose only possible remedy under EEOICPA is the addition of a class of employees to the SEC.

This section of the report summarizes research findings by which NIOSH determined that it lacked sufficient information to complete the relevant dose reconstruction and on which basis it has defined the class of employees for which dose reconstruction is not feasible. NIOSH's determination relies on the same statutory and regulatory criteria that govern consideration of all SEC petitions.

6.1 Feasibility of Estimating Internal Exposures

NIOSH has evaluated the available employee and workplace monitoring data and source term information and has determined that there are insufficient data for estimating internal exposures, as described below.

As presented in Section 3.0 of this report, DHHS has previously designated an SEC class for INL CPP from March 1, 1970 through December 31, 1974. The NIOSH-recommended class for the period January 1, 1963 through February 28, 1970 is still under active review by the Advisory Board on Radiation and Worker Health.

In Rev. 2 of the SEC-00219 INL Evaluation Report (NIOSH, 2017), NIOSH determined that a routine bioassay monitoring program for transuranic radionuclides had not been established for CPP despite increased contamination levels during the evaluation period from January 1, 1949 through December 31, 1970. Though outside the evaluation period, the end date for the identified monitoring deficiency was chosen as December 31, 1974, based on a report entitled *Preliminary ICPP Health Physics Upgrade Program* released in October 1974 (Rich, 1974). After the SEC-00219 evaluation, NIOSH continued its data capture activities in an attempt to locate additional data that could be used to determine when a transuranic bioassay program was established for CPP.

Available bioassay data for CPP employees include beta/gamma urine bioassay, uranium bioassay, and very limited plutonium bioassay. In addition, there are comprehensive *in-vivo* bioassay data, primarily in the form of whole-body counting. There are limited chest-counting data (the method described in Section 5.5 of this report was still being developed and had limited detection capabilities for plutonium).

In 1966, the routine collection of urine samples at INL was halted in favor of a transition to reliance on whole-body counting (McCaslin, 1966, PDF p. 19). Incident-prompted special urine analyses were also performed, as deemed necessary at CPP, but not to a degree that would allow for the bounding of exposures to transuranic radionuclides, considering that there was a general lack of appreciation for the radiotoxicity of plutonium among the general CPP workforce. In addition, a complacent attitude towards low-level contamination had arisen at CPP (Rich, 1974). The analytical laboratories, in particular the CPP Shift Lab, were beleaguered with contamination control problems, including alpha-emitting radionuclides. Table 6-1 provides examples of reported alpha contamination during the period June 1 to August 16, 1979. When intakes of plutonium and uranium were discovered via routine bioassay for multiple CPP Shift Lab radioanalysts in 1981, plutonium and uranium analyses were fully implemented as demonstrated in INL documentation (Alexander, 1981).

Table 6-1: CPP Shift Lab Alpha Contamination Reported Between June 1, 1979 to Aug., 16, 1979

Date	Time	Description
June 1, 1979	15:30	Shift Lab contaminated when sample spike with uranium spilled. After cleaning area once, lab smeared 240 dpm alpha. Requested to clean again.
June 1, 1979	18:20	Survey of Shift Lab showed contamination to 240 dpm alpha, 500 dpm beta/gamma.
June 13, 1979	14:35	Shift Lab survey showed contamination of 8,168 dpm alpha
June 15, 1979	23:00	Routine survey of Shift Lab showed the following: Sink 600-800 dpm beta/gamma; Controlled Area 400-9,000 dpm beta/gamma and 100 dpm alpha.
June 17, 1979	18:00	Survey of Shift Lab showed contamination on cabinet. Contamination to 250 dpm alpha.
July 4, 1979	2:00	Shift Lab survey shows as follows: East Hood - 300 cpm alpha; Floor 300-2000 dpm beta/gamma and 1700 dpm alpha
July 21, 1979	3:00	Survey of Shift Lab showed contamination as follows (smears): Second survey showed 22,500 dpm beta/gamma and 5,800 dpm alpha
August 13, 1979	18:30	Survey of Shift Lab is as follows: Hood ledges contaminated to 3,200 dpm beta/gamma and 120 dpm alpha

Source: Norman, 1979

Much of the source term information for CPP is available through site records. INL established and maintains a centralized records program that has been used by NIOSH. Health physics records, source term and process information, including types and quantities of specific radionuclides and sources present, and the types and frequency of operations are available to NIOSH.

NIOSH has concluded, based on assessment of the available employee monitoring data, that there are insufficient internal dosimetry data or air monitoring data available to bound intakes of transuranic radionuclides for the period from January 1, 1975 through December 31, 1980. Nor does NIOSH have access to sufficient source-term data, for programs or facilities over time, to estimate potential internal exposures to transuranic radionuclides during this period of DOE operations. Consequently, NIOSH finds that it is not feasible to estimate, with sufficient accuracy, internal exposures to transuranic radionuclides and resulting doses for the class of employees covered by this evaluation.

Although NIOSH found that it is not possible to completely reconstruct internal radiation doses for the period from January 1, 1975 through December 31, 1980, NIOSH intends to use any internal monitoring data that may become available for an individual claim (and that can be interpreted using existing NIOSH dose reconstruction processes or procedures). Dose reconstructions for individuals employed at CPP during the period from January 1, 1975 through December 31, 1980, but who do not qualify for inclusion in the SEC, may be performed using these data as appropriate.

6.2 Feasibility of Estimating External Exposures

This evaluation responds to a petition based on NIOSH determining that internal radiation exposures to transuranic radionuclides cannot be reconstructed for a dose reconstruction referred to NIOSH by the Department of Labor (DOL). As noted above, HHS will consider this determination to be sufficient without further consideration to determine that it is not feasible to estimate the levels of radiation doses of individual members of the class with sufficient accuracy. Consequently, it is not necessary for NIOSH to fully evaluate the feasibility of reconstructing external radiation exposures for the class of employees covered by this report.

In its previous SEC-00219 INL class designation, NIOSH found that it has access to sufficient employee monitoring data to bound potential external exposures for employees at CPP from the beginning of radiological operations in 1951 through 1974. This current evaluation has found no evidence to the contrary for the period from January 1, 1975 through December 31, 1980. NIOSH has established that it has access to sufficient information to either: (1) estimate the maximum external radiation dose for every type of cancer for which radiation doses are reconstructed that could have been incurred under plausible circumstances by any member of the class; or (2) estimate the external radiation doses to members of the class more precisely than a maximum dose estimate.

Adequate medical dose reconstruction is possible by using the assumptions described in *Idaho National Laboratory and Argonne National Laboratory-West – Occupational Medical Dose* (ORAUT-TKBS-0007-3).

6.3 Class Parameters Associated with Infeasibility

On July 23, 2015, NIOSH recommended the following class definition for inclusion to the Special Exposure Cohort from the SEC-00219 evaluation of the Idaho National Laboratory.

> *All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Idaho National Laboratory (INL) in Scoville, Idaho, and (a) who were monitored for external radiation at the Idaho Chemical Processing Plant (CPP) (e.g., at least one film badge or TLD dosimeter from CPP) between January 1, 1963 and February 28, 1970; or (b) who were monitored for external radiation at INL (e.g., at least one film badge or TLD dosimeter)between March 1, 1970 and December 31, 1974, for a number of work days aggregating at least 250 work days, occurring either solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees in the Special Exposure Cohort.*

On May 2, 2016, the Advisory Board on Radiation and Work Health recommended to the Department of Health and Human Services (DHHS) that SEC status be accorded to all employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Idaho National Laboratory and were monitored for external radiation at INL (at least one film badge or TLD dosimeter) during the period from March 1, 1970, through December 31, 1974. The HHS designation for inclusion in the SEC was finalized on June 3, 2016. The January 1, 1963 through February 28, 1970 period is still under review.

NIOSH has found insufficient documentation associating job titles and/or job assignments with specific radiological operations or conditions within CPP. Without this information, NIOSH is unable to define the proposed SEC class based on job descriptions. Using information presented in Section 4.4, NIOSH is able to identify workers entering the CPP fenced area but not worker movement within CPP. NIOSH therefore recommends that the proposed class definition include all employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked in any area at CPP, as identified by external dosimetry, during the specified time period.

7.0 Summary of Feasibility Findings for Petition SEC-00238

This report evaluates the feasibility for completing dose reconstructions for employees at the Idaho Chemical Processing Plant from January 1, 1975 through December 31, 1980. NIOSH determined that members of this class may have received internal radiation exposures from transuranic radionuclides. NIOSH lacks sufficient information, which includes biological monitoring data and air monitoring data, which would allow it to estimate the potential internal exposure(s) to which the proposed class may have been exposed.

NIOSH has documented herein that it cannot complete the dose reconstructions related to this petition. The basis of this finding demonstrates that NIOSH does not have access to sufficient information to estimate either the maximum radiation dose incurred by any member of the class or to estimate such radiation doses more precisely than a maximum dose estimate.

External radiation exposures can be reconstructed for this class of CPP employees using ORAUT-TKBS-0007-6. Likewise, occupational medicine doses and environmental doses can be reconstructed using ORAUT-TKBS-0007-3 and ORAUT-TKBS-0007-4, respectively. Internal doses, with the exception of transuranic radionuclides as described above, can be adequately reconstructed using ORAUT-TKBS-0007-5.

Although NIOSH found that it is not possible to completely reconstruct radiation doses for the proposed class, NIOSH intends to use any internal and external monitoring data that may become available for an individual claim (and that can be interpreted using existing NIOSH dose reconstruction processes or procedures). Therefore, dose reconstructions for individuals employed at CPP during the period from January 1, 1975 through December 31, 1980, but who do not qualify for inclusion in the SEC, may be performed using these data as appropriate.

8.0 Evaluation of Health Endangerment for Petition SEC-00238

The health endangerment determination for the class of employees covered by this evaluation report is governed by EEOICPA and 42 C.F.R. § 83.14(b) and § 83.13(c) (3). Pursuant to these requirements, if it is not feasible to estimate with sufficient accuracy radiation doses for members of the class, NIOSH must determine that there is a reasonable likelihood that such radiation doses may have endangered the health of members of the class. The regulations require NIOSH to assume that any duration of unprotected exposure may have endangered the health of members of a class when it has been established that the class may have been exposed to radiation during a discrete incident likely to have involved high levels of exposure. If the occurrence of such an exceptionally high-level exposure has not been established, then NIOSH is required to specify that health was endangered for those employees who were employed for a number of work days aggregating at least 250 work days within the parameters established for the class or in combination with work days within the parameters established for one or more other classes of employees in the SEC.

NIOSH has determined that the increased potential for intake due to poor contamination control, and inadequate personnel monitoring for exposures to transuranic radionuclides separated from mixed fission products, makes it unlikely that exposures to alpha-emitters can adequately be reconstructed from January 1975 through December 1980. This time period is a continuation of the 1963-1974 period that NIOSH proposed to be added to the SEC in Rev. 2 of the SEC-00219 Idaho National Laboratory SEC Petition Evaluation Report (NIOSH, 2017). NIOSH believes that the establishment in 1981 of a routine bioassay program for transuranic radionuclides at CPP provides the data necessary going forward for reconstructing dose with sufficient accuracy.

NIOSH did not identify any evidence supplied by the petitioners or from other resources that would establish that members of the proposed SEC class at the Idaho Chemical Processing Plant (CPP) between January 1, 1975 and December 31, 1980 were exposed to radiation during a discrete incident resulting in significant unmonitored exposures likely to have involved exceptionally high-level exposures. The H Cell criticality of October 17, 1978 resulted in a maximum whole-body dose of less than 130 mrem to the highest-exposed worker. However, evidence indicates that some workers in the proposed class may have accumulated substantial chronic exposures through episodic intakes of radionuclides, combined with external exposures to gamma, beta, and neutron radiation. Based on its assessment, presented in this evaluation report, NIOSH finds that there were issues that make it unlikely that exposures to alpha-emitters can be adequately reconstructed from January 1, 1975 through December 31, 1980. Consequently, NIOSH has determined that health was endangered from January 1, 1975 through December 31, 1980 for CPP workers who were employed for at least 250 aggregated work days either solely under their employment or in combination with work days within the parameters established for other SEC classes.

9.0 NIOSH-Proposed Class for Petition SEC-00238

The evaluation defines a single class of employees for which NIOSH cannot estimate radiation doses with sufficient accuracy. This class includes all employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Idaho National Laboratory (INL) in Scoville, Idaho, and who were monitored for external radiation at the Idaho Chemical Processing Plant (CPP) (e.g., at least one film badge or TLD from CPP) between January 1, 1975 and December 31, 1980 for a number of work days aggregating at least 250 work days, occurring solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees in the Special Exposure Cohort.

10.0 Evaluation of Second Similar Class

In accordance with § 83.14(a), NIOSH may establish a second class of co-workers at the facility, similar to the class defined in Section 9.0, for whom NIOSH believes that dose reconstruction may not be feasible, and for whom additional research and analyses is required. If a second class is identified, it would require additional research and analyses. Such a class would be addressed in a separate SEC evaluation rather than delay consideration of the current claim. At this time, NIOSH has not identified a second similar class of employees at the Chemical Processing Plant for whom dose reconstruction may not be feasible.

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Personal Communication, 2014c, *Personal Communication with former Department of Energy-Idaho Office [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH, ABRWH, and SC&A; June 24, 2014; SRDB Ref ID: 142359

Personal Communication, 2014d, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS, ORAU Team, ABRWH, and SC&A; June 25, 2014; SRDB Ref ID: 142404

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Personal Communication, 2014h, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS, ORAU Team, ABRWH, and SC&A; September 10, 2014; SRDB Ref ID: 142398

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Personal Communication, 2014j, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS, ORAU Team, ABRWH, and SC&A; November 17, 2014; SRDB Ref ID: 159717

Personal Communication, 2014k, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH, ORAU Team, ABRWH, and SC&A; November 18, 2014; SRDB Ref ID: 141477

Personal Communication, 2014l, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH, ORAU Team, ABRWH, and SC&A; November 18, 2014; SRDB Ref ID: 141478

Personal Communication, 2014m, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH, ORAU Team, ABRWH and SC&A; November 18, 2014; SRDB Ref ID: 142363

Personal Communication, 2014n, *Personal Communication with current Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH and SC&A; November 18, 2014; SRDB Ref ID: 141480

Personal Communication, 2014o, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by NIOSH, ORAU Team and SC&A; November 19, 2014; SRDB Ref ID: 142360

Personal Communication, 2014p, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS, ORAU Team, and SC&A; November 19, 2014; SRDB Ref ID: 142405

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Personal Communication, 2016b, *Personal Communication with former Idaho National Laboratory [job title redacted]*; In-person interview at Idaho Falls, Idaho by DCAS, ABRWH, and SC&A; January 27, 2016; SRDB Ref ID: 159731

Personal Communication, 2016c, *Personal Communication with former Idaho National Laboratory [job title redacted]*; Phone interview by ABRWH, and SC&A; February 16, 2016; SRDB Ref ID: 159716

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Wagner, 1999, *History for the CPP-601/-640/-627 Fuel Reprocessing Complex at the Idaho National Engineering and Environmental Laboratory*; INELL/EXT-99-00400; E.P. Wagner, June 1999; SRDB Ref ID: 52645, PDF p. 9

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Attachment One: Data Capture Synopsis

NOTE: This custom data capture synopsis was developed by searching the SRDB for all Idaho National Laboratory documents for the activity date range of 01/01/1975 – 12/31/1982, which resulted in 3,320 documents. Additional searches were performed of the 3,320 documents to identify when the term "Idaho Chemical Processing Plant" (or any of its alternate names) appears in the document title, subdocument title, text of the document, or health physics review notes. This effort resulted in a total of 1,737 identified documents that meet the criteria for this synopsis. Documents within the 3,320 that did not provide a positive result to the term searches (ICPP or alternate names) were manually reviewed to ensure that all responsive documents were identified. This is Rev. 1 of this synopsis. Since the submittal of Rev. 0, NIOSH and the ORAU Team conducted a site visit to Idaho National Laboratory and documents have been added through site association reviews, leading to the current total of 1,898 documents.

Table A1-1: Summary of Holdings in the SRDB for Idaho National Laboratory

Data Capture Synopsis	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Facility Name: INL, Idaho Chemical Processing Plant Period of Interest for the 83.14 Evaluation: 1975 - 1982 Alternate Facility Names: ICPP Chemical Processing Plant CPP Chem Plant Fuel Reprocessing Complex Chemical Processing Area Idaho Nuclear Technology and Engineering Center INTEC Westinghouse Idaho Nuclear Company WINCO Physical Size of the Facility: Approximately 200 acres Facility Population: 1,800	Internal dosimetry programmatic documents, environmental reports, neutron dosimetry, site telephone directories, individual medical records, environmental surveillances, monitoring and modeling effluent releases, occupational and environmental air sampling data, periodic health physics reports, periodic facilities reports, tritium reports, safety analyses for facilities and campaigns, surveys of specific areas with high radionuclide concentrations, ecological reports, contamination control plans, logbooks, bioassay results, whole body counting results, incident reports, employee health case files, temporary badge reports, standard operating procedures, policy and procedure manuals, correspondence files, routine surveys, health physics log sheets, safe work permits, annual exposure records, health and safety record sheets, periodic operations and technical reports, waste handling reports, internal dose assessments, shipping reports, air filter spectra, analytical methods, radiological incidents, criticality safety, employee locator cards, area exposure reports, documented site expert interview communications, and facility photographs.	04/06/2017	873
Battelle Memorial Institute - King Avenue	Battelle Research Reactor spent fuel sent to the ICPP.	04/12/2011	1
Dade Moeller	External and internal dosimetry records index, internal dose assessments, whole body counting description, and problems with the ICPP stack monitoring system.	03/10/2016	6
Dade Moeller / SC&A	Investigation report from the 1975 ICPP Tank Farm contaminated soil incident.	03/19/2007	1

Data Capture Synopsis	General Description of Documents Captured	Date Completed	Uploaded to SRDB
DOE Environmental Management Consolidated Business Center (EMCBC) - Cincinnati	An incident file including an ICPP radiation alarm incident.	03/30/2017	1
DOE Germantown	NIOSH researcher's notes.	03/18/2014	1
DOE Idaho Operations Office	A dosimetry records storage receipt.	12/20/2013	1
DOE Legacy Management - Morgantown Office	Employee dosimetry files and recycled uranium reports.	09/19/2011	6
DOE Legacy Management - MoundView (Fernald Holdings, includes Fernald Legal Database)	DOE annual Effluent Information System reports.	02/07/2007	2
DOE Oak Ridge Operations Office	U-233 disposition strategies and options.	07/09/2012	1
DOE Office of Scientific and Technical Information (OSTI)	Environmental restoration and waste management site maps and source term data on contaminated sites.	09/05/2008	2
East Tennessee Technology Park (ETTP) Records Center	A report confirming the routing of some recycled uranium through the ICPP.	05/05/2014	1
Federal Records Center (FRC) - Atlanta	A 1986 Effluent Information System (EIS) / Onsite Discharge Information System (ODIS) executive summary.	03/16/2004	1
Federal Records Center (FRC) - Denver	A 1995 DOE occupational exposure report with retrospective data.	04/20/2010	1
Federal Records Center (FRC) - Kansas City	Argonne National Laboratory fuel cycle and waste management field work proposals and agreements.	08/15/2008	1
Federal Records Center (FRC) - Lee's Summit	Spent fuel storage issues, shipment of West Valley samples to INL for isotopic analysis, a DOE plan to resolve spent fuel vulnerabilities, a discussion of an ICPP decontamination, and a review of hazardous waste issues.	06/07/2016	5
Hanford	Site profiles for 20 major DOE sites.	01/02/2013	1
Idaho National Laboratory Electronic Document Management System (EDMS)	Neptunium purification and concentrate disposal, incident investigations, waste management reports, safety reviews, records submittals, and ICPP decontamination and decommissioning plans.	10/21/2015	32
Idaho National Laboratory / Idaho Nuclear Technology and Engineering Center (INTEC)	Documented site expert interviews.	11/20/2014	19
Idaho National Laboratory / SC&A	The final environmental impact statement for waste management operations, reports, stack monitoring description and data, and a documented site expert interview.	06/25/2014	3
Interlibrary Loan	A survey of mixed waste HEPA filters in the DOE Complex.	05/03/2012	1
Internet - Defense Technical Information Center (DTIC)	Occupational dose reduction, waste classification for disposal, characterization of degraded EBR-II fuel, and corrosion studies.	02/16/2017	5
Internet - DOE	The standard of good radiological protection practices in plutonium facilities, data for release fractions from nonreactor facilities, and the response to the first five year review of the Test Reactor Area operable unit.	07/07/2016	3
Internet - DOE Environmental Management	Linking Legacies Chapter 3: Wastes.	10/28/2007	1

Data Capture Synopsis	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Internet - DOE Legacy Management	INL decontamination and decommissioning technology logic diagrams, an irradiated fuel materials shipping report, and a mixed waste report.	09/19/2014	4
Internet - DOE OpenNet	Linking Legacies Appendix B, the final Advisory Committee on Human Radiation Experiments report, a documented site expert interview, and the summary of the Controlled Environmental Radioiodine Tests (CERT).	10/02/2014	4
Internet - DOE OSTI	The Tiger Team Assessment of INL.	11/30/2009	3
Internet - DOE OSTI Energy Citations	Facility histories which refer to the ICPP, a DOE radiation exposure report, radionuclide-specific treatment plans, a thorium utilization report, a decommissioning plan, historical photographs, proceedings of a nuclear air cleaning conference, and a contaminated concrete report.	01/01/2013	12
Internet - DOE OSTI Information Bridge	Integrated spent fuel and radioactive waste inventories, Stannard's Radioactivity and Health, spent fuel storage and disposal, liquid waste disposal, occupational dose reduction, environmental reports, waste treatment studies, inventory and sources of transuranic waste, thorium utilization reports, material control test and evaluation system, hazards evaluations, and safety analyses.	12/30/2012	73
Internet - DOE OSTI SciTech Connect	The INEL historical dose evaluation-reconstruction of airborne releases, chemical processing technology periodic reports, technical progress reports, analytical branch reports, safety analyses, analyses of irradiated materials, ICPP waste handling and management reports, fuels and materials reports, metals and ceramics reports, environmental reports, air emissions reports, a stewardship report, mixed waste processing reports, reactor development progress reports, and decontamination and decommissioning plans and reports.	07/15/2016	154
Internet - Google	Environmental reports, waste reports, DOE occupational exposure reports, INL history and photographs, waste shipments, environmental impact statements, radionuclide releases, environmental behavior of radionuclides, air sampling, remediation conceptual designs, EPA records of decision, facility descriptions, risk assessments, INL oversight reports, ICPP operational reports, estimating releases of various radionuclides, conference proceedings, planning for the long term storage of high-level ICPP waste, and waste characterization reports.	03/17/2017	170
Internet - Health Physics Journal	Intakes of I-129 and plutonium by indigenous animal species.	07/02/2014	2
Internet - Idaho National Laboratory	INL brochures, shipment of a Cs-134 aerosol generator to the ICPP for decontamination, an ARA hazardous waste determination, a report on a contaminated French drain, and an inventory of buried waste at the Radiological Waste Management Complex.	08/01/2016	10

Data Capture Synopsis	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Internet - National Academies Press (NAP)	Waste treatment and disposition, radionuclide releases, and a review of DOE's cleanup roadmap.	06/24/2015	5
Internet - National Institute for Occupational Safety and Health (NIOSH)	Two revisions of the INL SEC petition evaluation report, an epidemiologic study of mortality and cancer risk at INL, and an SC&A review of the INL site profile.	05/08/2017	4
Internet - National Service Center for Environmental Publications (NEPIS), US EPA	Superfund records of decision, a mixed energy waste study, and proceedings of a residual radioactivity and recycling criteria workshop.	09/30/2014	8
Internet - NRC Agencywide Document Access and Management (ADAMS)	Integrated spent fuel inventories, waste reports, spent nuclear fuel management, a remedial investigation/feasibility study, studies on environmental transport, environmental reports, NRC reviews of INL remediation plans, facility safety assessments, waste disposal studies, the risk analysis of the subsurface disposal area, map of the CPP tank farm, and an environmental impact statement.	03/29/2016	43
Internet - Oak Ridge National Laboratory (ORNL) Library	An ORNL division progress report showing waste treated at the ICPP and a reference to the 1978 ICPP criticality.	05/29/2015	2
Kansas City Plant	DOE daily operations briefs.	10/20/2014	1
Los Alamos National Laboratory - LAHDRA	A comparison of effluent quantities from DOE facilities on spent fuel and radioactive waste inventories.	12/13/2007	3
Mel Chew and Associates	Treating plutonium processing wastes at ICPP.	12/15/2014	1
Missouri Department of Natural Resources	Plutonium working group reports.	10/01/2008	2
National Archives and Records Administration (NARA) - Atlanta	Health physics guidelines for Kr-85 operations.	06/08/2004	1
National Archives and Records Administration (NARA) - Seattle	ICPP plot plans and fallout test station locations and radioactive material shipment records.	12/18/2014	2
National Institute for Occupational Safety and Health (NIOSH)	Internal dose assessment and bioassay manuals and reports, the histories of INL dosimetry programs, worker outreach meeting documents, a recycled uranium report, an ICPP plutonium inhalation exposure report, a classification release letter, and individual worker dosimetry files.	03/10/2016	27
NIOSH / SC&A	A recycled uranium report.	08/14/2003	1
Nuclear Regulatory Commission Public Document Room	Management of transuranic and high-level radioactive waste, a light water reactor source term study, a proposal for a liquid metal fast breeder reactor at INL, an INEEL emergency plan and Research Conservation Recovery Act contingency plan, a FOIA request, and a reference to ICPP high-level radioactive waste forms.	12/16/2014	7
Nuclear Testing Archive	Off-gas monitoring technology and an effluent iodine filter efficiency monitor.	05/22/2015	2
Oak Ridge Library for Dose Reconstruction	Discussion of Oak Ridge National Laboratory's design of the ICPP and the shipment of enriched recycled uranium to Y-12.	05/10/2011	2

Data Capture Synopsis	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Oak Ridge National Laboratory (ORNL)	ORNL's design work for the Materials Test Reactor.	02/21/2008	1
ORAU Team	Technical basis documents, an effluent monitoring report, recycled uranium reports, bioassay summaries, and documented site expert interview communications.	05/01/2017	56
Rocky Flats Plant	An assessment of the flammability and explosion potential of defense transuranic waste.	05/17/2006	1
Sandia National Laboratory - Albuquerque, New Mexico	Radiation exposure requests and potential relocation of Pantex operations.	02/17/2012	2
Savannah River Site (SRS)	SRS periodic reports referencing the ICPP and a reference to the ICPP Decontamination Manual.	01/12/2012	4
S. Cohen & Associates (SC&A)	The Radioactive Waste Management Complex history, ICPP recycled uranium shipped to Y-12, a list of major incident reports, an archives search results list, shipping reports, and the West Valley Tiger Team report.	04/07/2011	7
SC&A / INL	Environmental monitoring reports, ICPP stack sampling reports, effluent monitoring reports, radiation safety monthly reports, investigation of the 1978 criticality, source term quality control tasks, incident reports, the site aerial radiological survey, effluent releases, waste management, decontamination and decommissioning plans, evaluations of plutonium and tritium analysis techniques, and radioactive pollution control appraisals.	10/17/2010	260
SC&A / Internet - DOE OpenNet	The first 50 years of plutonium history.	10/28/2014	1
Unknown	Historical dose evaluations, source term quality control tasks, the 1978 ICPP criticality event, environmental monitoring data, bioassay sample analysis technical basis document, a review of the ICPP plutonium problem, decontamination and decommissioning information, dosimetry branch changes, and historical reports.	06/28/2010	40
Unknown / INL	Environmental monitoring data (1979).	05/10/2012	1
Unknown / SC&A	Environmental monitoring data.	06/24/2010	11
West Valley Demonstration Project	A 1981 investigation of a radiation exposure at the MTR Plug Storage Area.	08/02/2006	1
Y-12 / SC&A	A report on plutonium contamination on recycled material from INL.	07/28/2010	1
TOTAL	N/A	N/A	**1,898**