DOE/EH-0525

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HIGHLY ENRICHED URANIUM WORKING GROUP REPORT

ON

ENVIRONMENTAL, SAFETY AND HEALTH VULNERABILITIES ASSOCIATED WITH THE DEPARTMENT'S STORAGE OF HIGHLY ENRICHED URANIUM

VOLUME II: NUMBER 5

IDAHO NATIONAL ENGINEERING LABORATORY WORKING GROUP AND SITE ASSESSMENT TEAM REPORTS

U.S. DEPARTMENT OF ENERGY

DECEMBER 1996

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U.S. DEPARTMENT OF ENERGY
DECEMBER 1996

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IDAHO NATIONAL ENGINEERING LABORATORY
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PART A

WORKING GROUP ASSESSMENT TEAM REPORT

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DEPARTMENT OF ENERGY

HIGHLY ENRICHED URANIUM ES&H VULNERABILITY ASSESSMENT

WORKING GROUP ASSESSMENT TEAM REPORT

IDAHO NATIONAL ENGINEERING LABORATORY

August 1996

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Idaho National Engineering Laboratory

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June 24, 1996

Mr. Pranab K. Guha
DOE-EH 34
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Germantown, MD 20874

CLASSIFICATION REVIEW - KCG-16-96

Dear Mr. Guha:

I have reviewed the DOE Highly Enriched Uranium ES&H Vulnerability Assessment Working Group Assessment Team Report and have determined that it does not contain any classified or sensitive information per CG-SS-3. This document is authorized for unlimited distribution . If you have any questions, please call me at 208-526-0453.

Sincerely,

KCGerard

K. C. Gerard
Classification Officer

kcg

cc: C. S. Olson

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ACRONYMS

ASB	Air Support Building
ATR	Advanced Test Reactor
ATRC	Advanced Test Reactor Critical
CAM	Constant Air Monitor
CPP	Chemical Processing Plant
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
ES&H	environment, safety and health
HEU	highly enriched uranium
ILTSF	Intermediate Level Transuranic Storage Facility
INEL	Idaho National Engineering Laboratory
MHC	Mechanical Handling Cave
MTR	Materials Test Reactor
PBF	Power Burst Facility
RWMC	Radioactive Waste Management Complex
SAR	Safety Analysis Report
SAT	Site Assessment Team
SNM	special nuclear material
TMI	Three Mile Island
TRA	Test Reactor Area
TRU	transuranic
TSA	Transuranic Storage Area
WGAT	Working Group Assessment Team

EXECUTIVE SUMMARY

This report presents the results of the Working Group Assessment Team evaluation of highly enriched uranium environment, safety and health vulnerabilities at the Idaho National Engineering Laboratory. The term "environmental safety and health vulnerabilities" is defined for the purpose of this assessment to mean conditions or weaknesses that could lead to unnecessary or increased exposure of workers or the public to radiation or to chemical hazards collocated with highly enriched uranium, or to the release of radioactive materials to the environment.

In April 1992, the Secretary of Energy ceased reprocessing operations at the Idaho Chemical Processing Plant (ICPP). A large inventory of various forms of spent nuclear fuel at the Laboratory were reallocated from short term storage for reprocessing to interim storage prior to permanent disposal at a national repository. The reprocessing facilities at ICPP were either shut down to await decontamination and disposal or were placed in standby. The large inventory of highly enriched uranium has eliminated the need in the near future to resume reprocessing spent nuclear fuel for uranium recovery. Most of the storage and packaging of the spent nuclear fuel was intended for temporary storage until the fuel could be reprocessed. Many of the fuels need to be repackaged for extended storage.

Several metric tons of highly enriched uranium is present at the Laboratory, mostly in the form of metals, oxides, unirradiated reactor fuel elements, residues, sources, and U-233 metals and oxides in waste forms. The Spent Fuel Vulnerability Assessment (issued November 1993) encompassed the irradiated reactor fuel elements stored in the various Laboratory facilities and addressed most of the facility vulnerabilities. The following box summarizes, by material type, the inventory of highly enriched uranium packages in the scope of this assessment. Packages vary in highly enriched uranium content from a few grams to several kilograms. Much of this information related to quantities is classified.

HEU Total Plant Items

Metal	653
Oxide	64
Standards, Sources	100
Solution	31
Reactor Fuel	1669
U-233 Drums	215
Residues	65

The Working Group Assessment Team evaluated a total of 16 facilities addressed in the Site Assessment Team report, including five with significant highly enriched uranium holdings. It also reviewed an addendum prepared by the Site Assessment Team on the scope of the spent nuclear fuel inventories that had been received at the facility since the Spent Fuel Vulnerability Assessment was done in November 1993.

In addition to reviewing seven vulnerabilities identified by the Site Assessment Team, the Working Group Assessment Team identified three vulnerabilities and one issue of concern. No vulnerabilities were attributed to the in-scope spent fuel inventory. The following is a brief summary of the 10 identified vulnerabilities and one issue:

- The ROVER Fuels Processing Facility, located in the Chemical Processing Plant (Building 640), contains approximately 160 kilograms of HEU incinerator ash remaining in process vessels within the Mechanical Handling Cave and other process cells. Vessels have unfavorable geometry, and criticality is possible upon loss of moderator control. Three vulnerabilities were identified at the ROVER facility because of this condition. The first, INEL/CPP-640/SAT/01, identified water leakage through the roof and an increased potential to lose moderator control inside process vessels, thereby resulting in an inadvertent criticality. The second vulnerability, INEL/CPP-640/SAT/02, focused on weaknesses in roof and building construction and identified an increased potential for a criticality, as well as worker contamination due to a seismic event or extreme wind. The third vulnerability, INEL/CPP-640/WGAT/01, identified a high combustible loading on the operating floor accompanied by fire protection procedures that do not prohibit the use of water. This condition could also lead to an inadvertent criticality.

- The Radioactive Waste Management Complex stores over 200 drums of U-233 fuel rods and pellets that were shipped as waste from the Bettis Atomic Power Laboratory Light Water Breeder Reactor. This material, approximately 40 kilograms, is collocated with other TRU waste, and is dispersed in three separate storage locations: under earthen cover (TSA Pad), in cargo shipping containers within a concrete shielded open yard (ILTSF), and stacked within an air-supported structure (ASB-II). Material packaging in each location has degr due to corrosion and aging. vulnerabilities were identified at RWMC related to this condition. The INEL/RWMC/SAT/06, addressed th of container spacing and pot inadvertent criticality due to cont degradation. The second vulnera INEL/RWMC/SAT/07, identified lo drum spacing and inadvertent crit due to age and corrosion at the TSA The third, INEL/RWMC/WGA identified an increased potentia worker radiation exposure due to level gamma fields created by contaminants present in U-233 pac The fourth, INEL/RWMC/WG addressed potential rupture of a container and worker contami resulting from a drum mishandling, accident, or seismic event.

- The Unirradiated Fuel Storage F located in the Chemical Processin (Building 651), contains a large in of HEU (quantity classified) in th and south vault storage racks. vulnerabilities related to inad criticality were identified for Buildi The first, INEL/CPP-651/ identified that certain HEU configurations did not meet design requirements for cans fully with maximum allowed U-235 second, INEL/CPP-651/SAT/04, i seismic weaknesses within inne structure, which supports fuel ra condition could lead to a loss geometry and inadvertent critica

- One vulnerability, INEL/SITE identified that INEL aging faciliti numerous small packages (less grams) of HEU materials, in the forms of solids, liquids, and powders, have an increased probability of an HEU incident. HEU materials are currently stored in numerous locations and do not have an identified use or planned disposition.

- One WGAT issue, INEL/SITE/WGAT/02, identified inconsistent and incomplete implementation of the INEL fire protection program. This condition increases the potential for a fire involving HEU and the severity of consequences of such a fire.

The Working Group Assessment Team concluded that the highly enriched uranium vulnerabilities at the Idaho National Engineering Laboratory do not present an imminent danger to the health and safety of workers, the public, or the environment. However, the degraded conditions of the various facilities and the existence of numerous small, inactive inventories throughout the Laboratory facilities may require near-term action to preclude a progression to imminent dangers. Acute awareness by the Idaho National Engineering Laboratory of its highly enriched uranium vulnerabilities is clearly demonstrated by the level of detail in the Site Assessment Team Report.

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1.0 INTRODUCTION

1.1 Objective and Scope

A Highly Enriched Uranium (HEU) Vulnerability Assessment was conducted by the Office of Environment, Safety and Health of the U.S. Department of Energy (DOE), its aim being to examine current practices for the handling, processing, and storage of HEU and to identify any associated vulnerabilities. The assessment was in direct response to directives from the Secretary of Energy to study vulnerabilities with the Department's current fissile material inventories. Its results complement those of the previous Spent Fuel Vulnerability Assessment (November 1993) and the Plutonium Vulnerability Assessment (November 1994), and build on other available data to the extent appropriate.

- Included for assessment were all forms and isotopes of HEU (i.e., uranium containing at least 20 percent U-235) under the Department's custody or control: HEU as weapons components, pits, metal, oxide, scrap, residue, compounds, solutions, reactor fuel, and U-233; HEU in process holdups, samples, sealed sources, and standards; HEU collocated and commingled with hazardous materials; and irradiated fuel not previously evaluated, except HEU within intact nuclear weapons, spent fuel, and high-level, transuranic (TRU), and low-level waste.

- The assessment benefitted from the participation and support of DOE's Program and Operations Offices, the management and operating contractors, and the laboratories; as well as the involvement of external stakeholders, including Federal and State regulatory agencies, local governments, and public interest groups.

Presented in this report are the findings of the HEU Vulnerability Assessment of the Idaho National Engineering Laboratory (INEL) as conducted by the INEL Site Assessment Team (SAT) and verified by the Working Group Assessment Team (WGAT). The SAT objective was to identify those INEL ES&H vulnerabilities related to HEU holdings. Objectives of the WGAT were to review and validate the draft SAT Report and identify any additional vulnerabilities of concern.

1.2 Methodology

The WGAT's assessment of INEL facilities was conducted on June 10–21, 1996, concurrent with a review of facilities at the Argonne National Laboratory-West. Seven individuals from DOE, the M&O contractors, and independent consultants constituted the WGAT. Team activities included: (1) a technical review of a draft SAT Report, reflecting the site team's assessment; (2) a walkdown of those INEL facilities with in-scope HEU holdings; (3) a review of authorization basis documentation and supporting safety documents such as fire hazards analyses and procedures; (4) discussions with facility management and personnel on WGAT issues and concerns; and (5) the documentation of any additional ES&H vulnerabilities and preparation of this report. Also included was a WGAT in-briefing and exit briefing of stakeholders to discuss findings.

1.3 Stakeholder Participation

Stakeholders were informed as to plan for and conclusion of assessment effort. On May 22, 1996, the SAT met with the Environmental Management Site Specific Advisory Board and briefed its members on the purpose and scope of the HEU Vulnerability Assessment and how it was to be implemented at the INEL site. All Board members were later sent a letter inviting them to both the in-briefing and exit briefing. Local media were also invited, and an invitation to the public was printed in the newspaper on June 9, 1996. The in-briefing and exit briefing were held on June 11 and 20, 1996, respectively, in the upper level conference room of University Place. The press was given a fact sheet at that time.

2.0 EVALUATION OF SITE TEAM REPORT AND VULNERABILITIES

The WGAT reviewed SAT responses to "Question Sets," Vulnerability Assessment Forms and plant safety documentation, and performed walkdowns of 7 of the 16 INEL facilities with in-scope HEU holdings. Four of these facilities were identified by the SAT team as having a total of six vulnerabilities, none considered immediately dangerous to workers, the public, or the environment. One additional vulnerability, related to HEU storage practices, was found to be applicable to several Chemical Processing Plant (CPP) facilities. A summary of these vulnerabilities is described in the following table.

The 16 INEL facilities evaluated are located at the Test Reactor Area (TRA), the CPP, and the Radioactive Waste Management Complex (RWMC). Many of these facilities were built in the 1950s and are not

Most HEU holdings are, therefo storage configuration. A detailed d of these facilities is provided in t National Engineering Laborato Assessment Team Report.

2.1 INEL Facilities With Small Holdings

Several INEL facilities with sm holdings (i.e., less than 350 grams partitioned area) have simila characteristics and material storage and thus can be treated generica include:

- CPP-601, Fuel Processing B
- CPP-602, Laboratory Buildin
- CPP-627, Remote Analytical
- CPP-637, Process Improvem
- CPP-657, Safeguards Office
- CPP-666, Fluorinel Dissolut and Fuel Storage
- TRA-603/HR-4, Materials Te
- TRA-604, Materials Test Re Annex (or Radiological Labo
- Central Facilities Area-690, and Environmental Science

These facilities are primari laboratory areas or are reti awaiting decontaminat decommissioning. Material forn sealed sources, calibration environmental samples, and being sampled for HEU conter

A representative sampling of th was visited by the WGAT. Building CPP-627, is use radioactive samples in sup environmental sampling and p

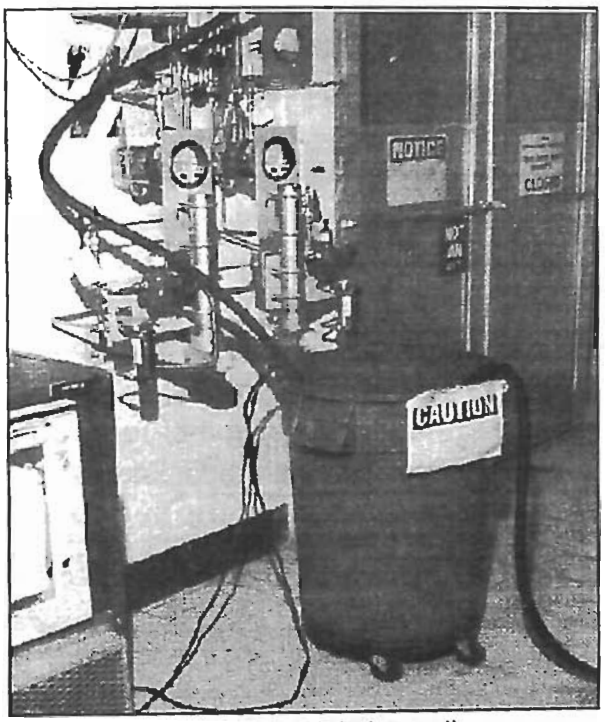
TABLE OF VULNERABILITIES IDENTIFIED AT INEL

NUMBER	DESCRIPTION
VULNERABILITIES IDENTIFIED BY SITE ASSESSMENT TEAM	
INEL/ CPP-640/ SAT/01	A few large volume vessels of unsafe geometry in the Mechanical Handling Cave and in cells 3 and 4 of the ROVER Facility contain large amounts of uranium. While dry, these vessels are critically safe. The addition of moderator to a vessel, however, could create a critical system. Also, the addition of moderator into a process cell, combined with a spill of material from one of the vessels, could result in a criticality on the cell floor. (Tight control of the amount of moderator present is essential for critically safety.) The roof of the facility leaks. Water exists in the lower level of the fire sprinkler system, but the system is isolated from the upper level.
INEL/ CPP-640/ SAT/02	CPP-640, which houses the ROVER process system, is not seismically qualified to current standards (built in 1961). The ROVER process cells have thick, reinforced-concrete shielding walls that appear to be structurally sound. A severe earthquake could cause structural damage, compromising the process vessels and other confinement features, and resulting in a localized spread of contamination. The CPP-640 roof is not qualified to withstand extreme winds, and wind failure of the roof could cause damage to confinement features in the Mechanical Handling Cave, resulting in a localized spread of contamination and loss of strict moderator control.
INEL/ CPP-651/ SAT/03	Fuel storage racks containing LANL material in Room 102 do not meet design requirements of KEFF <0.95 for cans fully flooded and containing the maximum U-235 allowable.
INEL/ CPP-651/ SAT/04	Seismic qualifications of the inner building (north and south vaults) and the south vault fuel storage racks have not been verified. A seismic event could cause a failure of the inner building, which supports all fuel storage racks. Damage to fuel storage racks and rack supports and a consequent loss of geometry could result in criticality.
INEL/ SITE/ SAT/05	Numerous aging facilities throughout the INEL contain small amounts of inactive HEU that collectively enhance the probability of an HEU incident and a consequent increase in contamination within the next 5-10 years.
INEL/ RWMC-/ SAT/06	Drums of U-233 are currently stored inside cargo shipping containers and located in a concrete shielded storage arrangement on the ILTSF PAD. Since the containers are in an open yard, corrosion and potential compromise of container spacing is possible, potentially resulting in a criticality.
INEL/ RWMC- TSA/ SAT/07	U-233 containers stored under earthen cover at the TSA PAD are subject to corrosion and loss of integrity due to age and storage conditions. This can potentially lead to a loss of drum spacing and a criticality.

TABLE OF VULNERABILITIES IDENTIFIED AT INEL

NUMBER	DESCRIPTION
	VULNERABILITIES IDENTIFIED BY WORKING GROUP ASSESSMENT TEAM
INEL/ CPP-640/ WGAT/01	Fire is possible on the operating floor area of the ROVER Fuel Processing Facility. The operating floor contains a significant combustible loading, the sprinkler system has been disabled in this area, and housekeeping is very An operating floor fire could breach confinement barriers and release contamination to the environment. The emergency fire response procedur preplan dated September 1993) does not reflect the current facility missior does not identify the potential for criticality and does not prohibit the use of for manual fire suppression. Inadvertent criticality is possible.
INEL/ SITE/ WGAT/02 (Issue)	Inconsistent or incomplete implementation of the INEL Fire Protection Pro increase as the potential for a fire involving HEU holdings and the severity consequences of such a fire. Typical of the problems in CPP facilities are deficient controls on fire protection equipment, housekeeping, facility modifications, and the storage of combustible material.
INEL/ RWMC/ WGAT/03	Drums of U-233 are collocated with thousands of drums of TRU waste in RWMC. Over 200 drums (containing more than 40 kilograms of material 233/232 waste from the Bettis Atomic Power Laboratory Light Water Bre Reactor are in storage in the RWMC. This material did not originate fron typical waste stream, but is being stored and handled in the RWMC as w compliance with a DOE declaration. Owing to the high-level gamma fie created by the U-232 contaminants, these materials pose severe radiolc hazards uncommon for materials declared as waste.
INEL/ RWMC/ WGAT/04	In ASB-II, U-233 drums are collocated with TRU waste drums and stack high with no restraints. Many of the drums show signs of corrosion that compromise their structural integrity. In the event of drum mishandling, accident, or a seismic event, drums containing TRU waste and U-233 c from the stack and rupture, thereby releasing and exposing workers to radiological and hazardous materials.

were visited: the Special Analysis Laboratory, containing 178 grams of uranium nitrate solution; the Remote Analytical Facility, containing less than 2 grams of HEU; and Room 105, containing 270 grams of HEU.



Building 627, Room 105 (trip hazard)

In its walkdown, the WGAT observed that all areas of the facility exhibited signs of aging and neglected maintenance. For example, in the corridor outside of Room 105, Building 627 the WGAT observed a make-shift catch basin is hung partially in the overhead to contain what appears to be a steam condensate leak. This catch basin, in the form of a small bucket, drains into a 55-gallon drum equipped with a portable sump pump. The sump pump discharged to a drain on the other side of the hall thereby creating a tripping hazard. Members of the WGAT agreed that this does not constitute an HEU vulnerability, yet cited it (Issue #INEL/SITE/WGAT/02) as representative of a poor practice.

Also in various locations are small HEU inventories with no specific purpose. The SAT identified one vulnerability (INEL/SAT/05) associated with holdings of this nature in facilities throughout the site. It noted the increased risk of an HEU-related accident owing to the high number of storage locations. The WGAT agrees with this vulnerability.

The SAT Question Set responses for these facilities are detailed and accurate. Moreover, authorization basis documents are

Building CPP 601/602

up-to-date, with the exception of those for Building CPP-601, now shut down awaiting decontamination and decommissioning, and Building CPP-666, last operated in 1988.

Chemical Processing Plant

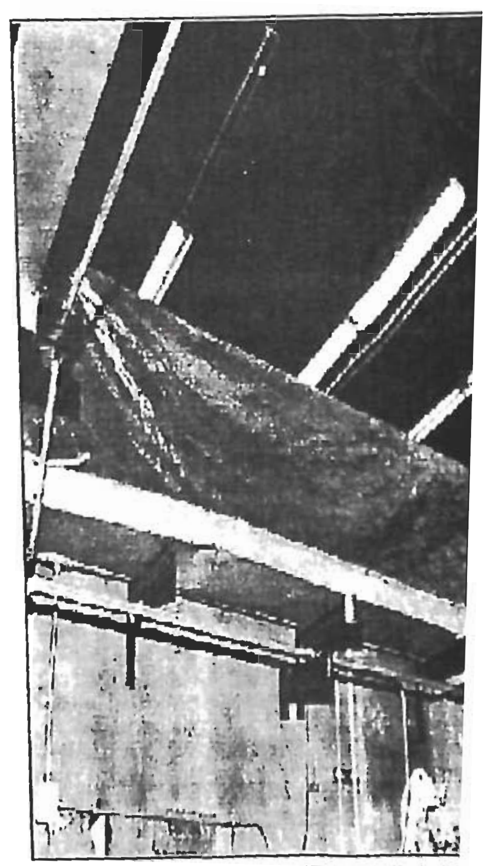
2.2 CPP-640, Head-End Processing

The ROVER Fuels Processing Facility (ROVER Facility), located in Building CPP-640, provided a head-end system for reclaiming HEU from irradiated ROVER reactor fuels use in the Atomic Energy Commission Rocket Program. Equipment and cells associated with the process are housed in a modified, hot pilot plant building previously used for other purposes. The ROVER process was installed during the period 1978–1982 in a building constructed in 1961.

The ROVER Facility is in the process of deactivating the dry processing system that includes the Mechanical Handling Cave (MHC) in cells 3 and 4. Deactivation will entail removing approximately 160 kilograms of HEU remaining in the system, packaging this material, and transporting it to an interim storage location at INEL. Cleaning and decontamination of the facility will follow. Facility holdings are in the form of uranium oxide, niobium oxide, unburned carbon, and aluminum oxide used as the bed for the burners. The former Halon fire protection system within the ROVER Facility has been removed, and the existing automatic sprinkler system have been isolated to avoid possible water moderation of the fissile material holdup in the ROVER system.

In its walkdown of the ROVER Facility, the WGAT observed the MHC and process cells. During ROVER Facility operation, the MHC was used to feed the ROVER fuel to the burners located in cells 3 and 4, and the resulting ash was transferred to cell 2 where it was dissolved in nitric and hydrofluoric acids. Cell 2 has since been washed and now contains only trace quanti HEU. Several of the equipment units MHC have [illegible]lding, and tem contamination boundary control composed of metal supports with covering have recently been erecte plastic glovebox, to aid in the rem process equipment and supplies, is construction. Wood is being used for and support in this glovebox. The e approximately 10 years without opera evident in the dust and trash accumu the facility.

The WGAT noted a potential for lea roof over the top hatches of the hot to the age and degradation of roo Water leakage through these hatch cause a loss of moderator control



INEL CPP-640 (ROVER cells) R tarpaulins cover

MHC. Plastic tarpaulins are in use to protect the hatches from water leakage, and cell penetrations have been sealed. The SAT identified this condition as a vulnerability (INEL/CCP-640/SAT/01) and the WGAT concurs.

Building CCP-640, which houses the ROVER process, was constructed in 1961 and is not seismically qualified to current standards. Although the process cells have thick, reinforced-concrete shielding walls, the WGAT concurs in the potential seismic vulnerability of the ROVER Facility confinement (INEL/CPP-640/SAT/02) identified by the SAT. Resolution of this vulnerability may not be achieved, however, before the scheduled removal of the HEU holdings in September 1998.

INEL CPP-640 (ROVER facility) Combustible materials buildup

Combustible materials in the form of cardboard boxes of supplies, lumber, plastic tarpaulins, personnel protective equipment, and temporary radiation boundary control enclosures were observed outside the ROVER hot cells. A significant fraction of these combustibles—some removed since the WGAT visit—are being used to protect the hot cells from the leakage of water through the building roof. Available fire protection on the upper floor is limited to hand-held dry-chemical extinguishers and a larger dry-chemical cart, although, the firefighting preplan for this area does not prohibit the use of water. The significant combustible loading in the area increases the potential for fire and fire damage. Any use of water hoses for firefighting would increase the risk of criticality. The ROVER Deactivation Project addendum to the Safety Analysis (WIN-107-5.5A) addresses the fire hazard only within the hot cell facility. The WGAT, however, identified the potential for fire in the operating floor as an additional vulnerability (INEL/CPP-640/WGAT/01).

2.3 CPP-651, Unirradiated Fuel Storage Facility

Building CPP-651, constructed in 1975, provides storage and protection for unirradiated fuels. The facility contains an inner vault structure inside a hardened shell. The vault structure consists of three storage areas—the north and south vaults, and an annular storage — are opening onto a 20-foot-wide receiving area. Fuel handling is performed by hand and monorail crane. Such handling is necessary for inspection, storage, accountability, and transfer into and out of the facility. The building is a designated Hazard as Category 2 facility, and its HEU holdings are classified.

In a walkdown of Building CPP-651, the WGAT observed that all four areas of the vault structure are very neat and orderly.

The SAT identified two vulnerabilities associated with Building CPP-651. One relates to the perception that the fuel racks in Room 102 would be unable to meet their performance acceptance criterion ($k_{eff} < 0.95$) on flooding with water. The only mechanism for introducing water into the cans, however, is direct impingement of a firefighting hose stream on a storage can lid in an upward direction. Furthermore, the can lids are tight-fitting and are unlikely to be dislodged to the extent that a can could be filled with water. Finally, the combustible loading of the facility is very low, and a Halon fire suppression system is situated in the area. The WGAT feels that a flooding-related fuel storage failure in Room 102 is unlikely, and thus the SAT's finding of such a vulnerability (INEL/CPP-651/SAT/03) is unwarranted.

Seismic inadequacy of the inner building structure is the second vulnerability (INEL/CPP-651/SAT/04) identified by the SAT. The seismic qualification of the structure, however, is yet to be fully determined; it has been found to meet the horizontal acceleration criteria, but results of a vertical acceleration examination are still in preparation.

The Question Set responses for this facility are accurate and detailed. Moreover, the authorization basis documents are up-to-date.

One observation by the WGAT was the large number of Occurrence Reports filed for this facility—an average of about one every 6 weeks over the past 2 years. Reportable incidents included inaccurate transportation indexes, improper storage of fuel, inacc identification, and other administ inaccuracies. A WGAT examinatio sampling of these reports yielded evi that most of the occurrences were attrib to sitewide conditions.

Test Reactor Area

2.4 TRA-621, Nuclear Material Inspection and Storage Faci

The Nuclear Material Inspection and Facility is a safeguards and security devoted to consolidated inspecti storage of strategic quantities of nuclear materials (SNM) within the consists of three main areas: the Staging Area, an SNM Storage Vault Quality Control Inspection/Safeguar Area. The facility is designatec Category 2, and its HEU holding is

In a facility walkdown, the WGAT that all three of the main areas in are neat and orderly.

It was also observed that the fu racks are constructed of interspersed with polyethylene an sheets. There is a slight possibil igniting the plywood, thus aff spacing between the material However the area is equipped Halon fire suppression system. initiate first, and a sprinkler syste these systems is designed to s fire before structural integrity of lost. (The criticality analysis for credits activation of the sprink Moreover, a sheet metal coating aids in fire retardance, and loading in the area is low.

Question Set responses for this facility are accurate and detailed. Facility authorization basis documents are currently being updated, and Safety Analysis Reports approved in December 1992 are being upgraded to meet DOE 5480.23. The WGAT does not view this as a vulnerability, since a Basis for Interim Operation has been prepared.

No vulnerabilities were associated with TRA-621, either by the SAT or the WGAT.

2.5 TRA-670, Advanced Test Reactor Critical Facility

The one-room Advanced Test Reactor Critical (ATRC) Facility is used to obtain accurate and timely data on nuclear characteristics of the ATR core. Its operating floor contains the ATR pool and canal, control panels, and the fuel storage cabinet. The ATRC is a very low power, pool-type reactor located in a section of the ATR fuel canal. This canal — 10 feet wide, 28 feet long, and 21 feet deep (24 feet deep where the reactor is located) — is separated from the main ATR canal by a moveable aluminum bulkhead. An estimated 41.81 kilograms of HEU, in slightly irradiated fuel elements, is in the fuel canal; a smaller quantity, about 0.5 kilograms, in the fuel storage cabinet. The facility is currently operational.

In a walkdown of the ATRC Facility, the WGAT observed that the room is clean, orderly, and well maintained. It is protected by a wet-pipe sprinkler system, in good condition, that covers all areas except the canal. Though not specifically related to HEU, the WGAT identified a tripping hazard (Issue INEL/SITE/WGAT/02) near the exit door at the inner security control point.

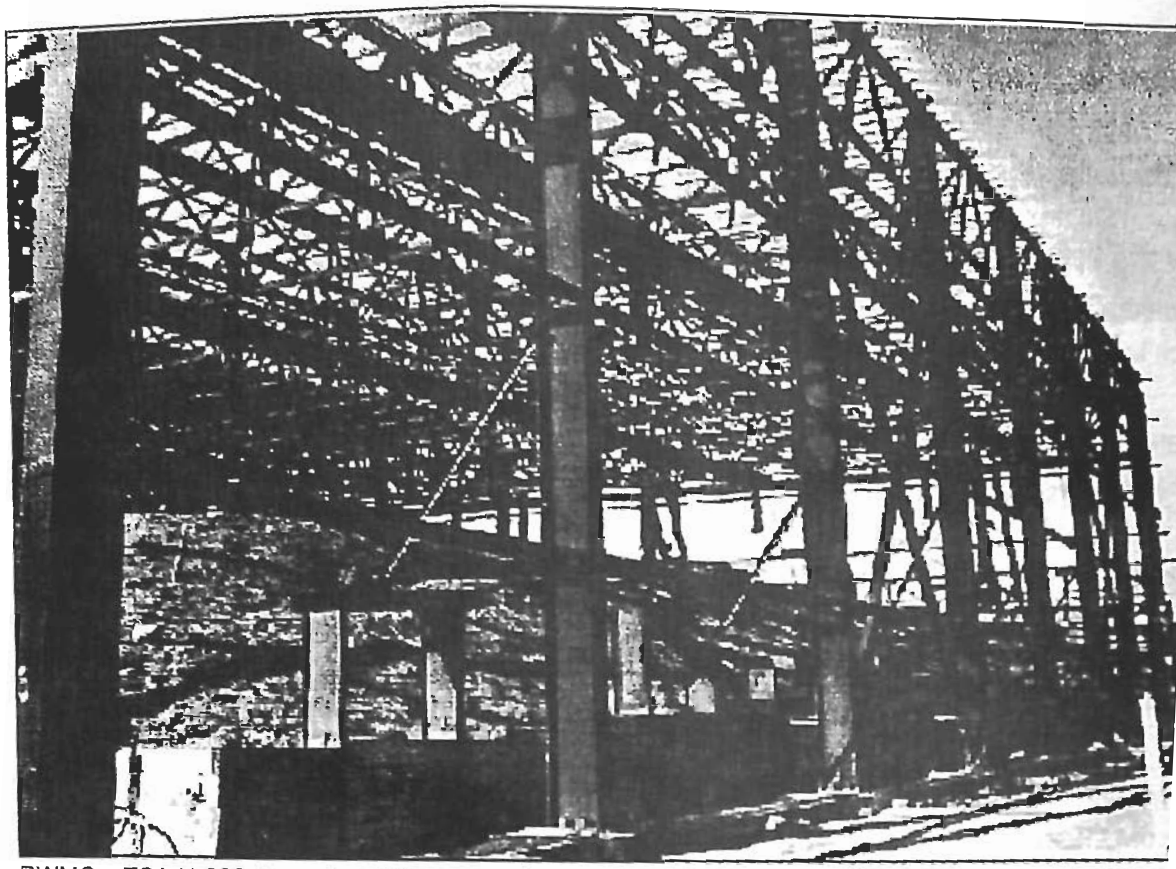
Criticality control measures within the fuel storage cabinet are appropriate. Spacing is maintained through use of a cadmium-lined, wooden drawer arrangement. The storage locker appears to be securely anchored to the floor. The authorization basis document for this facility is the September 1993 Final Safety Analysis Report. A new Basis for Interim Operation document is currently in the approval process, and facility management has applied for exemption from Final Safety Analysis Report upgrades to meet DOE 5480.22 and 5480.23.

The WGAT review of the SAT report and question set responses found them to be complete and accurate. Based on the WGAT review, and discussions with ATRC personnel, no new vulnerabilities were identified.

2.6 Radioactive Waste Management Complex

Located on the southwest corner of INEL, the Radioactive Waste Management Complex (RWMC) has served as a low-level waste burial and TRU and special-case waste storage facility for over 40 years.

HEU of interest in this study is in the form of materials containing U-233 and thorium that were received in 1980 from the Bettis Atomic Power Laboratory Light Water Breeder Reactor. These materials, in the form of fuel rods and pellets, were stored in 215 U.S. Department of Transportation 6M drums at the request of the Naval Reactor Facility in anticipation of future use. The materials in these drums were declared waste by DOE in 1973.



RWMC – TSA U-233 drums in earth covered mound

Approximately 150 6M drums containing up to 500 grams of U-233/232 (U-232 is always present as a contaminant with U-233, and accounts for a significant ingrowth of high energy gamma emitters) per drum are stored under earthen covers on pads in the Transuranic Storage Area (TSA). These drums, which are collocated with thousands of other TRU waste containers, are scheduled to be recovered within the next 8 to 10 years. The U-233/232 in the drums is in the form of sludges and other waste forms which are not well characterized.

Of the remaining 65 drums, 53 (containing 14.7 kilograms) are stored in metal cargo containers surrounded by concrete shielding blocks on the Intermediate Level Transuranic Storage Facility (ILTSF) pad. The other 12 drums (containing approximately 1.7 kilograms of U-233/232) are interspersed among ...

stacked on two asphalt pads i... Support Building II (ASB-II).

The TRU-bearing and U-233 dru... 110 gallons) in ASB-II are stacke... Successive levels of each ... separated, and the stack thus s... pressure-treated, fire-retardan... sheets. The U-233/232-bearing ... stored in 2R containers space... drums.

The Air Support Building-II ... supported, fire-retardant fabric ... is provided with forced-air fan... supporting air pressure in ... Propane heaters are used ... building temperature for s... removal in the winter. Propa... from the remote propane st...

RWMC – ILTSF

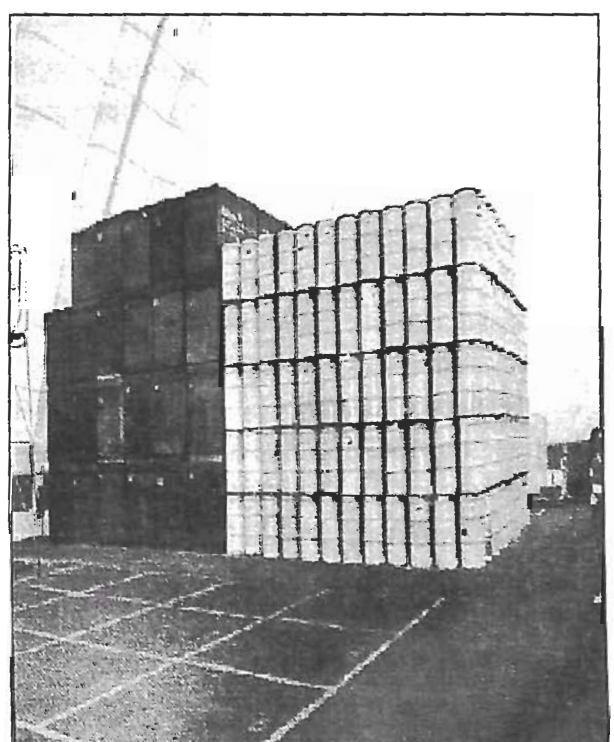
underground distribution lines to the propane heaters that are part of the building's air supply package. Propane is also supplied to the propane-powered engine that serves as a backup motor for the forced-air fans. Both the exterior air supply package and the propane engine are on the northeast side of the building. A flow orifice in the supply line limits flow in the event of a propane supply line rupture.

A WGAT walkdown of the three U-233 storage facilities in the RWMC was largely inconclusive owing to obstacles posed by high-radiation protection measures. The 53 drums stored in metal cargo containers on the ILTSF pad are hidden from view by concrete blocks used as high-radiation shielding as are drums stored on the TSA pad by their earthen cover. Only a few of the 12 drums in the ASB-II are visible, given their distribution through the stacks, to take advantage of the shielding afforded by the other drums of waste.

The SAT identified two vulnerabilities (SAT 06 and 07) associated with the structural integrity of drums stored in the RWMC, both relating to criticality concerns.

These two vulnerabilities were related to degraded material packaging within TSA Pad and ILTSF. Drums have not been inspected for many years and are likely corroded. This condition could lead to loss of structural integrity, thereby compromising drum spacing and resulting in an inadvertent criticality. This condition can be further exacerbated during drum recovery operations. The WGAT concurs with the SAT vulnerabilities.

In addition to SAT vulnerabilities, the WGAT identified two vulnerabilities (WGAT 03 and 04) related to worker exposure from waste handling and storage operations. Within the ASB-II facility, the WGAT identified numerous corroded drums containing U-233 among the



RWMC – ASB-II

stacked TRU waste containers. Given the height of the stacked drums (five high) and the lack of restraints, the WGAT was concerned that a drum could fall and rupture, exposing a worker to the contents. This event could be initiated by a forklift accident, a drum mishandling, or an earthquake. While the SAR addressed this condition, a breach of primary barriers is based on an average container loading of TRU waste and does not take into account the presence of U-233/232 materials. This was cited by the WGAT as vulnerability WGAT/03.

The WGAT's other vulnerability is related to overall condition of numerous U-233 containers collocated with TRU waste containers. It is the WGAT's feeling that the joint storage and handling of these two very different types of waste increases the potential for inadvertent worker exposures to high radiation. Additionally, such a physical configuration precludes effective container inspection, and thus the monitoring and timely correction of potentially hazardous drum corrosion. This was cited as vulnerability WGAT/04.

Review by the WGAT showed the SAT Report and Question Set responses to be complete and accurate, except for issues associated with storage, handling and disposal of the U-233/232. Although declared waste by DOE, these materials pose immediate and long-term radiological risks and thus warrant consideration in a study of HEU vulnerability. They have been stored for an undefined period using practices approved for the RWMC, and pertinent issues — continued storage, retrieval for reuse, handling and inspection, personnel radiation exposure potential, ultimate disposal have been address

studies and documented in memo
There are, however, no approved pla
their disposition. This condition is
change in the near future: an INEL mil
calls for the RWMC to draft a project p
transferring U-233 to the Idaho Ch
Processing Plant and to submit that p
review by September 30, 1996.

2.7 In-Scope Spent Fuel Invento

A large portion of INEL's highly en
uranium inventory is in the form of spe
While most of this material was ev
during the Spent Fuel Vuln
Assessment, recent additions
inventories fall within the scope of t
Vulnerability Assessment. Also in s
newly identified ES&H concer
anticipated fuel transfers as yet une
The following facilities and conditi
examined by the SAT and WGAT:

- *CPP-603, Underwater Fuel Facility:* While there is no addit inventory, 14 cans of Ex Breeder Reactor II fuel are ex significant water inleaka deterioration. This condition wa through nondestructive recommended in the S Vulnerability Corrective Actio

- *CPP-666, Underwater Fuel S* Additional storage racks are to Storage Pool 1 to accon shipments from the U.S. Na 603 basins. Reracking effor the introduction of a radiatio an adjacent empty fuel-cut some structural/seismic de evident in the concrete wa area. Both conditions have resulted in an Unreviewed Safety Question.

- *MTR-603, Materials Test Reactor.* Samples of spent fuel from the Power Burst Facility (PBF) are currently stored in horizontal tubes that extend from a concrete wall into a dirt berm. Also, several drums containing sample residues from the Three Mile Island (TMI) characterization program are being stored. Neither of these inventories was previously evaluated.

- *Radioactive Waste Management Complex:* Some U-233–bearing spent fuel previously declared as waste is present. This material, not evaluated during the Spent Fuel Vulnerability Assessment, is covered in this report under Section 2.6.

The WGAT assessment included a review of the spent fuel supplemental report provided by INEL and discussions of related ES&H issues and concerns with INEL and SAT personnel. Because CPP-603 and CPP-666 had been thoroughly evaluated during the Spent Fuel Vulnerability Assessment, they were not visited by the WGAT. The SAT raised a concern with regard to the foreign TRIGA fuels planned for shipment to CPP-666 beginning in June 1997 — specifically, the lack of adequate records on the history and condition of such fuels. This was not raised as a vulnerability, as the fuels' condition has yet to be verified, and a detailed implementation plan for fuel receipt is still in preparation. According to the WGAT however, the disposition of these fuels should be considered further when more information on their specification and condition is available.

Although not the object of the WGAT's visit to MTR-603, the PBF and TMI fuels stored there were evaluated by the team. It was observed that the PBF fuel had not been inspected for a significant time. The TMI fuel was found to contain corroded paint cans of acidic and basic solutions whose interaction could compromise containment. Given the limited inventory of such solutions, however, container breach would have no significant consequences. Inspection and evaluation of the materials are being integrated as specific tasks into the Spent Fuel Vulnerability Corrective Action Plan.

The WGAT concurs in the SAT finding of no HEU vulnerabilities for in-scope spent fuel. A comprehensive INEL corrective action plan in response to previously identified spent fuel vulnerabilities addresses the concerns raised by the WGAT. Also, the Unreviewed Safety Question process is being employed to address safety issues at CPP-666. Therefore, no vulnerabilities were identified by the WGAT.

3.0 CONCLUSIONS

The WGAT and SAT assessment yielded a total of 10 HEU vulnerabilities and 1 issue of concern for the INEL site. Seven of these vulnerabilities were identified by the SAT. The three raised by the WGAT relate to fire at CPP-640 and U-233 drum storage at the RWMC; the one WGAT issue of concern, to inconsistent or incomplete fire protection program implementation, which could contribute to personnel injury or increased contamination in the event of an HEU-related accident.

Most of the HEU materials identified at INEL are in a solid, stable form and in a storage configuration. The one exception is the ATRC facility, at which HEU material is used in support of the ATR mission. Minimal degradation is evident in HEU packaging, although conditions could be exacerbated through prolonged storage of excess materials with no defined mission or disposition plan. Throughout the site, criticality precautions are observed and implemented. Analysis of other types of HEU-related hazards is indicated by the existence of approved facility authorization bases.

APPENDIX A

Working Group Assessment Team Membership and Biographical Sketches

TEAM LEADER

PRANAB K. GUHA is a general engineer in the DOE Office of Engineering Assistance a Interface (EH-34). He joined DOE in October 1991, where he serves as an expert in safety a electrical and control systems design, safety assessments, equipment qualification, and vulnerability and reliability assessment. He had key roles in several technical assessmen include safety analyses review of Savannah River K-Reactor restart, Advanced Light S LLNL, and Super Compactor startup at Rocky Flats; review of DOE facilities at Hanford in potential TOMSK type accident at these facilities, and ES&H vulnerabilities of DOE's spent fuel and plutonium storage facilities. He also played a key role in the development of DOE S on Backup Electrical Power Systems. Before coming to DOE, he worked for 5 yea Tennessee Valley Authority as the Assistant Chief Electrical Engineer in the Office of Nucle and supervised over one hundred engineers and multi-million dollar contracts. Before jo Tennessee Valley Authority, Mr. Guha was associated with Stone & Webster En Corporation for 10 years as Lead Electrical/Control Engineer and Principal Engineer and s a large group of engineers/designers and managed multi-million dollar contracts. Mr. G an M.S. in Electrical Engineering from Drexel University, Philadelphia. He is a mem Institute of Electrical & Electronics Engineers (IEEE), and he is serving as Chairman for IE Subcommittee 4.8. Mr. Guha is a registered professional engineer in the state of Pennsyl areas of expertise include Safety Analysis Review, Failure Modes and Effects Analys Fault Tree & Failure Analysis, Engineered Facility Systems Design Review (e.g., HV Pumps, MOVs and other process system equipments), Electrical and Controls Syste Diesel Generator Maintenance and Reliability, Appendix-R Analysis, Systems Startup Operations, Equipment Qualifications and Aging Effects, and development of nucl standards.

DEPUTY TEAM LEADER

JEFF WOODY provides technical support to DOE Offices of Environment, Safety Defense Programs, and Environmental Management: technical guidance development and facility cleanup activities including hazard characterization and integration of S&H systems; project planning, safety analysis, and authorization basis development for deactivation and decommissioning projects (e.g., Hanford PUREX, B-Plant); working g of DOE Performance Improvement Team on standards consolidation, EH Deconta Decommissioning (D&D) Support Group, and response team for Office of Technolog (OTA) findings; technical reviewer of D&D safety basis documentation for DOE project was with DOE, Defense Programs (DP), as a general engineer, 1987-1993. He pr management responsibilities for major Defense Programs safeguards and security proj reviewer of DP facility Safety Analysis Reports; seismic evaluation of DP facilities at t Flats and Y-12 plants; technical lead for evaluation of DOE Savannah River K-Re Activity Confinement System on DOE restart team; manager of DP Facility Safety S (consequence analysis of DP high and moderate hazard facilities); DP technical rep DOE committee for development of DOE-STD-1027 (hazard categorization); DOE rep NRC maintenance team inspection of the Fitzpatrick Nuclear Power Plant. Mr. Wo in Civil/Structural Engineering from University of Tennessee-Knoxville and is a M.B.A. Hood College. He has additional training/certification in: Nuclear Power F Massachusetts Institute of Technology; Maintenance Management, America Association; Nuclear Weapons Orientation - Advanced Course, U.S. Air Force; Hazardous Wastes, Institute for Regulatory Science; and Associate Safety Professio Board of Certified Safety Professionals.

TEAM MEMBERS

BILLY L. LEE, JR. has 10 years of experience in nuclear criticality safety and nuclear engineering. He has recently been involved in projects requiring expertise in radiation shielding and detection, dosimetry, and health physics. As a criticality safety specialist, he has prepared and reviewed procedures to assure criticality safety, has performed audits and inspections of both uranium and plutonium production and storage facilities, and has served on ANSI/ANS writing group teams. As a safety specialist, Mr. Lee has served on Department of Energy assessment teams to identify a variety of safety concerns. He has expertise in the use of MCNP4A for analyzing shielding and radiation detection problems and with the KENO-Va computer code and the SCALE package to model and analyze nuclear system geometries for potential criticalities. In addition to his use of the SCALE package, Mr. Lee has had primary responsibility for the maintenance of a validated configuration controlled image of the SCALE package on two of Battelle's RS/6000 workstations. Mr. Lee has a B.S. in Nuclear Engineering from North Carolina State University and is currently in the M.S. Program for Nuclear Engineering with the Ohio State University. He is a Registered Professional Engineer (nuclear) with the State of Ohio and is an ANSI Standard ANS-8.3 Writing Group Member.

BRYCE L. RICH has a distinguished career in applied health physics/radiation safety that includes over 42 years of managerial and staff experience, President of the Health Physics Society (HPS), Chairman of the American Board of Health Physics (ABHP), a founder of the National Registry of Radiation Protection Technologists (NRRRT) and the American Academy of Certified Health Physicists (AACHP), President Pro Tem of the AACHP, and membership on numerous DOE, NRC, NCRP, IAEA and OECD panels, working groups and committees. He has a broad base of health physics experience in various phases of the nuclear fuel cycle, including mining and milling, reactors (both high flux test reactors and commercial power reactors), nuclear weapons testing, transuranium element processing, accelerators, waste processing and disposal, and chemical reprocessing of high enrichment fuel elements. Specific areas of expertise in applied radiation protection include the following: professional and technician training, personnel dosimetry, effluent and environmental monitoring, instrumentation maintenance and calibration, program documentation and evaluation, work place monitoring and exposure control. He holds a B.S. degree from Idaho State University and completed the AEC fellowship program at Vanderbilt University and Oak Ridge National Laboratory in radiation safety. He has recently retired from an Idaho National Engineering Laboratory (INEL) contractor as a Principle Scientist in radiological safety and consults in radiological safety programs. Prior to this position he spent 2 years as the Safety Director of the EG&G Corporation DOE Support Group, which included programs at EG&G Idaho, EG&G Mound Laboratories, EG&G Rocky Flats, EG&G Energy Measurement, Inc. - Nevada Test Site (NTS) and Reynolds Electrical Company - NTS. This assignment was preceded by 12 years as a manager of various assignments in applied radiation safety and research at EG&G Idaho. Previous employment includes Radiation Safety Manager for LLNL at the Nevada Test Site. He is a certified health physicist and a founding member and Fellow of the Health Physics Society.

SUBIR SEN is a civil engineer in the Office of Engineering Assistance and Site Interface (EH-34) where he provides technical oversight in the areas of structural, seismic and geotechnical engineering. He has over 19 years of experience in the design, and safety and risk evaluation of nuclear power plant and other nuclear facilities. Dr. Sen has served on DOE committees developing DOE orders and standards for Natural Phenomena Hazard mitigation. He has also participated in the safety analysis and technical reviews of several DOE facilities and in the assessment of the vulnerabilities of stored spent nuclear fuel in DOE facilities. Dr. Sen served on the Containment Integrity Expert Panel for NRCs Severe Accident Phenomena study (NUREG 1150) and is a member of National Code Committees developing design codes for nuclear facilities. He has a M.S., D.Sc. in Structural Engineering and is a Registered Professional Engineer.

RAY A. SPRANKLE has over 16 years working experience in the various phases of development/implementation of commercial and Department of Energy (DOE) nuclear fire protection programs, and in oversight, assessment and management of fire protection component designs, system installations, training and technical service projects. He has extensive experience in interpretation and compliance issues related to commercial nuclear, National Fire Code and DOE Order requirements as well as supervision of construction and testing activities. He has provided technical support to the DOE, Savannah River Site for design, start-up testing, Fire Protection Program and Operational Readiness Reviews of the Defense Waste Processing, In-Tank Precipitation, and H-B Line Facilities and for the Reactor startup and shutdown activities. Most recently, Mr. Sprankle has worked on the Pit Nine Demonstration Remediation Project at Idaho National Engineering Laboratories where he provided assistance on development of the site's fire protection design and in producing the facility Fire Hazards Analysis. Prior to that, Mr. Sprankle held the position of Project Manager with primary responsibility for a $5.8 million fire protection engineering and fire safety contract with Westinghouse Savannah River Co. at the Savannah River Site. Mr. Sprankle has a B. S. in Mechanical Engineering. He is qualified as a member of the Society of Fire Protection Engineers.

JAMES E. VATH has thirty-nine years experience in the nuclear industry including chemical and metallurgical processing, in support of fuel manufacturing and weapons material processing. Mr Vath is currently employed by Lockheed Martin Energy Systems in Enriched Uranium Operations and provides technical support on Safety Analysis, chemical processing, evaluation of off-site receipts and material specifications. Mr. Vath has a B. Ch. E. and is a Registered Professional Engineer (chemical) with the States of Ohio and Tennessee. He has served on two ANSI Standards writing groups.

TEAM COORDINATOR

BARBARA K. KNEECE has experience in administrative management and support to vari elements of public and private enterprises. She currently is assigned as a project analyst for Office of Engineering Assistance and Site Interface (EH-34). Ms. Kneece has performed as administrative support coordinator for the DOE Complex Spent Fuel Vulnerability Assessment; Plutonium Vulnerability Assessment; and numerous assessments for EH including Rocky F Building 707, Building 559, and Supercompaction and Repackaging facilities; Savannah River HB-Line, FB-Line, and Replacement Tritium facilities; Princeton Plasma Physics Laboratory Toka Fusion Test Reactor; Portsmouth Gaseous Diffusion Plant; and Oak Ridge Y-12 DNFSB Criticality Assessment. As administrative coordinator and office manager for Argonne Nat Laboratory, she established a satellite office for the DOE New Production Reactor program in A S.C.

APPENDIX B

Working Group Assessment Team
Vulnerability Assessment Forms

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-640/WGAT/01

Block 1: *Title of the Vulnerability. (<20 words)*

Fire in the operating floor area of the Rover Fuel Processing Facility.

Block 2: *Executive Summary. (<50 words) Concise description of the sequence of events leading to the vulnerability.*

The operating floor contains significant combustible loading, the sprinkler system has been disabled in this area and housekeeping is very poor. An operating floor fire could breach confinement barriers and release contamination to the environment. The emergency fire response procedure (fire preplan dated 9/93) does not reflect the current facility mission because it does not identify the potential for criticality and does not prohibit use of water for manual fire suppression. Inadvertent criticality is possible.

Block 3: *Describe the condition or weakness, including the material, material form, quantity (if unclassified), packaging type and number of packages, and facility and other barriers that contribute to the vulnerability.*

Vulnerability Description/Information	
Material and material form	Removable holdup - Uranium oxide, Niobium oxide, Fission products
Material at risk (approximate mass [kg] and composition of material which may participate in the release—not necessarily the inventory of material at a given location)	160 g (quantity being transferred at any one time during decommissioning)
Packaging type and number of packages	Oxides
Facility and other barriers	Glovebox, facility walls and ceiling
Condition or weakness	Combustible control procedures, fire response procedures

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-640/WGAT/01

Block 4: *Potential causes and effects of barrier failure that contribute to the vulnerability.*

The Rover operating floor contains significant combustible loading and the installed automatic sprinkler system has been disabled to prevent inadvertent criticality. Housekeeping is very poor. Plastic trash cans and miscellaneous combustibles are stored or piled in various locations throughout the area. A fire in this room would likely consume the entire area and result in structural failure of the unprotected steel roof supports. A new plastic glovebox built on wood supports which are constructed of non-fire retardant treated lumber could contain a small amount of HEU contamination which would be involved in a fire. Cell entry tents would be breached, the plywood cell hatch covers would also become involved. The smoke and heat generated would spread contamination to local workers and the environment.

The fire fighting preplan for building 640 is outdated (9/93). It does not reflect the current facility configuration and mission and does not identify the potential for inadvertent criticality on the operating floor area. Use of water is not prohibited which is in conflict with the disabled sprinkler system. In fact, the preplan states that the building is provided with a wet pipe sprinkler system. Fire fighting preplan inaccuracies could cause confusion and lead to use of water for manual fire suppression. Water in this area could lead to an inadvertent criticality.

Block 5: *Compensatory measures that reduce the severity of the vulnerability.*

- Facility personnel immediately removed all transient combustible materials from the facility.

Block 6: *Possible consequences of the vulnerability.*

- Worker exposure
- Environmental release
- Inadvertent criticality

Block 7: *Time period in which the consequences of the vulnerability might occur (e.g., 0 to 5 years; 5 years to facility end-of-life; may not occur during facility lifetime).*

- 0-5 years

Block 8: *Comments, views, or plans by the site operations office and site contractor relative to mitigating or minimizing any potential vulnerability. Describe the plan and schedule of corrective actions (if any).*

- Replace plastic tarps with fire retardant waterproof sheeting.
- Paint wood glovebox supports and cell hatch covers with fire retardant paint.
- Replace wood HP dressout clothing locker with metal locker.
- Replace plastic trash cans with metal, fireproof trash cans.
- Improve housekeeping.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-640/WGAT/01

Block 9: *Database information.*

Radionuclide Source Parameters

Isotope	Physical Form	Chemical Form	MAR_i (g)
U-235	Ash	Residuals	160

Collocated Chemicals and Release Products

Chemical		Release Product	
Name	Mass (g)	Name	Mass (g)

Release Path Parameters[1]

Chemical Form and Release Products	DR_i	ARF_i	RF_i	LPF_i
Residuals impacted by fire	1	10^{-4}	0.3	1

Exposure Parameters[1]

Chemical Form and Release Products	V (meter^3)	t (minutes)	ΔT (minutes)	X/Q	
				Ex-facility	Public

Block 10: *Comments and references for parameter selection.*

Ray Sprankl (signature) — Signature, Team Member — Date: 8-8-96

(signature) — Signature, Team Leader — Date: 8-28-96

1. Described in the Assessment Plan.

ES&H Vulnerability Assessment Form

Issue # INEL/SITE/WGAT/02

Block 1: *Title of the Issue. (<20 words)*

Inconsistent/incomplete implementation of the INEL Fire Protection Program increases the potential for a fire involving HEU holdings and increase the consequences if a fire were to occur.

Block 2: *Executive Summary. (<50 words) Concise description of the sequence of events leading to the issue.*

The INEL Fire Protection Program is implemented across the site in an inconsistent, and in some cases, incomplete manner. For example, in some CPP facilities, deficient controls on fire protection impairments, housekeeping, facility modifications, storage of combustible material, etc. increase the likelihood of fire occurrence and the magnitude of fire damage if a fire were to occur.

Block 3: *Describe the condition or weakness, including the material, material form, quantity (if unclassified), packaging type and number of packages, and facility and other barriers that contribute to the issue.*

Vulnerability Description/Information	
Material and material form	N/A
Material at risk (approximate mass [kg] and composition of material which may participate in the release—not necessarily the inventory of material at a given location)	N/A
Packaging type and number of packages	N/A
Facility and other barriers	Fire barriers, administrative
Condition or weakness	Incomplete or non-existent implementing procedures

ES&H Vulnerability Assessment Form

Issue # INEL/SITE/WGAT/02

Block 4: *Potential causes and effects of barrier failure that contribute to the issue.*
The INEL Fire Protection Program is defined in a site-wide requirements document (PRD-27), developed by th LITCO S&H organization. However there is no consistent mechanism(s) for implementing the requirements at area or facility level, and the S&H organization has no staff for ensuring implementation or for assessing the effectiveness of implementation at any level. None of the CPP facilities have a procedure for implementing the requirements of PRD-27. A DOE-ID assessment of the CPP fire protection program, performed November 19 identified "an alarming trend indicating that the existing program and its management structure is unable to adequately address outstanding programmatic deficiencies." (ref. "Fire Protection Assessment of the ICOO (O SP-95-010)" performed 11/94 by DOE-ID.

PRD-27, section 3.1.4 requires the cognizant fire protection engineer (CFPE) who is a qualified FPE, to review design modifications. However, there is no CFPE designated for the INEL site. With a lack of qualified fire protection involvement, conditions can develop such as those currently existing on the CPP-640, Rover facility operating floor. In this example, non-fire retardant treated wood is used to a significant extent in construction o the glovebox for removal of HEU contaminated parts, HEU process cell hatch covers, HP dress out clothing storage locker and in scaffolding (boards are stored under the high voltage cabinets) used in the area; other combustible materials are present as well. A fire in this area is not analyzed in the recently-approved SAR addendum because effective fire protection program implementation is assumed in the SAR analysis. The facili may be outside their approved authorization basis because of this problem. A fire in the 640 Rover operating fl area would likely result in worker exposure and release of contamination to the environment.

Other examples of inadequate fire protection program implementation include:

- Poor housekeeping (plastic trash cans with portable sump pumps are used to collect leaks in buildings CI 627 and CPP-640);
- A propped open fire door to an egress stairway (CPP-640);
- A tripping hazard installed in the egress path at the inner ATRC security control point;
- Life safety egress path obstructed by boxes and a cart (CPP-602);
- Use of plastic trash cans in operating laboratories (CPP-627);
- Discussions with involved personnel indicate that they routinely encounter temporary and permanent desi modifications that have voided the effectiveness of installed fire protection features which indicates ineffective configuration management.

Block 5: *Compensatory measures that reduce the severity of the issue.*

- LITCO S&H providing 2½ fire protection engineers to support all CPP fire protection activities.

Block 6: *Possible consequences of the issue.*

- Increased potential for fire ignition
- Increased potential for fire damage
- Worker exposure
- Release to the environment

Block 7: *Time period in which the consequences of the issue might occur (e.g., 0 to 5 years; 5 years to facili end-of-life; may not occur during facility lifetime).*

- 0-5 years

Block 8: *Comments, views, or plans by the site operations office and site contractor relative to mitigating o minimizing any potential issue. Describe the plan and schedule of corrective actions (if any).*

ES&H Vulnerability Assessment Form

Issue # INEL/SITE/WGAT/02

Block 9: *Database information.*

Radionuclide Source Parameters

Isotope	Physical Form	Chemical Form	MAR_i (g)

Collocated Chemicals and Release Products

Chemical		Release Product	
Name	Mass (g)	Name	Mass (g)

Release Path Parameters[1]

Chemical Form and Release Products	DR_i	ARF_i	RF_i	LPF_i

Exposure Parameters[1]

Chemical Form and Release Products	V (meter^3)	t (minutes)	ΔT (minutes)	X/Q	
				Ex-facility	Public

Block 10: *Comments and references for parameter selection.*

[signature]
Signature, Team Member

8/7/96
Date

[signature]
Signature, Team Member

8-8-96
Date

[signature]
Signature, Team Leader

8-28-96
Date

1. Described in the Assessment Plan.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/RWMC/WGAT/03

Block 1: *Title of the Vulnerability. (<20 words)*

Collocated and subsequent handling of U-233/232 as TRU waste at RWMC.

Block 2: *Executive Summary. (<50 words) Concise description of the sequence of events leading to the vulnerability.*

Over 200 drums of U-233/232 waste shipped from the Bettis Atomic Power Laboratory Light Water Breeder Reactor Program to INEL for storage at RWMC. This material constitutes over 40 kg of material. This material did not originate from a typical waste stream, but is being stored and handled at RWMC as waste as a result of a DOE declaration. Due to the high level high energy gamma field created by the U-232 contaminants, these materials present severe radiological hazards not normally found in materials declared as waste. Inadvertent exposure above administrative limits is possible due to frequent handling of TRU/U-233 drums.

Block 3: *Describe the condition or weakness, including the material, material form, quantity (if unclassified), packaging type and number of packages, and facility and other barriers that contribute to the vulnerability.*

Vulnerability Description/Information	
Material and material form	U-233/232 and Thorium in fuel pins, pellets, and sludges, etc.
Material at risk (approximate mass [kg] and composition of material which may participate in the release—not necessarily the inventory of material at a given location)	Over 200 drums of U-233
Packaging type and number of packages	Materials all contained in 6M shipping containers, i.e. 55 or 100 gal. Steel drums with much of the in-scope material is contained in inner 2R containers.
Facility and other barriers	The TSA storage area is presently earthen-covered. The ASB-II Building is an air-support sturcture. Drums and the inner containers represent the effective barriers.
Condition or weakness	Drums are showing corrosion (for those that are visible) and the rest must be assumed to be subject to at least the equivalent (or greater) deterioration.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/RWMC/WGAT/03

Block 4: *Potential causes and effects of barrier failure that contribute to the vulnerability.*

The U-233/232 materials in storage at RWMC did not originate from a typical waste stream, but are being sto and handled at RWMC as waste. There are several methods where the treatment of these U-233/232 material this manner will increase worker hazards such as exposure to high radiation fields, potential criticality, and possible internal uptake. U-232 is always present as a contaminate in U-233 and accounts for the growing hi level and high energy gamma radiation fields.

DOE declared U-233 and thorium materials from the Bettis Atomic Power Laboratory Light Water Breeder Reactor program as waste in 1973 and shipped approximately 150 drums of U-233/U-232 material to the RV in 1980. This material is stored in three separate locations (TSA under earthen cover, ASB spread through a stack of plutonium waste drums, and at ILTSF in an uninspectable and heavily shielded metal cargo container exposed to the weather).

Many of the drums containing U-233 are not inspectable, contain sufficient quantities of U-233 to be of critic concern, and present high levels of high energy gamma radiation. These drums are subject to corrosion and subsequent degradation of drum integrity. On loss of drum integrity breaching of the containers and possible compaction by settling or other forces present severe radiological hazards including a potential criticality. Th criticality potential has been detailed in vulnerabilities SAT/06 and SAT/07.

Barrier failure could result in personnel contamination, both internal and external. However, of primary con the potential exposure to the high radiation fields created by the difficult to shield 2.6 MeV gamma ray from 232, and could result in personnel exposures inadvertently or planned through inspection/handling operation Additionally, unlike the commingled TRU waste, there are no approved plans for the future disposition of th 233 containing drums.

Block 5: *Compensatory measures that reduce the severity of the vulnerability.*

The radiological program at the RWMC is mature and comprehensive in nature. If operations are conducte the discipline, formality and under the direction of senior and experienced radiation safety personnel as pres constituted, the radiological issues/problems will be detected, evaluated and controlled sufficiently to minin radiological exposures to personnel and reduce radioactive material releases.

Block 6: *Possible consequences of the vulnerability.*

Drum degradation over time increases handling exposure potential. However, the nature of the material ar storage conditions at present represent a high potential of unnecessary personnel exposures, which could b avoided by resolving disposal and handling issues early (now), i.e. while the integrity of the drums are still

Block 7: *Time period in which the consequences of the vulnerability might occur (e.g., 0 to 5 years; 5 y facility end-of-life; may not occur during facility lifetime).*

0 to 5 years - Consequences could occur in a short time period as the ASB drums are moved or on a long period as the TSA drums are recovered or disposal issues finally resolved for all of the drums and the con materials.

Block 8: *Comments, views, or plans by the site operations office and site contractor relative to mitigat minimizing any potential issue. Describe the plan and schedule of corrective actions (if any).*

The INEL staff recognize the problems and potential hazards and have performed preliminary evaluation

ES&H Vulnerability Assessment Form

Vulnerability # INEL/RWMC/WGAT/03

Block 9: *Database information.*

Radionuclide Source Parameters

Isotope	Physical Form	Chemical Form	MAR_I (g)

Collocated Chemicals and Release Products

Chemical		Release Product	
Name	Mass (g)	Name	Mass (g)

Release Path Parameters[1]

Chemical Form and Release Products	DR_I	ARF_I	RF_I	LPF_I

Exposure Parameters[1]

Chemical Form and Release Products	V (meter^3)	t (minutes)	ΔT (minutes)	X/Q	
				Ex-facility	Public

Block 10: *Comments and references for parameter selection.*

[illegible] — 7/19/96

Signature, Team Member — Date

[illegible] — 8-28-96

Signature, Team Leader — Date

1. Described in the Assessment Plan.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/RWMC/WGAT/04

Block 1: *Title of the Vulnerability. (<20 words)*

Breach of U-233 drums collocated with TRU waste drums in ASB-II and contamination of worker.

Block 2: *Executive Summary. (<50 words) Concise description of the sequence of events leading to the vulnerability.*

In the ASB-II facility, U-233 drums are collocated with TRU waste drums and stacked 5 high with no restraints. Many of the drums show signs of corrosion and structural integrity could be compromised. In the event of drum mishandling, a forklift accident, or seismic event, it is likely that drums containing TRU waste and U-233 could fall from the stack and rupture. This event could lead to release of material and subsequent worker exposure.

Block 3: *Describe the condition or weakness, including the material, material form, quantity (if unclassified), packaging type and number of packages, and facility and other barriers that contribute to the vulnerability.*

Vulnerability Description/Information	
Material and material form	Approximately 1629 drums containing TRU waste and 12 drums containing U-233 (1) U-233/232 and Thorium in fuel pins, pellets and sludges (2) Commingled TRU waste
Material at risk (approximate mass [kg] and composition of material which may participate in the release—not necessarily the inventory of material at a given location)	500 g of U-233 per drum. Only one drum is involved in vulnerability.
Packaging type and number of packages	U-233 materials are contained within 2R containers within 12 drums. These drums are commingled with 1,629 drums containing TRU waste.
Facility and other barriers	ASB-II is an air-supported fabric structure. Drums provide the only barrier to worker exposure.
Condition or weakness	Unstable drum stacking array with no restraints and corroded drum walls.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/RWMC/WGAT/04

Block 4: *Potential causes and effects of barrier failure that contribute to the vulnerability.*

Forklifts are used in ASB-II facility for drum transport and stacking. A mishaning of drum stacking process or an impact to the drum storage array by a forklift operator cod result in portion of drums falling from the stack and possibly rupturing. The WGAT nod a previous breach at RWMC because of a forklift accident. This event could also be initiat by a mino event. The structural integrity of several drums may also be compromised due tcorrosion likely that drum contents would expose workers in the facility. Although U-233s contained containers within the drums, some of these containers are carbon steel and may degraded.

Block 5: *Compensatory measures that reduce the severity of the vulnerability*

The only compensatory measure currently being taken is to ensure forklift operars are trai qualified and the equipment is maintained.

Block 6: *Possible consequences of the vulnerability.*

Personnel contamination and possible internal uptake due to breach of TRU and U-233 con assumed that one U-233 drum and inner 2R container would be breached through drum mis Due to double containment and quantity of drums impacted by drum mishandling, no other are postulated to fail.

Block 7: *Time period in which the consequences of the vulnerability might occur (e.g., 0 years to facility end-of-life; may not occur during facility lifetime).*

Since forklifts are currently being operated in ASB-II on a routine basis and given the previ accident, the likelihood for consequences is within a five year period. For a seismically ind rupture, the consequences are not expected to occur within the facility lifetime.

Block 8: *Comments, views, or plans by the site operations office and site contractor rela mitigating or minimizing any potential vulnerability. Describe the plan and schedule of actions (if any).*

The INEL staff recognizes the potential of the events described in this VAF. A structural a been performed of the stack array and the consequences of a drum rupture and worker cont have been evaluated. The drums are planned for shipment to WIPP by 2003, pending resol WIPP facility startup.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/RWMC/WGAT/04

Block 9: *Database information.*

Radionuclide Source Parameters

Isotope	Physical Form	Chemical Form	MAR_i (g)
U-233	Powder	Oxide	500 g

Collocated Chemicals and Release Products

Chemical		Release Product	
Name	Mass (g)	Name	Mass (g)

Release Path Parameters[1]

Chemical Form and Release Products	DR_i	ARF_i	RF_i	LPF_i
Oxide	.01	$2x10^{-3}$	0.3	1

Exposure Parameters[1]

Chemical Form and Release Products	V (meter^3)	t (minutes)	ΔT (minutes)	X/Q	
				Ex-facility	Public

Block 10: *Comments and references for parameter selection.*

Values given in Block 9 are given for a forklift accident or drum mishandling. Source term from seismic event B not calculated due to low likelihood.

[signature] 8/7/96

Signature, Team Member — Date

[signature] 8/10/96

Signature, Team Member — Date

[signature] 8-23-96

Signature, Team Leader — Date

1. Described in the Assessment Plan.

APPENDIX C

Classification of Vulnerabilities by Likelihood and Consequence

Jnited States Government

Department of Energy

memorandum

DATE: September 24, 1996

EPLY TO
ATTN OF: Pranab Guha, Working Group Assessment Team Leader, Idaho National Engineering Laboratory

BJECT: Addendum to Highly Enriched Uranium Working Group Assessment Team Report - Vulnerability Classifications

TO: Sarbes Acharya, Project Leader, HEU Vulnerability Assessment

The Project Support Group performed initial vulnerability classifications (likelihoods and consequences) based on information contained in the vulnerability assessment forms (VAFs) completed as a part of the site assessments. During the Vulnerability Prioritization Meeting held on July 16-19, 1996 at the Washingtonian Marriott, as well as the Second Working Group Meeting, held on August 13 and 14 at the Gaithersburg Hilton, the classification results were reviewed and finalized by the Working Group and Site Assessment Team Leaders and the Project Support Group. The final results of the vulnerability classifications supersede those contained in prior versions of the Working Group Assessment Team (WGAT) report.

This memo, together with the attached final vulnerability classifications for the Idaho National Engineering Laboratory, is recognized as an addendum to this WGAT report.

Pranab Guha, Working Group Assessment Team Leader
Idaho National Engineering Laboratory

Enclosure: Table of final vulnerability classifications

HEU Assessment VAF Summary

Site	Facility	VAF Number	Description	Volume II Reference No./Part A Sect.	Like -li- hood	Conse- quences W	P	E	VAF Cate gory
Site:	**INEL**								
INEL	CPP-640	SAT-001	Nuclear criticality accident caused by leaks in building roof.	5/2.2	VL	H	*	*	FC
INEL	CPP-640	SAT-002	Failure of building from earthquakes or extreme winds.	5/2.2	VL	L	*	*	FC
INEL	CPP-640	WGAT-001	Fire and contamination caused by combustible materials on ROVER facility operating floor.	5/2.2	H	H	*	*	FC
INEL	CPP-651	SAT-003**	Nuclear criticality accident in Room 102 following flooding of slip-lip cans containing HEU.	5/2.3					
INEL	CPP-651	SAT-004	Earthquake-caused fluorinel storage rack failures and nuclear criticality in North and South vaults.	5/2.3	VL	H	*	*	FC
INEL	MULTIPLE	SAT-005	Worker contamination from the storage of numerous small quantities of HEU in aging facilities.	5/2.1	H	L	*	*	FC
INEL	MULTIPLE	WGAT-002	Poor housekeeping, contributing to fire hazards in numerous facilities.	5/2.1	-	-	-	-	IV
INEL	RWMC	WGAT-003	Incompatible storage of more than 200 drums of U-233 and thousands of TRU drums in the RWMC, creating hazards for workers.	5/2.6	+ L	L	*	*	FC
INEL	RWMC	WGAT-004	Poor storage practices and drum corrosion, causing releases of HEU material and worker contamination.	5/2.6	+ L	L	*	L	FC
INEL	RWMC-ILTSF	SAT-006	Loss of integrity of 53 drums containing U-233 currently in cargo containers in an open yard, resulting in nuclear criticality.	5/2.6	+ L	H	*	*	FC
INEL	RWMC-TSA	SAT-007	Corrosion and loss of structural integrity and designed spacing of drums containing U-233, resulting in a nuclear criticality accident.	5/2.6	+ L	H	*	*	FC

* Consequence Below Threshold for Characterization.
** VAF not accepted as vulnerability by WGAT.
- IV VAFs not characterized.
+ VAF contains U-233 or Plutonium.

APPENDIX D

References

"Addendum to Idaho Chemical Processing Plant Document Section 5.5, Rover Fuels Processing Facility Rover Deactivation Project," Document No. WIN-107-5.5A, Rev 0, June 1996 (UCNI).

"Addendum to Idaho Chemical Processing Plant Safety Document Section 5.5A, Rover Fuels Processing Facility Shutdown Status," Document No. WIN-107-5.5A, Rev 1, February 1996.

"Exemptions and Equivalencies" Document No. MCP-581 eff. date 11/30/95.

"Final Safety Analysis Report for the Rover Fuels Processing Facility," Document No. WIN-107-5.5, Revision 0b of February 1996 (UCNI).

"Fire Barriers" Document No. MCP-580 eff. date 10/30/95.

"Fire Hazards Analysis" Document No. MCP-579 eff. date 11/30/95.

Fire Hazard Analysis, ICPP Safety & Health, "CPP 601, Chemical Process Building", Document No. FHA-601, DRAFT.

Fire Hazards Analysis for the Unirradiated Nuclear Fuel Storage Fuel Storage Facility, Building CPP-651", Revision 1, April 17, 1995.

"Fire Protection", Document No. PRD-27, eff. date 9/30/95.

"Fire Protection Assessments" Document No. MCP-583 eff. date 10/30/95.

"Fire Protection Design Reviews" Document No. MCP-582 eff. date 11/30/95.

"Flammable and Combustible Liquid Storage and Handling" Document No. MCP-584 eff. date 11/30/95.

"ICPP-666 Fire Hazards Analysis", Revision October 11, 1994.

"Independent Oversight Evaluation of Environment, Safety, and Health Programs at the Idaho National Engineering Laboratory," October 1995, Office of Oversight E,S&H US DOE.

"Inspection Testing and Maintenance of Fire Protection Systems and Equipment" Document No. MCP-586 eff. date 11/30/95.

"Managing Fire Protection Impairments" Document No. MCP-585 eff. date 11/30/95.

"Operational Safety Requirements Document for the Nuclear Materials Inspection and Storage Facility," Issue 003 dated December 8, 1992.

"Overview of the LITCO Safety and Health Program", Document No. PRD-16, eff. date 5-1-96.

"Safety Analyses for Handling and Storage of Fuels in the Unirradiated Fuel Storage Facility (UFSF), CPP-651, Section 4.8," Document No. WIN-107-4.8 Rev 3, August 1993 (UCNI).

"Safety Analysis Report and Technical Specifications for the ATR Critical Facility," Issue 007 dated September 8, 1993.

"Safety Analysis Report for the Nuclear Materials Inspection and Storage Facility," Issue 02, dated December 8, 1992.

"Safety Analysis Report for the Radioactive Waste Management Complex at the Idaho National Engineering Laboratory," Document No. INEL-94/0226, Rev 0 (Formerly EGG-WM-10881), February 1995.

"Technical Safety Requirements for the RWMC," Document No. INEL-94/0076, Rev 0 (Formerly EGG-WM-1101).

"TRU Drum Corrosion Task Team Report," Document No. INEL-96/0187, May 1996.

"WINCO PRE-FIRE PLAN, Chemical Process Building 601, Birch Street Northwest", 9/93.

"WINCO PRE-FIRE PLAN, Chemical Process Building 640, Birch Street, Northwest", 9/93.

"WINCO PRE-FIRE PLAN, CPP 651 Unirradiated Fuel Storage, West Side of area", April 1995.

"WINCO PRE-FIRE PLAN, Flourinel & Storage Facility, Building 666, Maple Street, South Central Part of Area", 9/93.

"WINCO PRE-FIRE PLAN, Fuel Reprocessing & Lab Building 602, Birch Street North Central", September 1993.

"WINCO PRE-FIRE PLAN, Guardhouse Buildings 657/669, Cleveland Avenue, Main Guardhouse East Section", 9/93.

"WINCO PRE-FIRE PLAN, Remote Analytical Facility Building 627, Birch Street Northwest Area CPP", September 1993.

APPENDIX E

Stakeholder Involvement

DOE NEWS

"Finish the 60, grow the 40"

FOR IMMEDIATE RELEASE
June 7, 1996

PUTTING THIS STORY INTO CONTEXT: About 60 percent of the INEL's budget is devoted to environmental management, including managing special nuclear materials safely. A DOE team will visit the INEL to help ensure this effort is carried out safely.

INEL ENRICHED URANIUM STORAGE AND HANDLING PRACTICES EVALUATED AS PART OF DOE-WIDE ASSESSMENT PROGRAM

The Idaho National Engineering Laboratory will be visited by a Department of Energy-sponsored team of experts assessing environmental, safety and health vulnerabilities associated with stored highly enriched uranium (HEU) at the Site. The assessment will run from June 10 through June 20.

The INEL is one of 22 sites around the country being visited through an initiative announced by Energy Secretary Hazel O'Leary in February to assess HEU storage and operation issues at DOE facilities. The assessments are being coordinated through the Office of the Assistant Secretary of Environment, Safety and Health. The evaluation team, termed the "home team," includes representatives of the DOE's program and operations office, site contractors, independent consultants and external stakeholders.

The home team will visit five facilities at the INEL: the Idaho Chemical Processing Plant, Argonne National Laboratory-West, the Test Reactor Area, the Radioactive Waste Management Complex and the Radiological and Environmental Sciences Laboratory. The team will assess storage and handling conditions or operation weaknesses that could lead to unnecessary or increased exposure to workers or the public to radiation or associated chemical hazards. Information from the assessment will be used to identify corrective actions for safe management of HEU at the INEL and DOE wide.

In preparation for the visit, INEL personnel have performed a self-assessment of these facilities and identified eight vulnerabilities which they have provided to the home team for review and validation. These self-identified vulnerabilities involve issues such as the potential for structural damage to certain older buildings or equipment from a severe earthquake or extreme winds or container corrosion resulting in localized spread of contamination or a slight chance of a criticality. In this instance, a criticality would be an unplanned nuclear reaction. The home team could identify additional concerns.

Of the 22 laboratories to be visited, five will each have its own working

(More)

group focusing on that single laboratory because of particular safety or environmental concerns. The INEL is not among this group, but is one of 17 laboratories with storage and handling issues considered to be of lesser concern; therefore, they are being evaluated by a single home team.

As part of the visit, there will be a public pre-assessment briefing June 11, 9 a.m. in the second floor conference room at University Place, where the INEL's self-assessment team and the home team will outline the goals of the assessment and areas that will be reviewed. The public will be able to ask questions or make statements at that meeting.

Following the assessments, there will be a public wrap up meeting June 20, 9 a.m., at the same conference room to discuss findings.

--INEL--

NOTE TO EDITORS, NEWS DIRECTORS: News representatives are welcomed to attend the briefings.

Media Contact: John Walsh (208) 526-8646
jhw@inel.gov

96-59

DOE NEWS

"Finish the 60, grow the 40"

FOR IMMEDIATE RELEASE
June 18, 1996

PUTTING THIS STORY INTO CONTEXT: About 60 percent of the INEL's budget is devoted to environmental management, including managing special nuclear materials safely. A DOE team has been at the INEL to help ensure this effort is carried out safely. The team will have a close-out meeting open to the public and media to review its assessment of INEL practices.

DOE HOLDS CLOSE-OUT BRIEFING FOLLOWING ASSESSMENT OF INEL ENRICHED URANIUM STORAGE AND HANDLING PRACTICES

The Department of Energy-sponsored team that has been assessing the Idaho National Engineering Laboratory's environmental, safety and health vulnerabilities associated with stored highly enriched uranium (HEU) will review its findings at a close-out session Thursday, June 20, 9 a.m. in the second floor conference room of University Place.

The team will review its assessment of the INEL's self-identified vulnerabilities and any other issues identified by the DOE team. The INEL's self assessment, in preparation for the team's visit, had identified eight vulnerabilities such as the potential for structural damage to certain older buildings or equipment from a severe earthquake or extreme winds or container corrosion resulting in localized spread of contamination or a slight chance of a criticality.

The DOE team, which arrived June 10, has visited five INEL facilities: the Idaho Chemical Processing Plant, Argonne National Laboratory-West, the Test Reactor Area, the Radioactive Waste Management Complex and the Radiological and Environmental Sciences Laboratory. Members assessed storage and handling conditions and operation weaknesses that could lead to unnecessary or increased exposure of workers or the public to radiation or associated chemical hazards. Information from the assessment will be used to identify corrective actions for safe management of HEU at the INEL and DOE wide.

The INEL is one of 22 DOE sites being visited through the assessment initiative announced by Energy Secretary Hazel O'Leary in February to assess HEU storage and operation issues. The assessments are being coordinated through the Office of the Assistant Secretary of Environment, Safety and Health. The DOE assessment team includes representatives from the DOE programs and operations office, site contractors, independent consultants and external stakeholders.

--INEL--

Media Contact: John Walsh, (208) 526-8646
96-62

Post Register
June 9, 1996
Section A
Back Page

THE DEPARTMENT OF ENERGY WELCOMES YOUR PARTICIPATION

Highly Enriched Uranium Vulnerability Assessment

A DOE-sponsored Assessment Team will visit the Idaho National Engineering Laboratory June 10-20 to assess environmental, safety and health vulnerabilities associated with highly enriched uranium storage and operations. The Assessment Team will evaluate five facilities at the INEL: the Idaho Chemical Processing Plant, Argonne National Laboratory-West, the Radioactive Waste Management Complex, the Test Reactor Area and the Radiological and Environmental Sciences Laboratory.

The Assessment Team will present two public briefings associated with the assessment:

- Tuesday, June 11, 9 a.m., University Place, Second Floor Conference Room — Pre-briefing to describe the intent of the project and answer questions.
- Thursday, June 20, 9 a.m., University Place, Second Floor Conference Room — Post-briefing to discuss initial findings and answer questions.

The public is invited to attend and participate in both sessions.

DEPARTMENT OF ENERGY
UNITED STATES OF AMERICA

Idaho Statesman
Boise, ID
Circulation 64,000
June 9, 1996
Section B, Page 2

DOE safety experts plan search for flaws at INEL

Starting Monday, a team of Department of Energy experts will visit the Idaho National Engineering Laboratory to evaluate environmental, safety and health issues associated with stored highly enriched uranium.

INEL is one of 22 sites being visited.

Inspectors will tour the Idaho Chemical Processing Plant, Argonne National Laboratory-West, the Test Reactor Area, Radioactive Waste Management Complex and the Radiological and Environmental Sciences Laboratory.

They will look for storage and handling conditions or operational flaws that could lead to unnecessary or increased exposure to radiation or associated chemical hazards.

Idaho Falls Post Reg.
June 20, 1996
Front Page

Radiation team notes risks of uranium storag[e]

Accident would require unlikely chain of events

Brandon Loomis
Post Register

Leaky roofs and earthquakes could cause radiation releases to workers or the environment because of the way some uranium is stored at the INEL, radiation safety experts have found.

But a study to identify such potential problems found no imminent accident risks. It would take an unusual series of events to trigger some of the potential accidents, though corroding barrels in other areas could pose exposure risks to workers, the study found.

As part of a nationwide Department of Energy study to find risks with the storage of highly enriched uranium — the kind typically used in weapons or Navy reactors — a team of radiation scientists spent the last two weeks at the Idaho National Engineering Laboratory. They reviewed a self-report completed by the INEL and toured storage facilities, and found that local officials had caught most of the potential problems, team leader Pranab Guha of DOE said.

Of greatest concern was a deteriorating storage building at the Idaho Chemical Processing Plant, known as CPP-640 or the ROVER building. The roof of that building is leaking over a concrete cell that holds about 150 kilograms of uranium ash. If an earthquake cracked the cell and caused it to leak as well, the water could cause the uranium to react and release radiation. Right now there's a tarp over the cell to keep water off.

"You can see this is a very, very poor way of maintaining a facility," Guha said at a post-inspection briefing this morning.

CPP-640, built in 1961, also fails to meet seismic and extreme wind standards, and has combustible materials on the floor, investigators found. Officials intend to fix the problems by moving the uranium to another storage building by 1998.

Earthquakes also could cause storage racks in another Chem Plant building to collapse and eliminate the spacing between canisters that keeps the uranium from going critical, or starting a chain reaction, the experts found. And they said there is a remote chance that firefighters in another Chem Plant building could douse some uranium in the event of a fire, causing it to react and release radiation. Both of those risks are expected to be cleared up when DOE ships the uranium to Oak Ridge, Tenn., next year.

At the Radioactive Waste Management Area, 53 drums containing uranium fuel pellets and rods have been stored in concrete bunkers where they could not be inspected since 1981. The team said potential corrosion of the drums could pose a hazard for a chain reaction, and the drums should [illegible] and inspected. Another 153 [illegible] vered with dirt and cannot [illegible] Those are expected to be shipped [illegible] Mexico's Waste Isolation Pilot [illegible] in 2003.

The team also found that [illegible] are stacked among drums of [illegible] transuranic materials like [illegible] taminated debris. Corro[illegible] apparent, Guha said, but [illegible] whether they contain uranium [illegible] what exposure risks they pose [illegible]

One potential problem also [illegible] Argonne National Laboratory-We[st] itself found that a glove box [illegible] um for short periods of time [illegible] to the floor and could cause [illegible] ination in the event of an earthqua[ke].

Overall, Guha said the [illegible] storing uranium and protecting [illegible]

Idaho's INEL Oversight Prog[ram] [illegible] or agreed. The most pressing [illegible] volves the leaky roof at the [illegible] which the state already was [illegible] ert Ferguson said.

"We're going to keep a very [illegible] that from a risk standpoint," [illegible]

But the report turned up [illegible] gest major problems, he said.

"I see nothing here that [illegible] danger."

Times-News
Twin Falls, ID
Circulation 20,486
June 21, 1996
Section A, Page 6

INEL study finds potential risk, no imminent danger

IDAHO FALLS (AP) — A new study indicates that leaky roofs and earthquakes at Idaho National Engineering Laboratory facilities could cause radiation dangers to workers or the environment because of the way some uranium is stored.

But there's no imminent accident risk, the study concluded, and it would take an unusual series of events to trigger a radiation accident.

As part of a nationwide Department of Energy study to learn the risks from storing highly enriched uranium, radiation scientists spent the last two weeks at INEL.

After studying INEL reports and visiting storage facilities, the review team found that local officials have caught most of the potential problems, team leader Pranab Guha said.

Of greatest concern was a deteriorating storage building at the Idaho Chemical Processing Plant. Its roof is leaking over a concrete cell that holds about 150 kilograms of uranium ash. If an earthquake cracked the cell and caused it to leak as well, the water could cause the uranium to react and release radiation.

Idaho Statesman
Boise, ID
Circulation 64,000
June 21, 1996
Section B, Page 4

Risks low at INEL, study says

Scientists find no imminent danger

IDAHO FALLS — A new study indicates that leaky roofs and earthquakes at Idaho National Engineering Laboratory facilities could cause radiation dangers to workers or the environment because of the way some uranium is stored.

But there's no imminent accident risk, the study concluded, and it would take an unusual series of events to trigger a radiation accident.

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Of greatest concern was a deteriorating storage building at the Idaho chemical processing plant. Its roof is leaking over a concrete cell that holds about 150 kilograms of uranium ash. If an earthquake cracked the cell and caused it to leak as well, the water could cause the uranium to react and release radiation.

The 35-year-old building also doesn't meet seismic and extreme wind standards.

Earthquakes also could cause storage racks in another chemical plant building to collapse.

Both of those risks will end when the material is shipped to Oak Ridge, Tenn., next year.

Morning News
Blackfoot, ID
Circulation 6,000
June 21, 1996
Section A, Page 10

Study indicates little risk of radiation from INEL

IDAHO FALLS (AP) — A new study indicates that leaky roofs and earthquakes at Idaho National Engineering Laboratory facilities could cause radiation dangers to workers or the environment because of the way some uranium is stored.

But there's no imminent accident risk, the study concluded, and it would take an unusual series of events to trigger a radiation accident.

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PART B

SITE ASSESSMENT TEAM REPORT

DOE-ID-10538

DEPARTMENT OF ENERGY

HIGHLY ENRICHED URANIUM ES&H VULNERABILITY ASSESSMENT

IDAHO NATIONAL ENGINEERING LABORATORY

SITE ASSESSMENT TEAM REPORT

July 12, 1996

Unclassified

Reviewed by: K C Gerard
K. C. Gerard

Authority: Classification Officer - LMITCO
Date: 6-28-96

Highly Enriched Uranium ES&H Vulnerability Assessment
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Harrison, Lawmel	ES&H Radiation Dosimetry & Records	Ventilation

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ACRONYMS

AEC	Atomic Energy Commission
AEDL	Applied Engineering & Development Laboratory
ALARA	as low as reasonably achievable
ANL-W	Argonne National Laboratory-West
ANSI	American National Standards Institute
AOP	Abnormal Operating Procedure
ARMF	Advance Reactivity Measurement Facility
ASB	Air Support Building
ASWS	Air Support Weather Shield
ATR	Advanced Test Reactor
ATRC	Advanced Test Reactor Critical
AWCC	active well coincidence counter
CAM	constant air monitor
CAS	criticality alarm system
CCA	Criticality Control Area
CFA	Central Facilities Area
CFR	Code of Federal Regulations
cm	centimeter
CPP	Chemical Processing Plant
D&D	decontamination and decommissioning
DBT	design basis tornado
DNFSB	Defense Nuclear Facilities Safety Board
DOD	Department of Defense
DOE	Department of Energy
DOE-ID	DOE Idaho Operations Office
DOT	Department of Transportation
EBR-I	Experimental Breeder Reactor I
EIS	Environmental Impact Statement
EP	emergency preparedness
EPN	emergency procedure network
ES&H	Environment, Safety & Health
ETR	Engineering Test Reactor
FAST	fluorinel dissolution process and fuel storage
FDP	fluorinel dissolution process
FSA	Fuel Storage Area
ft	feet
g	gram
GETR	General Electric Test Reactor
HCWH&N	hazardous chemical waste handling and neutralization
HEPA	high efficiency particulate air
HEU	highly enriched uranium
HPP	Headend Processing Plant
HVAC	heating, ventilation, and air conditioning

ACRONYMS (cont'd)

ICPP	Idaho Chemical Processing Plant
IF	Idaho Falls
IH	Industrial Hygiene
ILTSF	Intermediate Level Transuranic Storage Facility
in.	inch
INEL	Idaho National Engineering Laboratory
IRC	INEL Research Center
IRT	Incident Response Team
ISAS	Isotopic Source Assay System
kg	kilogram
km	kilometer
LANL	Los Alamos National Laboratory
LMITCO	Lockheed Martin Idaho Technologies Company
LWBR	Light Water Breeder Reactor
m	meter
MHC	Mechanical Handling Cave
mi	mile
MTR	Materials Test Reactor
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NMIS	Nuclear Material Inspection and Storage
NRC	Nuclear Regulatory Commission
NWCF	New Waste Calcining Facility
OR	Occurrence Report
OSR	Operational Safety Requirement
OSRD	Operations Safety Requirements Document
PBF	Power Burst Facility
PIF	Process Improvement Facility
PM	Process Makeup
PSD	Plant Safety Document
QC	quality control
RAF	Remote Analytical Facility
RCRA	Resource Conservation and Recovery Act
RESL	Radiological and Environmental Sciences Laboratory
RWMC	Radioactive Waste Management Complex
SAL	Special Analysis Laboratory
SAR	Safety Analysis Report
SAT	Site Assessment Team
SNM	special nuclear material
SSE	safe shutdown earthquake
SWEPP	Stored Waste Examination Pilot Plant

ACRONYMS (cont'd)

TBD	to be determined
TI	Transport Index
TRA	Test Reactor Area
TRU	transuranic
TSA	Transuranic Storage Area
TSR	Technical Safety Requirement
UBC	Uniform Building Code
UFSF	Unirradiated Fuel Storage Facility
US	United States
USQ	unreviewed safety question
VFS	vertical fuel scanner

GLOSSARY

authorization basis
Documentation and administrative controls that establish safe parameters and limits for facility operations. These include safety analysis reports, Operational Safety Requirements, Technical Safety Requirements, criticality safety analysis, justification for continued operation, and Basis for Interim Operations.

collocated materials
Materials within a facility that contain HEU and may contribute to a vulnerability. Materials (e.g., large UF_6 cylinders) in an adjacent facility may also be considered collocated.

ES&H vulnerability
Conditions or weaknesses that might lead to unnecessary or increased radiation exposure of workers or the public, to radiation or associated chemical hazards, or to the release of radioactive materials to the environment.

facility
Buildings or functional areas covered within a safety analysis report or Basis for Interim Operation.

facility condition vulnerabilities
The potential for failure of physical barriers such as equipment, buildings, or safety systems, and the hold-up of plutonium in a facility.

HEU holdings
HEU materials to be assessed, including more than the types inventoried on the accountability books.

highly enriched uranium
Uranium having 20 percent or greater enrichment of uranium-235.

hold-up
HEU materials remaining in process tanks, piping, drains, ventilation ducts, or other locations. The materials may or may not be measured.

institutional vulnerabilities
Administrative or management weaknesses that are underlying causes of, or significant contributors to, material/packaging and facility condition vulnerabilities.

material/packaging vulnerabilities
The susceptibility of HEU materials and packaging to degradation from design deficiencies, corrosion, radiolytic damage, or changes in uranium form.

partitioned areas
Areas within a facility with similar activities, defined for evaluation purposes. Examples are vaults, chemical process areas, and the fabrication and assembly area.

EXECUTIVE SUMMARY

In accordance with the February 22, 1996 directive[1] issued by Secretary of Energy O'Leary on the Vulnerability Assessment of Highly Enriched Uranium (HEU)[a] Storage, the Idaho National Engineering Laboratory conducted an assessment of the site's HEU holdings and any associated vulnerabilities. The assessment was conducted between April 25 and May 24, 1996. The scope of this assessment, as defined in the Assessment Plan[2], included all HEU, and any spent fuel not evaluated in the Spent Fuel Vulnerability Assessment. Addressed in this assessment were all of the holdings at the Idaho National Engineering Laboratory (INEL) except any located at Argonne National Laboratory-West (ANL-W) and the Naval Reactors Facility. Excluded from the assessment were those HEU holdings previously assessed in the Idaho National Engineering Laboratory Spent Nuclear Fuel Inventory and Vulnerability Site Assessment Report[3] and any HEU holdings evaluated in the Plutonium Vulnerability Assessment Report.[4]

The goal of this assessment was to ensure that Environment, Safety, and Health (ES&H) vulnerabilities resulting from the storage and handling of HEU at the INEL were understood and corrective actions were underway. The information in this report pertains to the INEL and will contribute to the DOE complex-wide HEU Vulnerability Assessment.

The Site Assessment Team was composed of the team leaders, facilitators, administrative support personnel, representatives from each of the facilities that contained HEU, safety analysis personnel, and specialists in criticality safety, industrial hygiene, conduct of operations, maintenance, fire protection, emergency preparedness, radiation protection, ventilation, seismic and natural phenomena, and material accountability.

The facilities with significant [i.e., greater than approximately 1 kilogram[b] per partition area] or minor [i.e., greater than 1 gram] HEU holdings addressed in this assessment, as shown in Tables 1 and 2, include those at (1) the Idaho Chemical Processing Plant (ICPP), (2) the Test Reactor Area (TRA), (3) the Radioactive Waste Management Complex (RWMC), and (4) the Radiological and Environmental Sciences Laboratory (RESL) [CFA-690]. Other areas, that were initially evaluated and then excluded from the assessment due to insignificant quantities or previous coverage under other studies include the Power Burst Facility (PBF), the Central Facilities Laboratories Complex(CFA-625), and the Idaho National Engineering Laboratory Research Center (IRC). All facilities containing HEU were assessed, and walkdowns were conducted where safety permitted, of those facilities containing significant or minor quantities of HEU. As shown and ranked for the overall assessment in Tables 1 and 2, the Site Assessment Team found seven ES&H vulnerabilities in these facilities.

Safety Analysis Reports for several of these facilities have recently been revised or are in the process of being revised. An Independent Oversight Evaluation of Environment, Safety, and Health Programs at the INEL Report[5] was issued in October 1995 by the Office of Oversight, ES&H, United States Department of Energy (DOE).

Overall, the Idaho National Engineering Laboratory site presents limited risks related to HEU storage and handling. Within the scope of

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[a] In the context of this assessment, the term "HEU" is meant to include both (a) uranium having 20 percent or greater enrichment of uranium-235, and (b) uranium-233.

[b] Quantities of HEU are normally reported in terms of kilograms or grams. Utilizing the International System of Units. The conversion factor to U.S. customary unit is 1 kilogram ≅ 2.2046 pounds.

this assessment, the vast majority of the HEU holdings at the INEL reside in five major locations: (1) the Unirradiated Fuel Storage Facility (UFSF) at CPP-651; (2) the Rover Fuel Reprocessing Facility at CPP-640; (3) the Nuclear Material Inspection and Storage Facility (NMIS) vault at TRA-621; (4) The Advance Test Reactor Critical (ATRC) Facility at TRA-670; and (5) three local areas at RWMC. The risks of the several other facilities included in this assessment are of a lesser nature and are solely related to worker safety.

The Site Assessment Team identified seven vulnerabilities, two in CPP-651, two in CPP-640, two in RWMC, and one institutional. None of these had the potential to effect the public or the environment. Potential effects were limited to workers only. In the Site Assessment Team's view, the number one ranked vulnerability was significantly more important than the other six vulnerabilities. These six, although ranked in this assessment, are of relatively equal importance. All of these vulnerabilities had already been known by the facility managers, and actions were already underway or planned to deal with most of them. For all but one of the vulnerabilities, the Site Assessment Team judged the likelihood of occurrence to be very remote, i.e., the vulnerability is not expected to occur during the lifetime of the facility. Unreviewed safety question screens have been performed for these vulnerabilites and no unreviewed safety question safety violations were required.

Table 1. Facilities Assessed with a Significant Amount of HEU

Facility	Mission	Walkdown	Ranking-Vulnerability
CPP-640 Headend Processing Plant (HPP)[c]	Contains Rover Fuel Reprocessing Facility	X	1. **Possibility of loss of moderator control** 2. **Potential compromise of confinement structures due to severe earthquake/wind**
CPP-651 Unirradiated Fuel Storage Facility (UFSF)	Provides secure storage of a variety of unirradiated fuel materials	X	3. **Potential for fire** 4. **Lack of seismic qualification of storage racks**
TRA-621 Nuclear Materials Inspection and Storage Facility (NMIS)	Consolidates the secure storage, inspection, and nondestructive assay of special nuclear materials (SNM)	X	None
TRA-670 Advanced Test Reactor Critical (ATRC) Facility	Obtains nuclear characteristic data on ATR core	X	None
RWMC	Stores of transuranic (TRU) and special case waste	X	6. **Container corrosion on ILTSF Pad** 7. **Container corrosion on TSA Pads**

[c]This facility is in the decommissioning phase, and the HEU material is scheduled for removal by July 1997.

Table 2. Facilities Assessed with Minor Quantities of HEU

Facility	Mission	Walkdown	Ranking-Vulnerabilities
Chemical Processing Plant (CPP)-601 Fuel Processing Building	Previously reprocessed spent fuel (discontinued)	X	None
CPP-602 Laboratory Building	Performs chemical and radiochemical analysis	X	None
CPP-627 Remote Analytical Facility (RAF)	Prepare and analyze radioactive samples	X	None
CPP-637 Process Improvement Facility (PIF)	Conducts small-scale general chemistry and experimental programs	X	None
CPP-657 Safeguards Office	Performs portal monitor calibrations	X	None
CPP-666 Fluorinel Dissolution Process and Fuel Storage (FAST) Facility	Conducts headend dissolution process	X	None
TRA-603 Materials Test Reactor (MTR) Building	Serves as a storage vault	X	None
TRA-604 MTR Annex	Performs laboratory activities	X	None
CFA-690 RESL	Conducts radiochemical and dosimetry analysis	X	None
General	Various	X	5. **Aging facilities with <u>inactive</u> quantities of HEU**

The HEU Assessment Team requested that the INEL evaluate any spent fuel containing HEU not included in the Spent Fuel Vulnerability Assessment. An evaluation was completed in response to that request and is detailed in Appendix E. Several changes have occurred at the INEL becuase of anticipated increases in the volume or condition of spent fuel that should be identified and reported to the HEU Site Assessment Team. These are listed and discussed in the appendix.

1.0 IDENTIFICATION OF FACILITIES

The Idaho National Engineering Laboratory (INEL) is a U.S. Department of Energy (DOE) facility and a leader in environmental management, nuclear materials disposition, research, applied engineering and systems integration, and transfer of derived-used energy and environmental technologies. The INEL is located in the southeast corner of Idaho. It encompasses 890 square miles (see Figure 1). Satellite facilities are located in Idaho Falls, approximately 30 miles (mi) east of the INEL eastern most boundary (see Figure 1).

The facility partitions with significant (i.e., greater than 1 kilogram per partition area) or minor (i.e., greater than 1 gram) HEU holdings addressed in this assessment, as shown in Tables 1 and 2 of the Executive Summary, include those at (1) the ICPP, (2) the TRA, (3) the RWMC, and (4) the RESL. Other areas, which were initially evaluated and then excluded from the assessment due to insignificant quantities or previous coverage under other studies, include the PBF, the CFA Laboratory Complex, and the IRC. All facilities containing HEU were assessed and walkdowns were conducted, where safety permitted, of those facilities containing significant or minor quantities of HEU. As shown and ranked for the overall assessment in Table 1 of the Executive Summary, the SAT found seven ES&H vulnerabilities in these facilities.

The Site's Spent Nuclear Fuel Vulnerability Development Forms in the 1993 Spent Nuclear Fuel Vulnerability Assessment Report (see Reference 3) have been reviewed. While the total quantity of spent nuclear fuel at the INEL has increased since 1993, no additional vulnerabilities associated with the spent fuel received since that report have been identified. All receipts of new spent nuclear fuel have been handled in the same manner as the existing spent nuclear fuel. No spent fuel has been received that was suspected of having damaged or degraded cladding or packaging. All receipts have been visually observed to be in very good physical condition and pose no additional vulnerabilities to the existing facilities. Since January 1, 1993, 3894.4 additional kilograms of uranium from Navy fuel have been received from on-site sources and stored in CPP-666, and 241.6 kilograms of uranium from the ATR Program have been transferred to the ICPP.

SARs for several of these facilities have recently been revised or are in the process of being revised. An Independent Oversight Evaluation of Environment, Safety, and Health Programs at the INEL Report (see Reference 5) was issued in October 1995 by the Office of Oversight, ES&H, U.S. DOE.

1.1 Idaho Chemical Processing Plant

The ICPP complex houses (see Figure 2) one-of-a-kind reprocessing facilities for government-owned defense and research spent fuels. Since beginning operation in 1953, the facility has recovered approximately 31.5 metric tons of uranium. The reprocessing mission was discontinued in 1992. Facilities at ICPP include spent fuel storage and reprocessing areas, a waste solidification facility and related waste storage bins, remote analytical laboratories, and a coal-fired steam generating plant.

Other than the assessment mentioned above, there are no recent events, ongoing evaluations, recent assessment reports, or studies that are relevant to this assessment for ICPP.

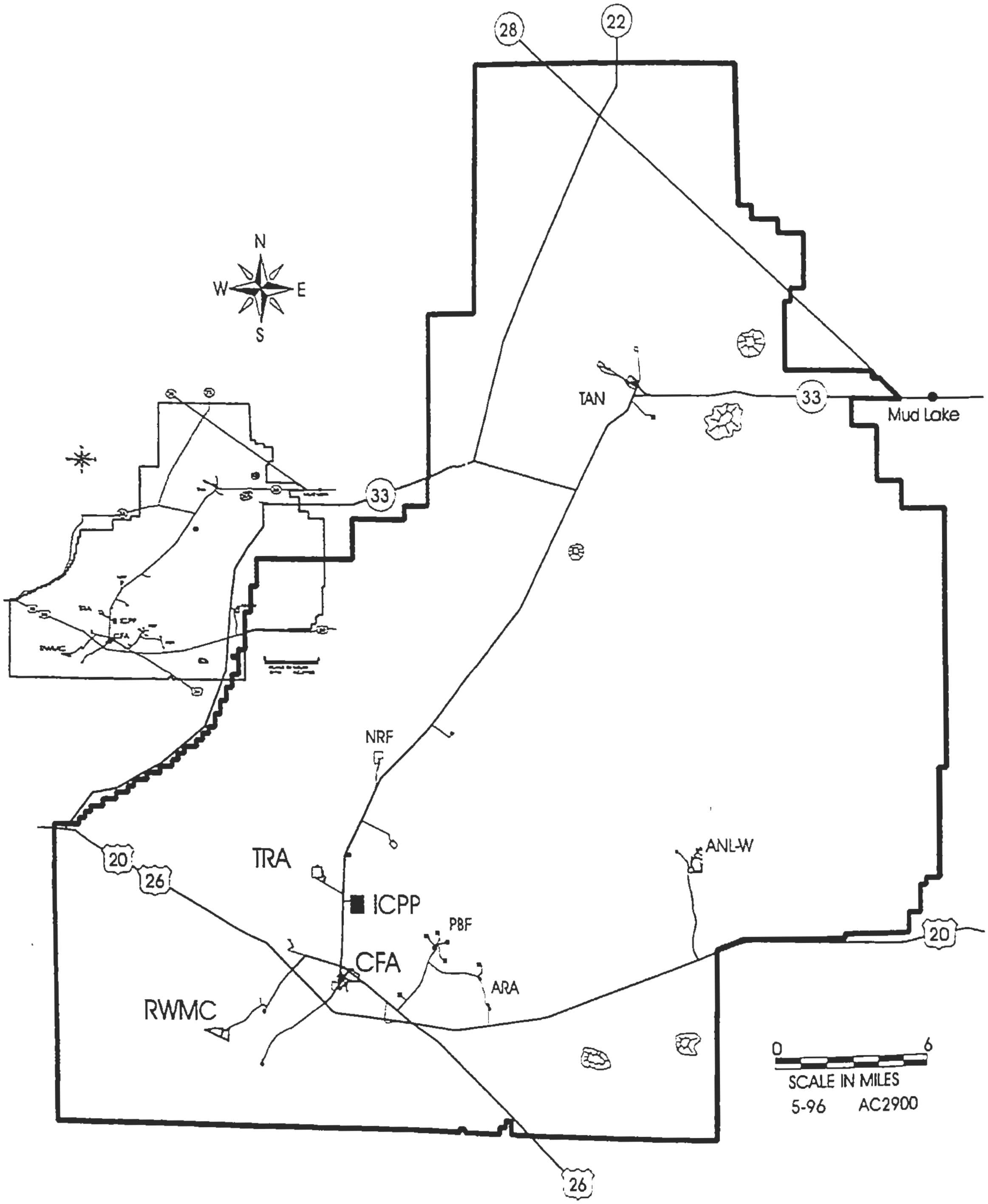
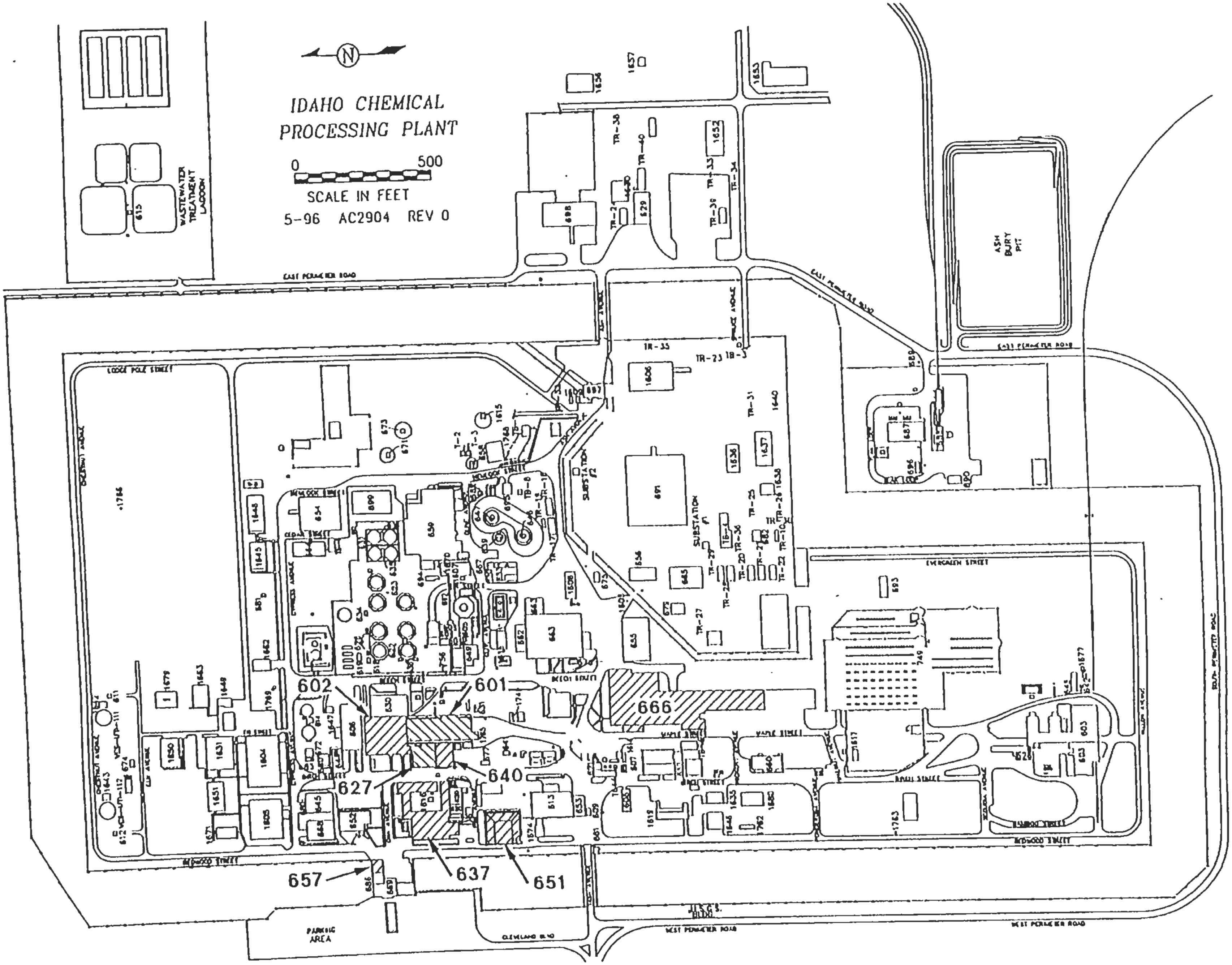


Figure 1. Idaho National Engineering Laboratory


IDAHO CHEMICAL
PROCESSING PLANT
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WASTEWATER TREATMENT LAGOON
SUBSTATION
PARKING AREA
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602
627
637
640
651
657
666

1.1.1 CPP-601, Fuel Processing Building[d]

Originally, the purpose of CPP-601 was the reprocessing of spent fuel. In 1992, the spent nuclear fuel reprocessing operations in the CPP-601 Facility were discontinued. The reprocessing equipment has been cleaned out and isolated. It is estimated that the facility contains less than 345 grams of HEU remaining in the equipment as process holdup material, which is not retrievable until decontamination and decommissioning is completed. The entire facility is considered the partitioned area for this report.

1.1.2 CPP-602, Laboratory Building[d]

Chemical and radiochemical analyses are performed in this facility. This includes, but is not limited to, radiochemical analysis of plant process samples; preparation and storage of quality control samples; assay of alpha, beta, and gamma emitting radioactive samples; and microscopic and x-ray analysis of nonradioactive and small quantities of contained radioactive samples.

For this assessment, the facility was partitioned into five areas: (1) Laboratory 207 has 234 g of HEU; (2) Cage area has 3 g of HEU; (3) Laboratory 212 has 235 g of HEU; (4) Laboratory 109 has 2 g of HEU; and (5) LC-100 has 767 g of HEU.

1.1.3 CPP-627, Remote Analytical Facility[d]

The laboratories in CPP-627 prepare and analyze radioactive samples in support of the INEL environmental sampling and process support. The facility also supports other DOE site and DOE-approved programs. Three partitioned areas have been identified for the purposes of this assessment: (1) the Special Analysis Laboratory (SAL), containing 178 g of HEU; (2) the RAF, containing <2 g of U; and (3) Room 105, contains 270 g of HEU.

1.1.4 CPP-637, Process Improvement Facility[d]

This facility consists of small-scale general chemistry laboratories and experimental facilities that support waste management, spent fuels, and other development programs. For the purposes of this report, the facility is partitioned into Laboratory 107, Laboratory 111, and Room 191. Laboratory 107 contains a total of 348 g of HEU, Laboratory 111 contains 345 g of HEU, and Room 191 contains 344 g of HEU. All material is stored in multiple containers in locked cabinets and in Room 191 it is also contained in metal drums.

1.1.5 CPP-640, Headend Processing Plant

The HPP contains the Rover Fuel Reprocessing Facility, which was designed as a pilot-plant scale demonstration of fuel reprocessing operations. The Rover Facility comprises a headend reprocessing system for reclaiming HEU from unirradiated and irradiated Rover graphite fuels. The system has been shutdown since 1984. It contains approximately 100 to 150 kg HEU as ash and burner bed material.

The Rover process consisted of two largely separate operations: the dry side, involving fuel handling, burners, and ash handling; and the wet side, involving aqueous dissolution of the ash. On the dry side, the graphite fuel rods (in cardboard tubes) were remotely charged from the Mechanical Handling Cave (MHC) to a fluidized-bed burner, where most of the graphite was burned away and the uranium was converted to oxides. The ash from this primary burner was pneumatically transferred via the MHC to a secondary fluidized-bed burner to further reduce the carbon content of the ash. The uranium-bearing product ash was then charged to a critically safe dissolver in Cell 2, where the ash was dissolved in nitric and hydrofluoric acids. After fluoride ion complexing,

[d]Inventory of HEU was as of May 9, 1996.

the product solution was transferred to CPP-601 for solvent extraction recovery of the uranium. The Rover dry process area is the single partition for purposes of this report.

The draft addendum to the existing safety basis for uranium recovery operations has been submitted to the Lockheed Martin Idaho Technologies Company Radiological and Environmental Safety Committee.

1.1.6 CPP-651, Unirradiated Fuel Storage Facility

CPP-651 provides secure storage of a variety of HEU materials for subsequent shipment to other facilities. Unirradiated fuel is delivered using trucks, manlifts, and forklifts. After delivery, the fuel is off-loaded and taken inside. Vehicles are not allowed inside the facility except for an electric forklift and hydraulic-powered lift equipment. The fuel is placed into the vault storage location by hand. Within the building, fuel handling is necessary for inspection, storage, accountability, and transfer into and out of the facility. The quality of holdings of HEU are classified. The building is considered one partitioned area.

The safety basis documentation for this facility is currently being revised.

1.1.7 CPP-657, Safeguards Office[e]

The facility houses Safeguards and Security personnel. The 18 grams of HEU in this facility are triply contained. The entire facility is considered a single partition area for purposes of this report.

1.1.8 CPP-666, FAST Facility

The FAST Facility is a large hot cell facility for storing irradiated fuel. Less than 21 grams of HEU are stored at the facility. The Fluorinel Dissolution Process Cell is the single partition area for this report.

1.2 Test Reactor Area

TRA (see Figure 3), the world's most sophisticated materials testing complex, houses extensive facilities for studying the effects of radiation on materials, fuels, and equipment for the nuclear Navy. The Advanced Test Reactor (ATR), located at TRA, produces a neutron flux that allows simulation of long-duration radiation effects on materials and fuels. ATR is also used for producing important isotopes used in medicine, research, and industry.

Other than the assessment mentioned above, there are no recent events, ongoing evaluations, recent assessment reports or studies that are relevant to this assessment for TRA (see Figure 3).

1.2.1 TRA-603, HR-4, Materials Test Reactor

HR-4 is a walk-in vault storage facility located next to the MTR reactor. It is considered a single partition area for purposes of this study. Small quantities (i.e., 55 grams) of HEU are held in containers. They consist of soil samples and standards.

[e]Inventory of HEU was as of May 9, 1996.

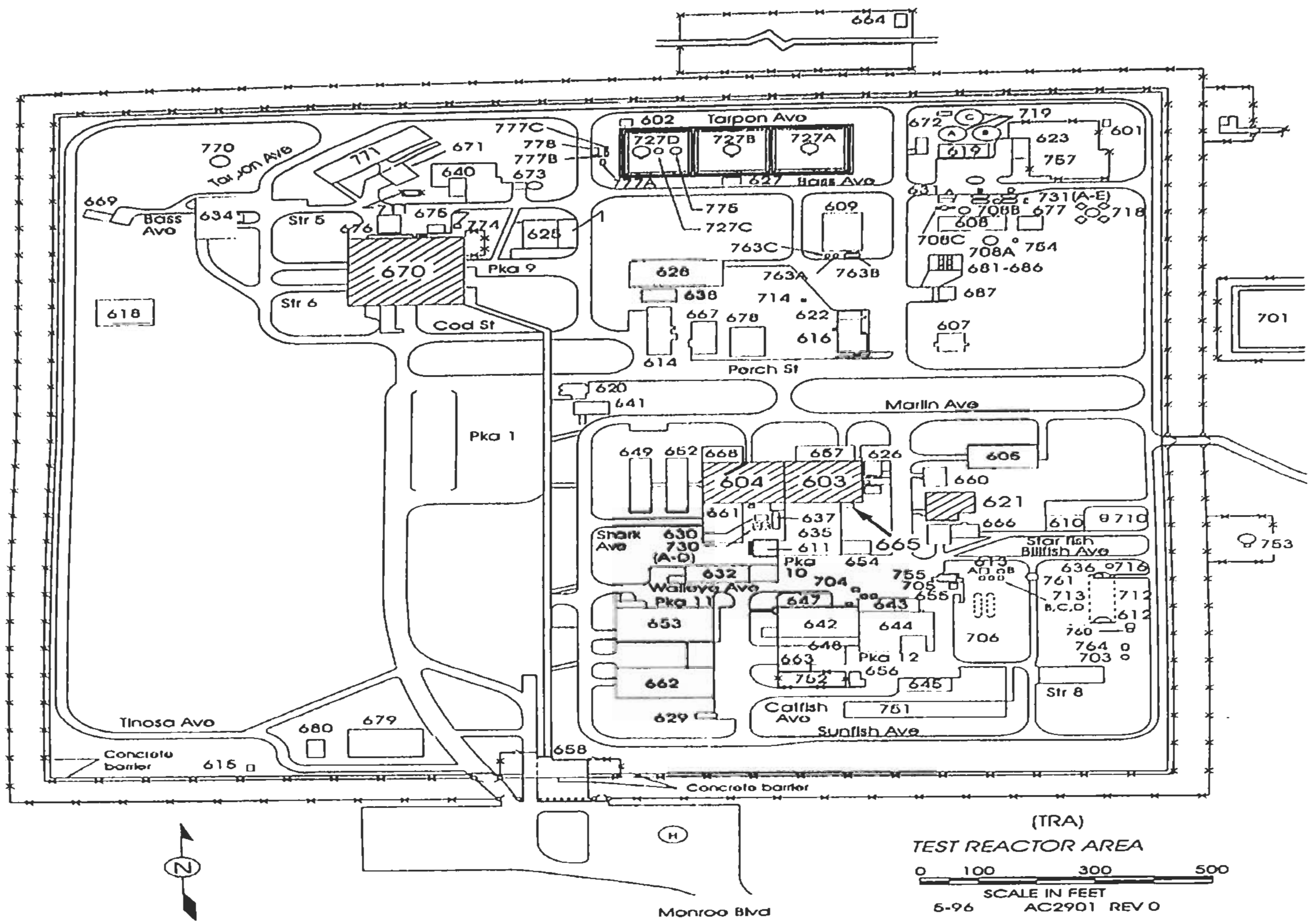

Figure 3. Test Reactor Area

1.2.2 TRA-604, MTR Annex (or Radiological Laboratory)

This laboratory does chemical research, routine chemistry, physics research, instrumentation research, computer applications and radioactive material counting. The single partition area is Laboratory 112, which contains 10.6 grams of HEU stored in a fire-resistant safe. Laboratory 112 is used for preparation and handling of neutron dosimetry materials and ATR experimental samples.

1.2.3 TRA-621, Nuclear Material Inspection and Storage Facility

The NMIS Facility consolidates the inspection and storage of strategic quantities of special nuclear materials within the TRA. The amount of HEU holding is classified. The facility is partitioned into two areas for this report: (1) Inspection Staging/Assay Area; and (2) Special Nuclear Material (SNM) Storage Vault.

Operational Safety Requirements (OSRs) are currently being upgraded to Technical Safety Requirements (TSRs) to meet DOE Orders.

1.2.4 TRA-670, Advanced Test Reactor Critical Facility

The ATRC Facility is used to obtain accurate and timely data on nuclear characteristics of the ATR core. For this assessment, there are two partitioned areas: (1) the Canal, and (2) the Fuel Storage Cabinet. The Canal contains an estimated 41.81 kg of HEU; and the Storage Cabinet contains an estimated 0.511 kg.

1.3 Radioactive Waste Management Complex

Various high-technology strategies for waste storage, processing, and disposal are studied at the RWMC, which was established in 1952 as a controlled area for disposal of solid radioactive wastes generated in INEL operations. Since 1954, the facility has received defense wastes for storage.

The RWMC SAR, in accordance with DOE Orders 5480.22 and 5480.23, was updated in February, 1996. Other than the site-wide assessment mentioned above, there are no recent events, ongoing evaluations, recent assessment reports, or studies relevant to this assessment for RWMC (see Figure 4).

1.3.1 Air Support Building II (ASB II)

The eastern half of the RWMC comprises the Transuranic Storage Area (TSA), where transuranic waste is stored in large container stacks on asphalt pads. The waste on two of these pads has been covered with a layer of soil. The pads are divided into cells. Cell three of Pad 2 is not covered with soil, but has an air-support structure over it for protection of the waste container stacks. The structure is called ASB II.

The ASB II is used as a waste storage facility. U-233 material from the Light Water Breeder Reactor (LWBR) Program is stored in 12 Department of Transportation (DOT) CM drums. The total mass of U-233 stored in the ASB II is estimated to be 1.682 kg. Several hundred other drums of transuranic waste are also stored in this facility. It is considered a single partitioned area for this report.

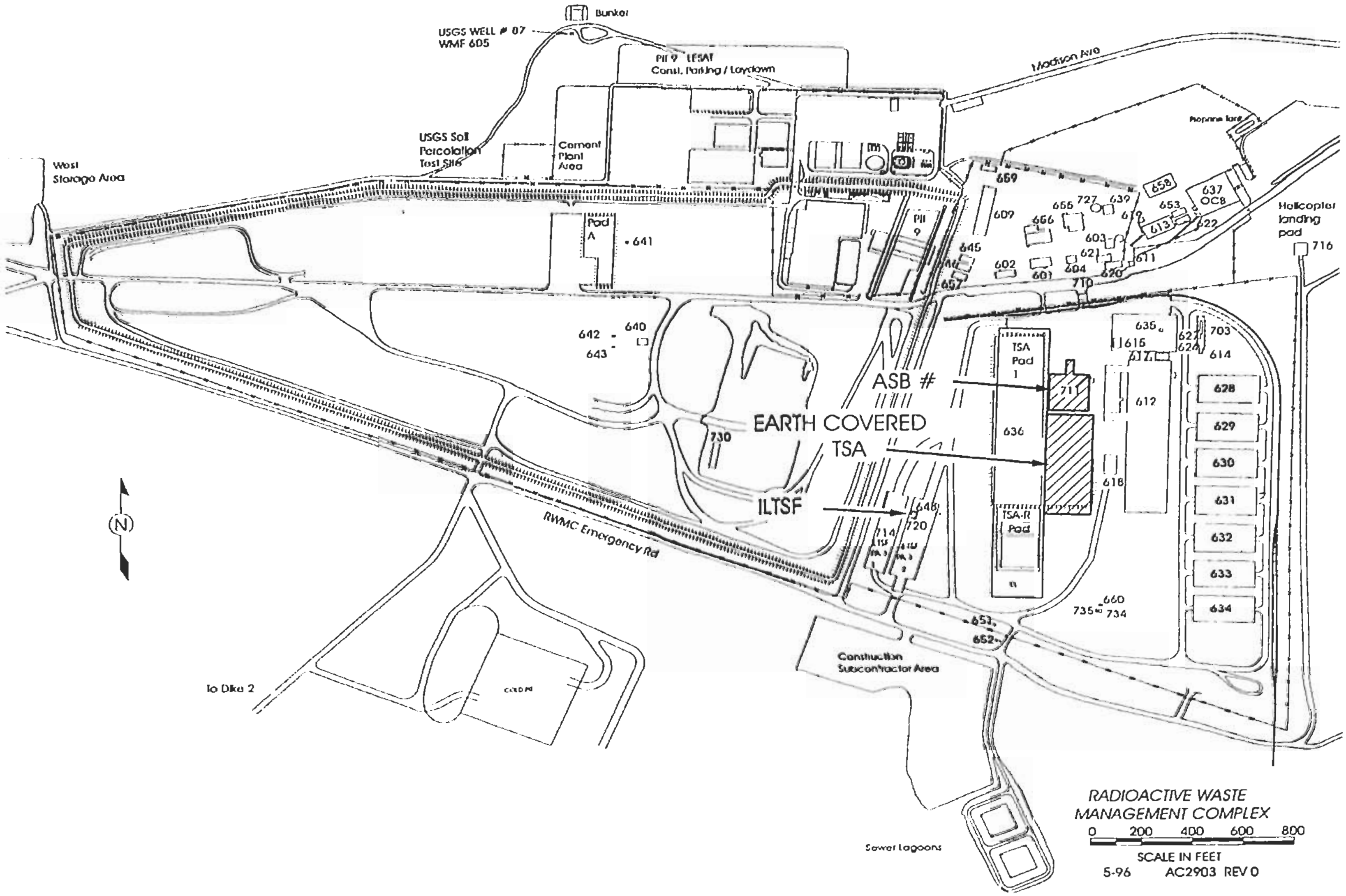

Figure 4. Radioactive Waste Management Comples

1.3.2 Transuranic Storage Area Pads

The TSA Pads are on an earth-covered area of RWMC, which stores approximately 152 DOT 6M drums of U-233 from the LWBR program, along with thousands of other TRU waste containers. Eighty of these drums contain U-233 in the form of fuel rods or pellets, and documentation on the mass content is available. The contents of the remaining drums are not as well characterized. They are described as "solidified sludge, metallography mounts, fuel assembly end plates, and scrap." U-233 mass content is not presently available, but they were received under an acceptance criterion of no greater than 500 grams per drum. It is considered a single partitioned area for purposes of this report.

1.3.3 Intermediate Level Transuranic Storage Facility (ILTSF)

The ILTSF consists of two asphalt pads in the RWMC TSA. The U-233 stored at the ILTSF also originated from the LWBR Program at Bettis Atomic Power Laboratory. The material has been declared TRU waste by DOE, and handled and stored by RWMC this way since its receipt.

This area contains 53 DOT 6M drums of U-233 in the form of fuel pellets and fuel rods. The drums are in shielded storage on the ILTSF pad in the TSA at RWMC. This is considered a single partitioned area for the purposes of this report. The total mass of U-233 is estimated to be 14.731 kg.

1.4 CFA-690 Radiological and Environmental Sciences Laboratory

The RESL is owned and operated by DOE. The facility mission is to provide a laboratory where radiochemical analyses of collected biological and environmental samples may be performed and where radiological dosimeters may be irradiated and analyzed.

HEU holdings in RESL are in one partitioned area for the purpose of this assessment. These include reference standards and sources stored in the radioactive material storage vault and in two other laboratory rooms.

Other than the assessment mentioned above, there are no recent events, ongoing evaluations, recent assessment reports or studies relevant to this assessment (see Figure 5).

1.5 Power Burst Facility - Buildings 612 and 620

Most of the material at PBF 612 (Waste Engineering Development Facility Reactor Building) and PBF 620 (PBF Reactor Building) was included in the Spent Nuclear Fuel Vulnerability Assessment, completed in November 1993. It also contains 67 grams of residual material and 14 grams tied up in instrumentation that is outside the scope of the rest of this assessment. (See memo from J. T. Taylor to Norm Klug, subject: HEU Vulnerability Assessment at PBF - JTT-04-96, May 10, 1996.)

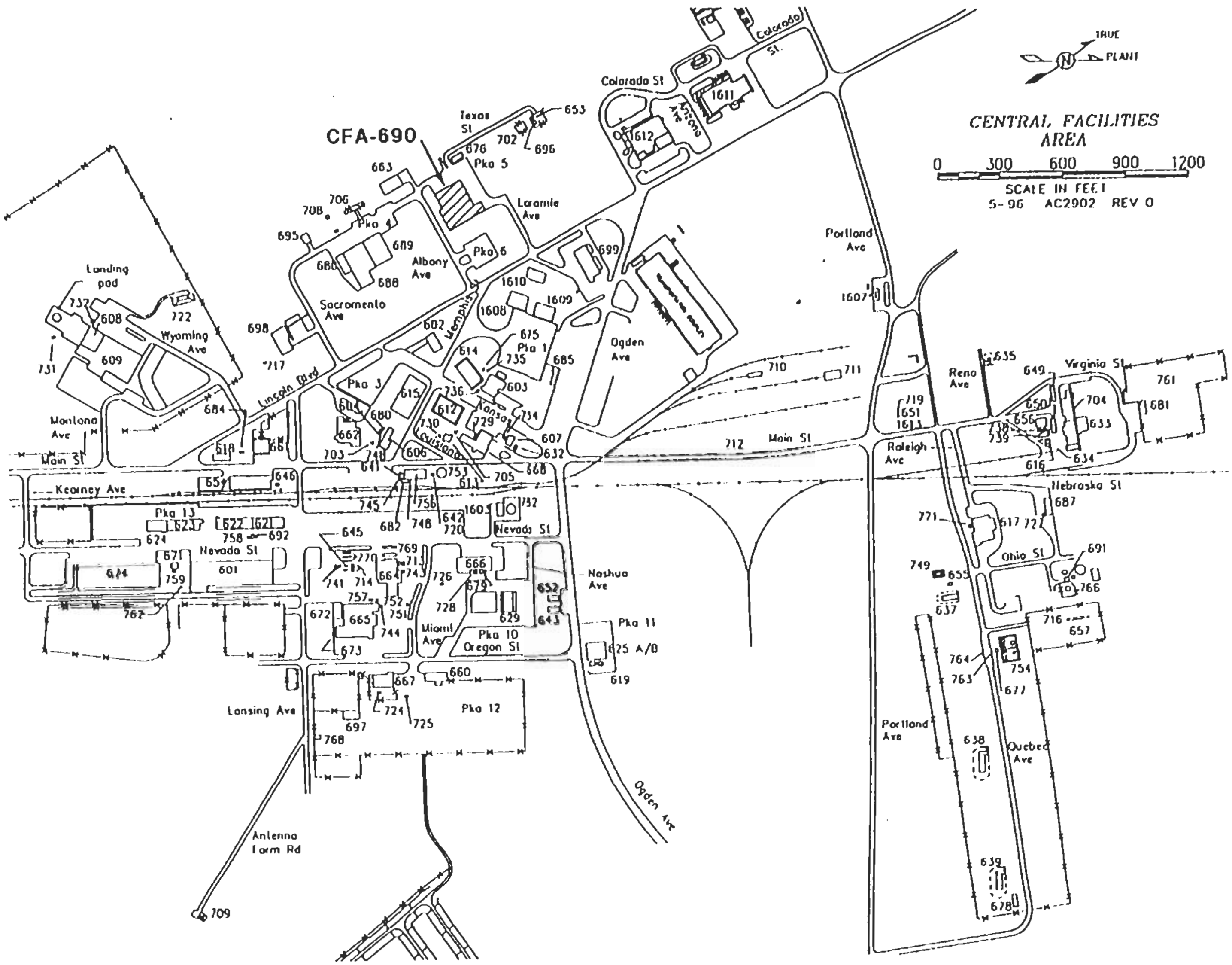

Figure 5. Central Facilities Area Map

1.6 INEL Research Center

The IRC consists of four office buildings, a single level laboratory complex, an engineering demonstration facility, a chemical storage facility, a multipurpose specialized storage unit, a National Security Laboratory, and a Systems Analysis Facility. The IRC laboratories contain less than 1 gram of HEU and are, therefore, excluded from the rest of this assessment.

1.7 CFA-625, CFA Laboratory Complex

The facility mission of CFA-625 is to provide a laboratory for research and development support for INEL programs, particularly in the area of analytical chemistry. CFA-625 contains less than 1 gram of HEU and is, therefore, excluded from the rest of this assessment.

2.0 DISCUSSION BY FACILITY

Per guidance from DOE in the HEU Vulnerability Assessment Plan, the following discussion by facility first includes a summary of the question set responses (Appendix B), and second an ES&H Vulnerability Summary (Appendix C).

2.1 ICPP

Photographs of ICPP and associated components are found in Appendix B with the question set response to which they pertain.

2.1.1 CPP-601

Question Set Summary

The CPP-601 Facility is a mass limit criticality control area (CCA). Administrative controls limit the amount of fissile material to 350 grams or less of U-235. Procedures implement this limit. The cell and concrete shielding of the walls and ceiling provide worker protection. Protective clothing is required to be worn when making cell entries. Radiation monitoring is provided by Constant Air Monitors (CAMs). There are no credible criticality scenarios.

ES&H Vulnerability Summary

No vulnerabilites were found.

2.1.2 CPP-602

Question Set Summary

The HEU is located in five areas, which contain small quantities of radioactive samples, including HEU stored in locked cabinets. Each area is a mass limit CCA and is limited to 350 grams of fissile material or less. No credible criticality scenarios have been identified. The quantity of material and barriers in each area preclude significant exposure to workers, the public, or the environment.

ES&H Vulnerability Summary

No vulnerabilites were found.

2.1.3 CPP-627

Question Set Summary

The HEU is located in three areas. In the SAL it is stored in containers inside of a hood, and in a locked cabinet. In the RAF, it is located in a shielded Type III cave. In Room 105 it is in the form of pieces, or contained in bottles or cans, multiple bagged, and placed in a drum. Each of the three areas is a mass limit CCA and is limited to 350 grams of fissile material or less. No credible criticality scenarios have been identified. The limited quantity of material and the barriers in each area preclude significant exposure to workers, the public, or the environment.

ES&H Vulnerability Summary

No vulnerabilites were found.

2.1.4 CPP-637

Question Set Summary

Each of the three laboratory areas containing HEU are mass limit CCAs and are limited to less than 350 grams each of U-235 by administrative controls. Hoods and protective clothing are used when handling the material and it is stored in plastic bags within locked cabinets or a locked room. No credible criticality scenarios have been identified. The limited quantity of material and barriers preclude significant exposure to workers, the public, or the environment.

ES&H Vulnerability Summary

No vulnerabilites were found.

2.1.5 CPP-640

Question Set Summary

The bulk of the HEU is combined with a minimal amount of other fission products in the burners. Aging degradation of the moderator isolation barriers or administrative control violations could potentially cause moderator introduction and a criticality accident in the process vessel.

Shielded cells, some remote handling equipment, and administrative controls keep radiation doses to workers to a low level. Protective clothing is used during cell entries for preventing possible uptakes of airborne radioactivity. A criticality alarm system (CAS) ensures prompt worker evacuation for mitigating radiation doses from a criticality accident. Administrative controls ensure that moderator materials are not taken into dry process cells.

ES&H Vulnerability Summary

1. **Possibility of loss of moderator control in CPP-640 (INEL/CPP-640/SAT/01)**

   A few large-volume, unsafe geometry vessels in the MHC and Cells 3 and 4 of the ROVER facility contain large amounts of uranium. While dry, these vessels are critically safe. The addition of moderator to a vessel, however, could create a critical system. Also, the addition of moderator into a process cell, combined with a spill of material from one of the vessels, could result in a criticality on the cell floor. The facility relies on maintaining tight control on the amount of moderator present in order to remain critically safe. The roof of the facility leaks. Water exists in the lower levels of the fire sprinkler system, but the system is isolated from the upper level.

2. **Potential compromise of confinement structures due to severe earthquakes or severe winds (INEL/CPP-640/SAT/02)**

   CPP-640, which houses the Rover process system, is not seismically qualified to current standards (built in 1961). The process cell walls are thick, reinforced concrete shielding walls and appear to be structurally sound. A severe earthquake could potentially cause structural damage, compromising process vessels and other confinement features, resulting in local spread of contamination. The CPP-640 roof is not qualified to withstand extreme winds, and wind failure of the roof could cause damage to confinement features in the MHC area of the Rover system, resulting in local contamination spread and loss of strict moderator control.

2.1.6 CPP-651

Question Set Summary

The facility is in use and contains a large amount of HEU (quantity classified). Its major weakness may be seismic response, which is currently under review.

A number of barriers are provided to protect workers and the public. Mass limits in containers protect workers from criticality accidents. Most fuel is double contained. A CAS is included in the safety features.

ES&H Vulnerability Summary

1. **Potential flooding of fully loaded cans (INEL/CPP-651/SAT/03)**

   Fuel storage racks containing LANL material in Room 102 of CPP-651 do not meet design requirements of $\leq$ 0.95 Keff when the cans are fully flooded and loaded to the maximum allowable U-235 limit..

2. **Structure Failure (INEL/CPP-651/SAT/04)**

   CPP-651 inner building (north and south vaults) and south vault fuel storage racks have not been verified to be seismically qualified. A seismic event could cause a failure of the inner building, which supports all fuel storage racks. Damage to fuel storage racks and rack supports could result in criticality resulting from loss of geometry.

2.1.7 CPP-657

Question Set Summary

The Safeguards Office Facility uses only small sealed quantities for portal monitoring calibration. The sources are contained in sealed glass containers, within a plastic container, in a plexiglass container. Administrative controls are used to protect the workers.

ES&H Vulnerability Summary

No vulnerabilites were found.

2.1.8 CPP-666

Question Set Summary

The FDP Cell is inactive, with an estimated 15 grams of uranium in the equipment that is not retrievable. An additional 6 grams of fuel samples are stored in the FDP cell in sealed containers. The FDP cell is a mass limit CCA and is limited to 350 grams of fissile material or less. No credible criticality scenarios have been identified. The limited quantity of material and barriers preclude significant exposure to workers, the public, or the environment.

ES&H Vulnerability Summary

No vulnerabilties were found.

2.2 TRA

Photographs of TRA and associated components are found in Appendix B with the question set response to which they pertain.

2.2.1 TRA-603

Question Set Summary

In TRA-603, HEU is stored in vault HR-4, located adjacent to the MTR. The HEU material in HR-4 consists of physical samples and nuclear accident dosimeter material, and is occasionally used for research within three laboratories at TRA-603, or at Idaho State University in Pocatello, Idaho. There are less than 63 grams of HEU in HR-4. Administrative controls are used to minimize the possibility of criticality. The storage vault is locked to restrict access.

ES&H Vulnerability Summary

No vulnerabilites were found.

2.2.2 TRA-604

Question Set Summary

In TRA-604, the HEU is stored in Laboratory 112. It is used for calibration and as reference standards. Only one person has access to the material, or uses it. Procedures, directives, and other documentation are in place to control all activities associated with the storage, handling, and use of the HEU in Laboratory 112; all of these are appropriate and ample for ensuring safe and efficient operations.

ES&H Vulnerability Summary

No vulnerabilites were found.

2.2.3 TRA-621

Question Set Summary

The NMIS Facility contains classified amounts of HEU. This material is all either unirradiated (fresh) reactor fuel, or slightly irradiated reactor fuel, targets, and other HEU materials. Company-level and facility-level procedures, directives, and other documentation are in place to control all operations associated with the NMIS Facility; all of these are appropriate and ample for ensuring safe and efficient operations.

An SAR dated December 1992 serves as the safety basis for operation of the facility.

ES&H Vulnerability Summary

No vulnerabilties were found.

2.2.4 TRA-670

Question Set Summary

The ATRC Facility contains approximately 41.81 kg of HEU in the assembled pool reactor. The ATRC Facility reactor is operated at low neutron flux levels so that the fuel contained therein is considered only slightly irradiated.

There are 10 grams of HEU stored in an SNM storage cabinet on the ATRC Facility floor, which is used for determining flux profiles in the reactor. Additionally, the cabinet holds 126 fuel strips, which are assembled into experimental fuel element structures for use in the ATRC Facility reactor for validating reactor physics parameters.

Procedures are in place controlling the amount of allowable HEU material within the ATRC outside of the reactor core.

ES&H Vulnerability Summary

No vulnerabilties were found.

2.3 RWMC

Photographs of RWMC and associated components are found in Appendix B with the question set response to which they pertain.

2.3.1 ASB II

Question Set Summary

The ASB contains 12 DOT 6M drums containing an estimated 1.682 kilograms of U-233 in the form of fuel pellets and fuel rods. The 6M drums are constructed according to DOT standards. The air in the ASB is monitored for radioactive contamination with alpha and beta/gamma monitors. While the outer container could conceivably be breached in an accident, it is not credible that the inner 2R container could be breached.

ES&H Vulnerability Summary

No vulnerabilties were found.

2.3.2 TSA

Question Set Summary

Approximately 152 DOT 6M drums containing U-233 materials are located in the earth-covered TSA pads in stacks along with thousands of other TRU waste containers. Eighty of these drums contain U-233 in the form of fuel rods or pellets. The contents of the remaining drums are not as well characterized.

ES&H Vulnerability Summary

1. **Container corrosion on TSA Pads (INEL/RWMC-TSA/SAT/07)**

   Corrosion of containers is possible, though moisture barriers are built into the earth- covered container stack.

Criticality safety of the U-233 containers is based on an assumption of arrays of intact containers maintaining a designed spacing. If that spacing is lost, criticality becomes possible.

2.3.3 ILTSF

Question Set Summary

Fifty-three DOT 6M drums containing 14.731 kg of U-233 in the form of fuel pellets and fuel rods are located in the shielded storage arrangement on the ILTSF pad. These drums were removed from their original storage on one of the TSA pads and placed six at a time in metal bins. Three metal bins were placed into a cargo container, and three of the cargo containers were placed on the ILTSF pad. The cargo containers are completely surrounded by stacked concrete blocks for shielding. Storage of the U-233 drums on the ILTSF pad poses no threat to the environment or public.

ES&H Vulnerability Summary

1. **Container corrosion on ILTSF Pad (INEL/RWMC-ILTSF/SAT/06)**

   Corrosion of containers in the shielded configuration is possible. Criticality safety of the U-233 containers is based on an assumption of arrays of intact containers maintaining a designed spacing. If that spacing is lost, criticality becomes possible, although extremely unlikely.

2.4 CFA-690

Photographs of CFA-690 and associated components are found in Appendix B with the question set response to which they pertain.

Question Set Summary

The radioactive material in the source vault is stored in a vault that has a locked door and concrete shiuelding walls that are fire-rated. The U-235 encapsulated source stored in Room 119 is kept in a lead brick shielded locked 0.5 in. plastic box. The U-233 sources stored in Room 133 are in a locked storage drawer. Criticality is not a concern for RESL, as it has an administrative control in place that does not allow more than 100 grams of fissile material in the facility. Radioactive material in the vault is surveyed weekly. Radioactive sources are checked for levels every six months by trained personnel. A computer program is used for accountability for all radioactive material at RESL. A facility fire has been identified as the only potential cause and effect of a vulnerability; however, the building has fire sprinklers and fire extinguishers, and all areas containing HEU have a low combustible loading. A release of HEU from areas within RESL by a fire would not result in worker contamination, exposure, or injury, since all personnel would evacuate the facility and the HEU loading is small (< 1.5 grams total). The environment is not expected to be adversely affected since the HEU released would be a small fraction of the total loading. The public would not be exposed to contamination, exposure, or injury due to the site boundary distance from RESL.

ES&H Vulnerability Summary

No vulnerabilties were found.

APPENDIX A

SITE ASSESSMENT TEAM
MEMBERSHIP AND BIOGRAPHICAL SKETCHES

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Appendix A
Site Assessment Team Membership

Name	Organization	Functional Area
Jensen, William	DOE-ID	SAT Coleader
Olson, Craig	CPP Facilities	SAT Coleader
Anderson, Philip A.	Materials and Processes	Facilities CPP
Balkovetz, Fred J.	Engineering Analysis	Emergency Preparedness Hazard Analysis
Bonney, Richard F.	Engineering Analysis	Emergency Preparedness Hazard Analysis
Bopp, Ronald P.	Nuclear Engineering	SAT Facilitator
Bright, Darris J.	RWMC Operations	Facilities RWMC
Campbell, Roy L.	Nuclear Fuel Operations	Facilities CPP
Cerchione, Connie J.	INEL Institute	Administration
Denison, Stephen L.	ATR Operations	Facilities TRA
Denning, Bryce L.	Technical Operations	Safeguards and Security
Edson, Jerald L.	Electrical, Instrumentation & Control	Operations/Maintenance
Garbe, Donald D. Jr.	Nuclear Fuel	Ventilation
Gerard, K. C.	Safeguards & Security	Safeguards & Security
Graham, Mark A.	Nuclear Engineering	Safety Analysis
Hand, Rodney L.	Analytical Laboratories	Facilities CPP
Hansen, Jeffrey L.	Electrical, Instrumentation & Control	Operations/Maintenance
Harrison, Lawrnel	ES&H Radiation Dosimetry & Records	Ventilation
Henscheid, Joseph P.	Analytical Operations	Facilities CPP
Jensen, Nels C.	Nuclear Engineering	Operations/Maintenance
Jensen, Cindie L.	Nuclear Engineering	Administration
Johnson, Deborah A.	Engineering Analysis	Emergency Preparedness Hazard Analysis
Johnson, Stephen P.	Nuclear Engineering	Operations/Maintenance
Johnson, John E. Jr.	Nuclear Engineering	Safety Analysis
Klug, Norman P.	Nuclear Engineering	SAT Core Team Leader
Kubiak, Karen A.	ES&H Program Area/TRA/CPP/IH	Industrial Hygiene
Kyes, Allyn W.	Nuclear Engineering	Safety Analysis
Laible, Ernest L.	Technical Operations	Facilities CPP
Landgraver, Charles M.	Nuclear Fuel Operations	Facilities PBF
Lee, Laurence G.	Nuclear Engineering	Safety Analysis
Martin, Kerry L.	Radiological Analysis	Facilities TRA
Metcalf, Ron T.	ATR Operations	Facilities TRA
Mobley, E. V.	TRA Nuclear Engineering	Safety Analysis
Nitzel, Michael E.	Speciality Engineer	Seismic/Natural Phenomena
Oesterling, Richard G.	ES&H Radiological Support	Radiation Protection
Olsen, David L.	High Level Waste Operations	Facilities CPP
Ostby, Paula A.	Nuclear Engineering	Safety Analysis

Site Assessment Team Membership (cont'd)

CPP Operations	Facilities CPP
ES&H Ops Support/IF Site Service	Fire Protection
Specialty Engineer	Seismic/Natural Phenomena
Nuclear Engineering	Safety Analysis
Nuclear Engineering	SAT Facilitator
High Level Waste Operations	Facilities CPP
ATR Operations	Facilities TRA
Nuclear Engineering	Administration
Nuclear Engineering	Criticality Safety
Nuclear Engineering	SAT Facilitator
Nuclear Engineering	Criticality Safety
Nuclear Engineering	Criticality Safety
Technical Operations	Safeguards & Security
ES&H Radiological Support	Radiation Protection
Text Processing	Administration
Nuclear Engineering	Criticality Safety
Chemical/Radiological Risk Assessment	Safety Analysis

ıhy sketches are included. Additional information will be provided upon request.

Appendix A
Biographical Sketches

NAME: William D. Jensen

EDUCATION: BES, Chemical Engineering, Brigham Young University (1968)
ME, Chemical Engineering, Brigham Young University (1975)

EXPERTISE: Criticality Safety, Conduct of Operations, Reactor and Process Safety, Electronics, Computers and Programming, Accident Investigation, SAR reviews, Licensed Professional Engineer (Chemical) in the State of Washington since 1975

EXPERIENCE: Twenty years Facility Manager, Idaho Chemical Processing Plant, Deputy Assistant Manager, Nuclear Programs, Acting Manager, ES&H Oversight, Director, Safety Division, Chief Nuclear Safety Branch, and Nuclear Engineer, Nuclear Safety Branch, Idaho Operations Office; 2 years Nuclear Safety Specialist, and Quality Assurance Engineer, Richland Operations Office; 5 years Test and Decontamination Engineer, Pearl Harbor Naval Shipyard.

NAME: Craig S. Olson

EDUCATION: BS, Mechanical Engineering
Naval Nuclear Power Officer's Training

EXPERTISE: INEL SAT Coleader

EXPERIENCE: Mr. Olson has sixteen years of professional experience including eleven years of management experience. He has experience in engineering and maintenance of naval nuclear power plants, overhauls, refuelings and testing. He has trained naval officers and enlisted personnel on and operated two different naval nuclear reactors. He has represented operations on joint refueling and testing. He managed responsibilities for environmental and radiological controls, mechanical, electrical and reactor control maintenance and overall operations of a naval nuclear reactor training facility. He is currently managing storage of special nuclear material and spent nuclear fuel at the Idaho Chemical Processing Plant.

NAME: Fred J. Balkovetz

EDUCATION: BS, Mathematics
MS, Mathematical Statistics

EXPERTISE: Emergency Preparedness Hazards Assessments

EXPERIENCE: Idaho National Engineering Laboratory (INEL), 1967 - Present.
Twenty-nine years' experience to include emergency preparedness and hazards assessments, project management, technical training, scientific and engineering management, spent nuclear fuel management and environmental impact statements, safety and criticality analyses, statistical and reliability analyses of nuclear hardware and tests, nuclear safeguards, environmental studies, probabilistic risk assessments of energy technology systems, and computer modeling. This work was performed for the Department of Energy, the Nuclear Regulatory Commission, and the Department of Defense.

NAME: Richard F. Bonney

EDUCATION: BA, Sociology
Naval Nuclear Power Training

EXPERTISE: Emergency Preparedness Hazard Assessments
Safety Analysis

EXPERIENCE Twenty-four years experience in nuclear energy as a naval nuclear propulsion plant operator, experimental nuclear power plant operator and shift supervisor, commercial nuclear power plant emergency core cooling system test evaluator, safety analyst, and emergency preparedness hazard assessment specialist. Currently employed by Lockheed Martin Idaho Technologies and performs hazard assessments and safety analysis for facilities at the Idaho National Engineering Laboratory.

NAME: Ron Bopp

EDUCATION: BS, Biology, Minor in Chemistry

EXPERTISE: Wide range of laboratory research

EXPERIENCE: Mr. Bopp has five years experience in managing laboratory research in support of activities at the Idaho Chemical Processing Plant, as well as one year in agricultural research. He is currently employed by Lockheed Idaho Technologies Company, the operating contractor at the INEL for the Department of Energy. His more recent assignment was supporting the Technology Transfer Department in the areas of biological and chemical technologies.

NAME: Darris J. Bright

EDUCATION: BS, Industrial Management
MBA

EXPERTISE: RWMC Waste Generator Interface
U-233 Waste Coordinator

EXPERIENCE: Darris Bright has six years experience working with the storage and disposal of waste at the Radioactive Waste Management Complex. He has been responsible for the status of the U-233 material at the RWMC for the last three years.

NAME: Stephen L. Denison

EDUCATION: Graduated from Shorecrest High School, Seattle, WA., June 1970
Navy schools (1971 through 1989):
Basic Propulsion and Engineering; Machinist Mate "A" School; Naval Nuclear Power School; Nuclear Power Plant Operator School; Quality Assurance; Quality Control; Leadership and Management Training

EXPERTISE:

EXPERIENCE: Principle Technical Specialist on staff at the Advanced Test Reactor from November 1991 to present.

Custodian of the Nuclear Materials Inspection and Storage Facility at TRA from August 1995 to present (responsible for receipt, safeguarding, handling, storing, accounting, and transferring all Special Nuclear Material in custody at NMIS).

Machinist Mate (Mechanic) with the U.S. Navy Nuclear Power Program from January 1971 through June 1991.

NAME: Bryce L. Denning

EDUCATION: BBA, Accounting from Boise State University
MS, Computer Science from University of Idaho (will be completed end of calendar year)

EXPERTISE: Accounting
Safeguards & Materials Management

EXPERIENCE: Responsible for development, maintenance and operation of database programs designed to manage nuclear materials for Lockheed Idaho Technologies Company and assist in the management of reactor fuel as part of the national University Reactor Fuel Assistance Program. Knowledgeable of subcontract activities related to reactor fuel procurement; safeguards accountability records and reporting systems; and NRC and DOE nuclear material transmittal paperwork. Also involved in the development, completion, and submittal of all required Material Management reports (forecast, assessment, allotments, materials management plans, and special report requests).

NAME: Jerald L. Edson

EDUCATION: MNS (EE)
BS (EE)

EXPERTISE: Thirty-seven years experience at the INEL in providing technical support, project management, plant operations, and program development and review. Mr. Edson is currently employed by Lockheed Idaho Technologies Company and has recently been involved with the NRC's Nuclear Plant Aging Research Program. He has participated in a team effort to support updating the NRC's Standard Review Plan (NUREG-0800), participated in the development and publication of an IEEE standard for performing aging assessments of 1E equipment in nuclear power plants, has participated in the development of a DOE Standard on Configuration Management (DOE Std. 1073), and is participating as a member on the Energy Facility Contractors Group Working Group on Aging Management. Mr. Edson performed a hazards assessment of the Power Burst Facility at the INEL and led a team effort in reviewing the ATR Life Extension Program. He is currently Chairman of the IEEE Working Group 3.4, Guidelines for Life Extension of Class 1E Equipment Used in Nuclear Power Generating Stations and member of IEEE Subcommittee 3, Operations, Surveillance and Testing.

NAME: Donald D. Garbe, Jr.

EDUCATION: BSME
Naval Nuclear Power Training

EXPERTISE: Ventilation

EXPERIENCE: Mr. Garbe has three years professional experience in providing operational and technical support in HVAC and utility systems for the Nuclear Fuels Operations Department at ICPP at the INEL. Mr. Garbe is currently employed by Lockheed Idaho Technologies Company as a senior engineer. He has served on the ICPP work control restructuring team. Prior to attending college, Mr. Garbe served as a nuclear trained mechanical operator aboard the USS Baltimore, SSN-704.

NAME: K. C. Gerard

EDUCATION: BS, Agronomy and Chemistry, Brigham Young University
DOE Trained and Certified Classification Officer and Declassifier

EXPERTISE: Classification Officer

EXPERIENCE: Twenty years experience in Safeguards and Security, including nondestructive assay measurements of nuclear material, accountability, and materials management; 15 years experience in classifying breakthrough technologies, chemical processes and weapon programs.

NAME: Mark A. Graham

EDUCATION: BS, ChE
Michigan Technological University

EXPERTISE: Safety Analyst

EXPERIENCE: Mark has 18 years of professional experience. Mark is currently employed as a safety analyst for the U.S. Department of Energy contractor Lockheed Idaho Technologies Company. Mark has provided safety analysis support to operations in high level waste treatment and processing areas. Prior to this employment, he spent 13 years providing technical support at a commercial twin unit PWR in the areas of plant startup and operations. Primary areas of expertise then were in hazardous and low level radioactive operations and disposal.

NAME: Jeff Hansen

EDUCATION:

EXPERTISE: Advisory Engineer
Conduct of Operations

EXPERIENCE: Mr. Hansen has 25 years experience in nuclear facility safety analysis, operations and maintenance. This experience covers a broad range of areas in both DOE research and commercial nuclear power generation facilities. He has been a primary system engineer in three commercial facilities, a senior operations engineer at the INEL LOFT facility and has provided technical assistance to the DOE and US NRC on many generic safety issues. Mr. Hansen is currently employed by Lockheed Idaho Technologies Company Nuclear Regulatory Support Programs. He is currently providing training to the government of the Czech Republic on US NRC nuclear plant licensing methodology.

NAME: Lawrnel Harrison

EDUCATION: BS, ME
Several continuing education courses in ventilation and ventilation testing

EXPERTISE: Ventilation

EXPERIENCE: Over the past three years, Mr. Harrison has been working directly with ventilation and filtration systems. His duties have included testing of HEPA filter systems, design review of ventilation systems, and support to facilities on ventilation issues. He has attended several workshops and courses on ventilation and ventilation system testing. He is a member of the American Society of Mechanical Engineers and the American Society of Heating, Refrigerating and Air Conditioning Engineers. He is a member of two code subgroups for the ASME Committee on Nuclear Air and Gas Treatment.

NAME: Joseph P. Henscheid

EDUCATION: Analytical Chemistry, Knowledge of Analytical Sample Storage

EXPERTISE:

EXPERIENCE: Supervisor of the Routine Analytical Chemistry Group for thirteen years. This is the laboratory that provided the routine analyses necessary to keep the ICPP process operating. We also provided for the analysis of the "final product" samples of $U0_3$ and provided tracking and storage for these samples on an interim basis. Was author of the preparation procedure for the denitrator samples, and provided the on-the-job training for the fissile material handlers in the laboratory. Knowledgeable in routine analytical chemistry, especially chemical analysis in remote hot cells. Have worked in analytical chemistry for 22 years.

NAME: Nels C. Jensen

EDUCATION: U.S. Navy Nuclear Power Program

EXPERTISE: Operations, Training, Safety Analysis

EXPERIENCE: Mr. Jensen has over 27 years professional experience in the nuclear industry, including nuclear reactor operation, operating personnel supervision, personnel training, procedure development, operating facility safety and health assessments, safety analysis activities, and operator performance evaluations. He was a member of DOE Chemical Safety Vulnerability Review team, reviewing operations for chemical safety vulnerabilities at the Los Alamos National Laboratory, and has been a member of seven different Technical Safety Appraisal Teams at various DOE Nuclear Sites. Mr. Jensen has prepared and administered nearly 100 Reactor Operator and Senior Reactor Operator written, oral/walk-through, and simulator examinations at NRC regulated commercial reactor sites across the United States. He was a shift supervisor and training coordinator at the Loss of Fluid Test Facility, a DOE Category I reactor, at the Idaho National Engineering Laboratory.

NAME:	Deborah A. Johnson
EDUCATION:	BSEE BAT, Electronics Systems
EXPERTISE:	Electronic/Electrical Circuitry Instrumentation and Control Hazards Assessment Probabilistic Risk Assessment
EXPERIENCE:	Thirteen years experience in electronic instrumentation and control and component circuitry. Recent work experience has focused on hazards assessments and on reactor and non-reactor studies using probabilistic risk assessment techniques and reliability, availability, and maintainability techniques.

NAME:	John E. Johnson
EDUCATION:	BS, Chemistry MS, Physical Chemistry/Nuclear Engineering
EXPERTISE:	Safety Analyses and OSRs for ICPP HEU storage and processing facilities, CPP-640/Rover question set, consultation on vulnerability writeups
EXPERIENCE:	Mr. Johnson has 25 years experience at the Idaho National Engineering Laboratory in providing technical research and development support and safety analysis support to chemical processing and HEU fuel storage facilities. He supervised safety analysis and preparation of OSRs for HEU fuel storage and reprocessing facilities at the INEL for 15 years. He participated in the INEL Spent Fuel Vulnerability Study and the Tomsk-7 Lessons Learned/Nitrated Organics Vulnerability Study. He is currently chairman of the LMITCO Safety Analysis Committee, which is responsible for Company-wide implementation of safety analysis-related DOE Orders/Rules, facilitating communication among the INEL safety analysis groups, and serving as the central agency for safety analysis-related communications with DOE.

NAME: Stephen P. Johnson

EDUCATION: BSNE
Senior Reactor Operator License Training

EXPERTISE: Operations and Maintenance

EXPERIENCE: Over 15 years experience in operations and operations technical support, training and inspections. Currently employed by Lockheed Idaho Technologies Company, the M&O contractor for the U.S. Department of Energy at the Idaho National Engineering Laboratory. He has provided technical support to DP-45 Special Projects Group in the area of operational assessment. He has also provided support to the U.S. Nuclear Regulatory Commission in licensing of commercial power plant operators and inspections for the training programs. Prior to working for Lockheed Idaho Technologies Company, he was a shift supervisor for operations at Georgia Power Company's Vogtle Electric Generating Plant.

Name: Norman P. Klug

EDUCATION: BS, Chem.Eng.
MS, Nuc. Eng.
MS, Gen. Adm.

EXPERTISE: SAT Core Team Leader
SAR Reviews

EXPERIENCE: Mr. Klug has over 35 years of professional experience in nuclear safety reviews and oversight matters. He spent most of his career working in the DOE Offices of Nuclear Energy, Environmental, Safety and Health, and predecessor organizations. In Nuclear Energy he served as the Director of Operational Safety, and in Environmental Safety and Health he acted as a Technical Safety Appraisal Team Leader. Over the past four years, Mr. Klug has served as a consultant for the DOE Offices of Defense Programs, Nuclear Energy and Environmental, Safety and Health. In his most recent assignment for Lockheed Idaho Technologies Company, he has been a member of a DOE Headquarters panel reviewing upgraded SARs for the Pantex Plant.

NAME: Karen A. T. Kubiak

EDUCATION: BS, Occupational Safety and Health
MS, Industrial Hygiene

EXPERTISE: Industrial Hygiene

EXPERIENCE: Karen Kubiak has 6-1/2 years experience in providing technical industrial hygiene support for both operations and construction activities. She is currently employed in the Environmental Safety and Health Department of Lockheed Idaho Technologies Company, a contractor for the Department of Energy. Ms. Kubiak has been a member of the American Conference of Governmental Industrial Hygienists for the past nine years.

NAME: Charles M. Landgraver

EDUCATION: Naval Nuclear Power Training

EXPERTISE: Advisor
Operations and Regulatory Issues

EXPERIENCE: Twenty-five years experience in reactor operations and analysis of operational events. He has obtained reactor operator certifications on six nuclear reactors, and is currently a certified shift supervisor at the Power Burst Facility. Responsibilities also include project engineering support to the Nuclear Fuels Department of Lockheed Idaho Technologies Company. He has served as an advisor to the NRC and INPO in the development of the Licensee Event Report and Performance Indicator Systems, and served as the DOE's lead instructor on the Occurrence Reporting and Processing System.

NAME:	Laurence G. Lee
EDUCATION:	BS, Mathematics and Statistics, Utah State University, 1974 MS, Industrial Engineering (Safety), Texas A&M University, 1975 PhD, Civil Engineering (Bioenvironmental), Oklahoma State University, 1985
EXPERTISE:	Safety Analyst, Nuclear Fuel Safety Analysis Board of Certified Safety Professionals - Certified Safety Professional in both Comprehensive Practice and System Safety (1990) American Board of Industrial Hygiene - Certified Industrial Hygienist in Comprehensive Practice (1992)
EXPERIENCE:	Six years professional experience in providing safety analysis support, 4 years professional experience in providing safety engineering technical support, and 9 years professional experience in educating safety and health professionals. Currently employed by Lockheed Idaho Technologies Company as a nuclear fuel safety analyst at the DOE Idaho National Engineering Laboratory.

NAME:	Ronald T. Metcalf
EDUCATION:	Graduated from Flathead County High School, Kalispell, MT, May 1965 Attended Montana State University studying Architecture and Engineering 1965-1967 Attended Spokane Community College studying electronics 1968 through 1969 Attended University of Idaho (Idaho Falls continuing education classes) studying Reactor Operations (Associate Degree) 1982 to 1990
EXPERTISE:	Reactor Operations
EXPERIENCE:	Worked for ATR Operations from February 1978 to present. Certified as Utility Area Operator (ATR Operations) 1978-1980, Certified as Process Operator (ATR Operations) 1980-1989. ATR Operations Document Controller 1989 to present; also ATR Operations Technical Specifications Surveillance tracking independent verifier, Reactor Cycle Control Document, and Periodic Check document controller.

NAME: Emory V. Mobley

EDUCATION: MS, ME U of Washington

EXPERTISE: Safety Analysis

EXPERIENCE: General experience includes construction, procurement, scheduling, testing, experiments, safety analysis, and criticality.

NAME: Michael E. Nitzel

EDUCATION: BS, Aerospace Engineering
ME, Civil Engineering

EXPERTISE: Seismic Analysis/Natural Phenomena Hazards

EXPERIENCE: Mr. Nitzel has over 24 years experience related to the nuclear industry. His experience in the areas of structural analysis, applied mechanics, and component design has included the analysis and evaluation of structures and components subjected to a variety of loading conditions including seismic and other natural phenomena loads. He has been involved in a variety of research, consultation, design, and analysis projects performed for customers that include the Department of Energy, the U.S. Nuclear Regulatory Commission, and military organizations. This work has included participation in a number of industry-wide programs for the NRC and special initiatives for the DOE. He has participated in reviews and/or inspections at 24 commercial nuclear power plants and been involved in reviews and/or assessments at a number of DOE weapons complex facilities. He was actively involved in the previous DOE Spent Fuel Vulnerability Assessment.

NAME: Richard G. Oesterling

EDUCATION: Certified Health Physicist, BS

EXPERTISE: Radiological Protection

EXPERIENCE: Over three decades of professional and managerial radiological protection experience in US DOE contractor facilities, nuclear power reactor design and operations, and US NRC licensed facilities. Performed numerous programmatic and technical assessments in all environments using systems analysis, MORT analysis, INPO review, and US NRC inspection manual methodologies

NAME: Paula A. Ostby

EDUCATION: BA, Chemistry

EXPERTISE: Staff Engineer
High Level Waste Safety Analysis
Idaho Chemical Processing Plant (ICPP)

EXPERIENCE: Ms. Ostby has 18 years safety analysis experience in all processes at the ICPP. She is directly responsible for preparation and documentation of safety analyses for several waste processing operations at the ICPP. Ms. Ostby is currently employed by Lockheed Idaho Technologies Company in the High Level Waste Safety Analysis section of the Nuclear Engineering Department. She is a LMITCO representative on the EFCOG TSR Subgroup.

NAME: Ken C. Phillips

EDUCATION: BS, Brigham Young University, Tool and Manufacturing Engineering
MS, University of Idaho, Safety Engineering

EXPERTISE: Fire Protection Engineering

EXPERIENCE: Thirty-two years experience in providing fire protection engineering to industry and the Department of Energy for loss prevention programs, and control of fire losses. Provided engineering design and review, development and management of fire protection programs using interaction of people, hazards, and prevention for control of fire risks. Mr. Phillips is currently employed as the cognizant fire protection engineer for Lockheed Martin Idaho Technologies Company at the INEL. He is serving as a member of the DOE HQ fire protection safety committee, and has been a member of several DOE assessment teams. Prior to working at the INEL he was a field fire protection engineer in the highly protected risk fire insurance industry.

NAME: Richard Rahl

EDUCATION: BS, Civil Engineering
MS, Civil Engineering

EXPERTISE: Static and Dynamic Structural Analysis

EXPERIENCE: More than 28 years experience in the area of structural analysis. Mr. Rahl is currently employed by Lockheed Martin Idaho Technologies Company at the Idaho National Engineering Laboratory. He performed the dynamic analyses (seismic and accident conditions) for the Loss of Fluid Test program. He performed stress and dynamic analyses of large and small structures, nuclear piping systems, and instrumentation for hydrodynamic, seismic, and accident loadings using finite element computer codes and hand calculations, and evaluated results according to the requirements of the ASME, AISC, and ACI structural codes, as well as DOE requirements. He was Section Leader of the NRC Licensing Support Section which included analysis and/or review of commercial plant analysis of structures such as containment buildings and auxiliary buildings, and components such as NSSS systems and fuel assemblies. He was a member of the working group for Plutonium Vulnerability Assessment Team for the Pantex Plant in 1994. Other areas of involvement were cooperative work with the German HDR testing program, Seismic Qualification of Nuclear Power Plants, and the NRC Systematic Evaluation Program.

NAME: Ronald J. Ramer

EDUCATION: Master of Science, Chemical Engineering
Bachelor of Science, Chemical Engineering
University of Idaho Extension Courses

EXPERTISE: Staff Engineer
Nuclear Engineering

EXPERIENCE: Mr. Ramer has 17 years professional experience in 1) safety analysis support, and 2) research and development. Mr. Ramer is currently employed by Lockheed Martin Idaho Technologies Company in Nuclear Engineering. He has eight years of experience as a safety analyst for the laboratory and experimental facilities. Prior to working as a safety analyst he served as a lead engineer in research and development. He has been the recipient of the George Westinghouse Signature Award of Excellence, a Quality Achievement Award Nominee, and is a patent holder.

NAME: Lt. Col. (Retired) John W. Rice, Jr.

EDUCATION: BS, Electrical Engineering
MS, Nuclear Weapons Effects

EXPERTISE: Site Assessment Team Facilitator
Safety Analysis

EXPERIENCE: Lt. Col. Rice has 24 years of experience in providing nuclear safety and safety analysis support to the U.S. Department of Energy and Department of Defense. He is currently employed by Lockheed Idaho Technologies Company as an Advisory Engineer staff member to the Company's Safety Analysis Committee. Under EG&G Idaho, Inc. management of the Idaho National Engineering Laboratory, he was the Company's Nuclear Safety Cognizant Professional. Prior to moving to the INEL in 1989, Lt. Col. Rice spent 20 years in the Air Force working on safety analyses for nuclear weapons systems, terrestrial reactors, and space nuclear systems.

NAME: Paul Sentieri

EDUCATION: BS, Engineering Physics

EXPERTISE: Criticality Safety

EXPERIENCE: Seven years experience in the field of Criticality Safety. Two years at Rocky Flats and five years at the INEL. Provide support and guidance to operations with regard to criticality safety. Including evaluation of various systems, determination of safe operating parameters, providing guidance to operations with regard to all regulatory compliance related to criticality safety, and overall operational support.

NAME: Richard D. Struthers

EDUCATION: Masters - Business Administration

EXPERTISE: Site Assessment Team Facilitator

EXPERIENCE: Sixteen years at the Idaho National Engineering Laboratory in field of project management, facility planning, hazard assessment and emergency planning. Authorized Derivative Classified-area of expertise is space nuclear power and propulsion.

NAME: Charles E. Stuart

EDUCATION: BS, Nuclear Engineering from University of California at Berkeley

EXPERTISE: Criticality Safety

EXPERIENCE: Eight years experience in the criticality safety field at DOE facilities. Chuck has worked for 6 years at the Rocky Flats Plant in Golden, Colorado, and has worked at the INEL for the last 2 years.

NAME: Mary Alice Thom

EDUCATION: BS, Liberal Arts from University of Wisconsin, Whitewater

EXPERTISE: Safeguards and Materials Management

EXPERIENCE: Direct Lockheed Martin Idaho Technologies Company's Materials Management operation. Responsibilities include integrated, long range planning, utilization of resources, project and allotment control and inactive materials disposition for inventories at the INEL, other DOE contractor sites, university research reactors, and NRC licensed facilities. Knowledgeable in Material Control and Accountability processes and requirements due to several years as Nuclear Materials Representative and considerable interface with Safeguards.

NAME: A. N. Tschaeche

EDUCATION: BSc, Nuclear Chemistry, MIT

EXPERTISE: Radiation Protection

EXPERIENCE: Mr. Tschaeshe is a certified health physicist with 40 years experience participating in or managing radiation protection programs including those for nuclear power reactors; nuclear fuel manufacturing plants (uranium and plutonium); radioactive material and radiation laboratories; nuclear fuel reprocessing plants; radioactive source fabrication plants; medical facilities utilizing radiation generating machines, radiation sources, and radioactive pharmaceuticals; experimental critical facilities; radioactive waste facilities; uranium mines and mills; and nuclear weapon test facilities. He has been active in voluntary standards activities for 37 years, including those for safeguards, criticality safety and radiation protection. Currently he is an advisory scientist at the Idaho National Engineering Laboratory in Idaho.

NAME: Helmut A. Worle

EDUCATION: BS, Physics
MS, Nuclear Physics
Additional courses in various safety disciplines
DOE/NRC certified accident/incident investigator

EXPERTISE: Leader, Radioactive Waste Management Complex Site Assessment Team
Criticality Safety
Safety Analysis

EXPERIENCE: Nineteen years professional experience in criticality safety, including review and appraisal of operations, training, and documentation; 10 years experience in safety analysis preparation and review. Mr. Worle has participated in several operational readiness reviews, both as a presenter and as a reviewer (most recently in the readiness assessment for the Gas Generation Test Facility at RWMC). Co-author of the current RWMC Safety Analysis Report, and has been involved in the preparation of several criticality safety evaluations for the RWMC

APPENDIX B

SITE ASSESSMENT TEAM
RESPONSES TO QUESTION SET

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SITE: INEL	FACILITY (Building or Location) CPP-601
	FUNCTION: Uranium Reprocessing

Question 1: SITE

DOE Headquarters Facility Landlord: EM
DOE Headquarters Program Sponsor: EM
Design Life: 40
Facility Age: 43

Location of Facility on Site and Distance to Site Boundary

Location (map) of facility and distance to site boundary.
CPP-601 is centrally located at the ICPP and located between Birch and Beech Streets.
Distance to the site boundary is 13,700 meters (m).

Design Mission, Interim Mission, Current Use

Originally, the purpose of the CPP-601 was the reprocessing of spent nuclear fuel. In 1992, reprocessing operations at this facility were discontinued. The systems used in the reprocessing operations have been cleaned-out and capped-off as needed. CPP-601 is now used for 1) makeup, storage, and pumping of nonradioactive chemical solutions used in other operations such as the preparation of decontamination solutions for use in NWCF or CPP-604, and 2) storage of raw materials (e.g. chemicals and solvents). Currently, no operations take place in CPP-601 that involve the use of radioactive materials. Since the process piping and tanks have been cleaned out and secured, it is estimated that less than 350 grams of uranium remain in the equipment.

Operational Status

Not operating

Historical Information

Until 1992, CPP-601 housed the operating uranium reprocessing facility. Reprocessing operations at this facility were discontinued in 1992 and the systems used in reprocessing operations have been cleaned-out and capped-off as necessary. The remaining radioactive material in the facility is estimated using accountability records after the facility cleanout was completed.

SITE: INEL	FACILITY (Building or Location) CPP-601
	FUNCTION: Uranium Reprocessing

Question 1: SITE

List Authorization Basis

The ICPP Plant Safety Document (PSD) contained approved safety analyses for all of the reprocessing activities previously conducted at ICPP in CPP-601. Since the mission change at ICPP, the reprocessing systems have been shut down, flushed and capped off. The small amount of HEU material in CPP-601 per the accountability records is still present in the facility cells and/or equipment but is essentially not retrievable.

The ICPP Safety Review Document, Section 3, "Facilities Description", ENI-113-3, contains a description of the CPP-601 facility.

Describe Important or Unique Design Features

Architecturally, CPP-601 consists of two levels. The lower level (largely belowground) is constructed of reinforced concrete, and the upper level (aboveground), of transite and structural steel. The building is rectangular, 244 x 102 ft and a maximum of 95 ft 3 in. high, extending from 57 ft 6 in. below grade to 37 ft 9 in. above grade at the peak of the roof. The building is joined on the north by a common firewall with the Laboratory Building (CPP-602) and on the west with the Headend Processing Plant (HPP) (CPP-640) and the Remote Analytical Facility (RAF) (CPP-627). CPP-601 consists of 25 process cells in two rows extending the length of the building with various corridors extending between and outside the cell rows. The top story of the building is an unpartitioned area used for storage and makeup of chemical solutions and for charging materials to the cells. The main fuel processing equipment was formerly located within the process cells, which are identified by alphabetic notations.

Shielding for reducing levels is provided by ordinary concrete that varies in thickness. Process cell shielding was designed to reduce radiation levels to mR/hr in the operating areas. All equipment inside the cells is designed to decontaminate in place to a low radiation level before direct-contact maintenance or D&D activities. Funnels located in the process makeup (PM) area are used to introduce decontamination solutions into the process cell equipment. Cell sprays decontaminate the cell interiors as well as the external surfaces of the processing equipment.

Describe Weaknesses in the Design Basis

1. Inadequate seismic design for current standards.
2. Aging facility.
3. HEU material distributed throughout the facility.

Structural Design

Other- specify

Partitioned Areas of HEU within facility

Shielded Cells

Description of Partitioned Areas

CPP-601 consists of two levels. The lower level (largely belowground) is the partitioned area of the building and is constructed of reinforced concrete.

Amount & Location of Hazardous Material Collocated or Commingled with HEU

No hazardous materials remain inside the facility cells collocated with HEU materials.

Process Material Transfers

Not Appliable.

On-Site Transportation

HEU material is not retrievable so transportation is not applicable.

Staff Levels & Experience

Not Applicable.

Applicable References

1. Idaho Chemical Processing Plant Safety Review Document, Section 3.0, "Facilities Description", ENI-113-3, December 1983

SITE: INEL	FACILITY (Building or Location): CPP-601
	PARTITIONED AREA: Shielded Cells

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier [2]	Criticality [1,2]	Administrative Barrier [3]
[ ] Gloveboxes	[Y] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[Y] HVAC/Confinement	[ ] Double Contingency Not Applied (specify) (e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike		[ ] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines		[ ] Configuration Control
[ ] Vault	[ ] Canyons		[ ] Quality Assurance
[ ] Room	[ ] Pads		[ ] Conduct of Operations
[Y] Hot Cell/Canyon	[Y] Site Boundary		[ ] Authorization Basis
[ ] Hood	[ ] Trenches		[ ] Training
[Y] Piping	[ ] Storage Vault		[ ] Organization
[Y] Shielding	[ ] Fire Suppression		[ ] Lessons-Learned
[ ] Distance	[ ] Alarm System		[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[ ] Protective Clothing			[ ] Records
[ ] Remote Handling			[ ] Standards
[ ] Confinement System			[ ] External Regulation
[ ] Burial Ground			[ ] Surveillance
[Y] Tanks			[ ] Personnel Reliability Assurance Program
[Y] Alarm System			[ ] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[ ] Emgergency Response
[ ] Other-specify			[ ] Other-specify
[ ] None			

1. Barriers between HEU and worker.
2. Barriers between HEU and public/environment.
3. Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.

SITE: INEL	FACILITY (Building or Location): CPP-601
	PARTITIONED AREA: Shielded Cells

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

The cell and concrete shielding of the walls and ceiling provide worker protection.

The tanks and piping contain the radioactive materials and provide isolation.

Protective clothing is required to be worn when making cell entries.

Radiation monitoring is provided by Constant Air Monitors (CAMs).

Public/Environment Barrier Narrative:

The site boundary is at a significant distance, 13,700 m, and provides protection to the public against doses as a result of HEU releases.

The HEU material is contained within the CPP-601 building which has a filtered ventilation system which ties into the ICPP Atmospheric Protection System.

Criticality Barrier Narrative:

The CPP-601 facility contains a total of 345 gm U-235. There are no credible criticality scenarios.

The CPP-601 facility is a Mass Limit Criticality Control Area. Administrative controls limit the amount of fissile material to 350 gm of U-235 or less. Procedures implement this limit.

Administrative Barrier Narrative:

The CPP-601 facility is a Mass Limit Criticality Control Area. Administrative controls limit the amount of fissile material to 350 gm of U-235 or less. Procedures implement this limit.

Many of the other administrative barriers listed under "Barrier Types" are implemented in the procedures governing use of Mass Limit Criticality Control Areas. The major administrative barriers are material limits and procedure controls.

SITE: INEL	FACILITY (Building or Location) CPP-601
	PARTITIONED AREA: Shielded Cells

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Holdup	Enriched	Materials in pipes, tanks, ducts, etc		Process Area		0	0.3450

umulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Not Applicable.

Describe material at risk, which constitutes a source term.

The HEU material remaining in CPP-601 is process material which is not retrievable.

SITE: INEL	FACILITY (Building or Location): CPP-601
	PARTITIONED AREA: Shielded Cells

Question 4: POTENTIAL CAUSES

Facility	Material	External
☐ Process Material Transfer	☐ Aging	☐ Fire
☐ Inadvertent Transfers	☐ Container Seal Degradation	☐ Explosion
[Y] Aging/Degradation	☐ Pressurization	☐ Earthquakes
☐ Equipment Failure	☐ Pyrophoricity	☐ Subsidence
☐ Change in Mission	☐ Radioactivity	☐ Winds
☐ Other Collocated Hazards	☐ Chemical Reactivity	☐ Floods
☐ Corrosion/Embrittlement	☐ Radiolysis	☐ Extreme Temperature
☐ Inadequate Configuration Knowledge	☐ Volumetric Expansion	☐ Snow
☐ Combustible Loading	☐ Oxidation	☐ Ash Loading
☐ Inadequate Seals	☐ Flammability	☐ Aircraft Crash
☐ Water Sources	☐ Toxicity	☐ Vehicle Accident
☐ Inadequate Drains	☐ Hydroloysis	☐ Onsite Transportatio
☐ Preventive Maintenance Failure	☐ Crystallization	☐ Adjacent Facility Acci
☐ Administrative Control	☐ Other - Specify	☐ Other-specify
☐ Human Error		
☐ Chemical Reactions		
☐ Contamination		
☐ Inadequacy of Design Basis		
☐ Design Deficiency		
☐ Flooding		
☐ Fire		
☐ Other SAR Accidents		
☐ Other-specify		

SITE: INEL	FACILITY (Building or Location): CPP-601
	PARTITIONED AREA: Shielded Cells

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Aging or degradation of the CPP-601 building could result in deterioration of the barriers identified in Question 2. No effects are anticipated since the HEU material appears to be fixed-in-place and not removable by flushing or other clean-out methods.

SITE: INEL	FACILITY (Building or Location): CPP-601 PARTITIONED AREA: Shielded Cells

Question 5: POTENTIAL EFFECTS

Facility	Material	External
☐ Fire ☐ Explosion ☐ Contamination ☐ Criticality ☐ Leakage/Spills ☐ Other Accidents-specify ☐ Structural Failure ☐ Equipment Failure ☐ Material Release ☐ Increased Radioactivity Level ☐ Other-specify	☐ Criticality ☐ Material Release ☐ Breach of Packaging ☐ Fire ☐ Other-specify	☐ Loss of Site Integrity ☐ Loss of Building Integ ☐ Release of Materials ☐ Radiation and Releases from Critic

05/25/9

SITE: INEL	FACILITY (Building or Location): CPP-601
	PARTITIONED AREA: Shielded Cells
Question 5: POTENTIAL EFFECTS	

Describe Each Effect Identified Above:

Not Applicable.

SITE: INEL

FACILITY (Building or Location): CPP-601

PARTITIONED AREA: Shielded Cells

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury

Explanation

Not Applicable.

Applicable References

SITE: INEL	FACILITY (Building or Location) ICPP-602
	FUNCTION: ICPP-602 Laboratory Facilities
Question 1: SITE	

DOE Headquarters Facility Landlord: EM

DOE Headquarters Program Sponsor: EM

Design Life: 40

Facility Age: 43

Location of Facility on Site and Distance to Site Boundary

The ICPP-602 Laboratory Building is located between Beech Street and Birch Street, north of the Process Building, ICPP-601. It is located 13.7 km from the INEL site boundary.

Design Mission, Interim Mission, Current Use

Chemical and radiochemical analyses are performed in the ICPP-602 Laboratory and Office building. This includes but is not limited to chemical separation and material preparation for research studies; gas dilution, gas chromatographic, and mass spectrometric analyses; radiochemical analysis of plant process samples preparation and storage of quality control samples; assay of alpha, beta, and gamma emitting radioactive samples; asbestos determination; and microscopic and X-ray analyses of nonradioactive and small quantities of contained radioactive samples. The facility is currently in use.

Operational Status

In use

Historical Information

The facility was built in 1953.

List Authorization Basis

INEL Radiological Control Manual, January 1995
Criticality Safety Program Requirements Manual, PRD 112, November 1995
ICPP Safety Analysis Report, INEL-92/022, 1995
PSD 9.3, "Mass Limit Criticality Control Areas, "September 1992
PSD 91.C, "Laboratory Facilities," February 1994

SITE: INEL	FACILITY (Building or Location) ICPP-602
	FUNCTION: ICPP-602 Laboratory Facilia

Question 1: SITE

Describe Important or Unique Design Features

ICPP-602 alarm systems include fire, evacuation, and criticality. The building is constructed of reinforced concrete. The labs contain hoods. gases are routed through double HEPA filter systems and discharged to the atmosphere. The denitrator area contains several grams of unretrievable uranium. LC-106 and ICPP-684 analytical cell and warm lab are CCAs which currently contain no uranium.

Describe Weaknesses in the Design Basis

The facility was built in 1953. Weaknesses are a result of an aging facility.

Structural Design

Reinforced concrete

Partitioned Areas of HEU within facility

L-207
L-212
LC-100
Cage
L-109

Description of Partitioned Areas

L-207 Laboratory 207 Radiochemical Laboratory
L-212 Laboratory 212 Quality Control and Standards Laboratory
L-109 Laboratory 109 Instruments Laboratory
LC-100 Denitrator Product Sample Storage Area
Cage Lazy-susan

Amount & Location of Hazardous Material Collocated or Commingled with HEU

Typical laboratory quantities of acids and bases and liquid standards.

Process Material Transfers

None

On-Site Transportation

Fissile material being transferred is doubly contained and in lead pigs where required.

Staff Levels & Experience

6 engineers/scientists 10-20 yrs. experience
4 chemical analysts 5-15 yrs. experience

Applicable References

INEL Radiological Control Manual, January 1995
Criticality Safety Program Requirements Manual, PRD 112, November 1995
ICPP Safety Analysis Report, INEL-92/022, 1995
PSD 93.3, "Mass Limit Criticality Control Areas," September 1992
PSD 9.1C, "Laboratory Facilities," February 1994
ICPP Hazards Assessment, March 1995

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-207

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality [1,2]	Administrative Barrier[3]
[ ] Gloveboxes	[Y] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[Y] HVAC/Confinement	[ ] Double Contingency Not Applied (specify)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike	(e.g., Mass	[ ] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines	Absorbers	[ ] Configuration Control
[ ] Vault	[ ] Canyons	Geometry	[Y] Quality Assurance
[ ] Room	[ ] Pads	Interaction	[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary	Concentration	[Y] Authorization Basis
[Y] Hood	[ ] Trenches	Moderation	[Y] Training
[ ] Piping	[ ] Storage Vault	Enrichment	[Y] Organization
[Y] Shielding	[ ] Fire Suppression	Reflection	[Y] Lessons-Learned
[ ] Distance	[ ] Alarm System	Volume)	[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[Y] Protective Clothing			[Y] Records
[ ] Remote Handling			[Y] Standards
[ ] Confinement System			[ ] External Regulation
[ ] Burial Ground			[Y] Surveillance
[ ] Tanks			[ ] Personnel Reliability Assurance Program
[Y] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[ ] Emgergency Response
[ ] Other-specify			[ ] Other-specify
[ ] None			

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-207

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

The CCA is contained in one room. A hood is located in the room for use of material. The room is vented through the hood through a HEPA filter system. Protective clothing is used while using uranium. A small amount is also contained in shielding. The area is covered by a CAS.

Public/Environment Barrier Narrative:

The public is 13.7 km from the facility. The CCA is located in one room in a facility coverred by a filtered off-gas system.

Criticality Barrier Narrative:

The Mass Limit Criticality Areas are limited by mass to 350 grams of U-235. There are no credible criticality scenarios.

Administrative Barrier Narrative:

This facility is a Mass Limit Criticality Control Area. Administrative controls limit the amount of fissile material to 350 gm of U-235 or less. Procedures implement this limit.

Many of the administrative barriers listed under "Barrier Types" are implemented in the procedures governing use of Mass Limit Criticality Control Areas. The major administrative barriers are material limits and procedure controls.

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-212

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]

- [Y] Gloveboxes
- [ ] Transfer System
- [ ] Duct
- [Y] Filter
- [ ] Vault
- [ ] Room
- [ ] Hot Cell/Canyon
- [Y] Hood
- [ ] Piping
- [ ] Shielding
- [ ] Distance
- [ ] Respiratory Protection
- [Y] Protective Clothing
- [ ] Remote Handling
- [ ] Confinement System
- [ ] Burial Ground
- [ ] Tanks
- [Y] Alarm System
- [ ] Temporary Barriers
- [ ] Other-specify
- [ ] None

Public/Environmental Barrier[2]

- [Y] Facility/Building Boundary
- [Y] HVAC/Confinement
- [ ] Liquid Containment/Dike
- [ ] Bay, Cells, Magazines
- [ ] Canyons
- [ ] Pads
- [Y] Site Boundary
- [ ] Trenches
- [ ] Storage Vault
- [ ] Fire Suppression
- [ ] Alarm System
- [ ] Other - Specify

Criticality[1,2]

- [Y] Double Contingency Applied
- [ ] Double Contingency Not Applied (specify)

(e.g., Mass
Absorbers
Geometry
Interaction
Concentration
Moderation
Enrichment
Reflection
Volume)

Administrative Barrier[3]

- [Y] Procedure: Operation, Maint.
- [Y] Material Limts
- [ ] Monitoring
- [ ] Configuration Control
- [Y] Quality Assurance
- [Y] Conduct of Operations
- [Y] Authorization Basis
- [Y] Training
- [Y] Organization
- [Y] Lessons-Learned
- [ ] Testing
- [ ] Trending
- [Y] Records
- [Y] Standards
- [ ] External Regulation
- [Y] Surveillance
- [ ] Personnel Reliability Assurance Program
- [ ] Worker/Access Occupancy Limits
- [ ] Emgergency Response
- [ ] Other-specify

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): ICP
	PARTITIONED AREA: L-212

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

The room is vented through the hood through a HEPA filter system. Protective clothing is used while using ur is stored in a glovebox. The area is covered by a CAS.

Public/Environment Barrier Narrative:

The public is 13.7 km from the facility. The CCA is located in one room in a facility covered by a filtered off-ga

Criticality Barrier Narrative:

The mass limit criticality areas are limited by mass to 350 grams of U-235. There are not credible criticality sc contained in one room. A hood is located in the room for use of material.

Administrative Barrier Narrative:

This facility is a Mass Limit Criticality Control Area. Administrative controls limit the amount of fissile material less. Procedures implement this limit.

Many of the administrative barriers listed under "Barrier Types" are implemented in the procedures governing us Criticality Control Areas. The major administrative barriers are material limits and procedure controls.

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: LC-100

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality [1,2]	Administrative Barrier[3]
[ ] Gloveboxes	[Y] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[Y] HVAC/Confinement	[ ] Double Contingency Not Applied (specify) (e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike		[ ] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines		[Y] Configuration Control
[ ] Vault	[ ] Canyons		[Y] Quality Assurance
[Y] Room	[ ] Pads		[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary		[Y] Authorization Basis
[ ] Hood	[ ] Trenches		[Y] Training
[ ] Piping	[ ] Storage Vault		[Y] Organization
[ ] Shielding	[ ] Fire Suppression		[Y] Lessons-Learned
[ ] Distance	[Y] Alarm System		[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[ ] Protective Clothing			[Y] Records
[ ] Remote Handling			[Y] Standards
[ ] Confinement System			[ ] External Regulation
[ ] Burial Ground			[Y] Surveillance
[ ] Tanks			[ ] Personnel Reliability Assurance Program
[Y] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[ ] Emgergency Response
[ ] Other-specify			[ ] Other-specify
[ ] None			

1. Barriers between HEU and worker.
2. Barriers between HEU and public/environment.
3. Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: LC-100

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

The material is contained in a locked steel cabinet located in a secured room accessed by a heavy steel door that is alarmed. These safeguards are to limit access to the material. The room is located within the ICPP guarded perimeter of ICPP on the INEL. Cd plates (poison) are in the storage area for material in the cabinet.

Public/Environment Barrier Narrative:

The public is 13.7 km from the facility. The CCA is located in one room in a facility covered by a filtered off-gas system. A CAS covers the area. Building off gas system would prevent external problems.

Criticality Barrier Narrative:

Cd plates (poison) are in the storage area for material in the cabinet. Procedure specify storage of material. Also, if the U is removed from its packages, placed in an optimal array and moderator is added to the array a criticality is possible. There is no credible mechanism to assemble such a critical configuration.

Administrative Barrier Narrative:

This facility is a Procedure CCA. Administrative controls limit the amount of fissile material. Procedures implement this limit and how the material is stored.

Many of the admininstrative barriers listed under "Barrier Types" are implemented in the procedures governing use of Procedures CCA. The major administrative barriers are material limits and procedure controls.

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: Cage

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality[1,2]	Administrative Barrier[3]
[ ] Gloveboxes	[Y] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[Y] HVAC/Confinement	[ ] Double Contingency Not Applied (specify)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike	(e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)	[ ] Monitoring
[Y] Filter	[ ] Bay, Cells, Magazines		[ ] Configuration Control
[ ] Vault	[ ] Canyons		[Y] Quality Assurance
[ ] Room	[ ] Pads		[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary		[Y] Authorization Basis
[ ] Hood	[ ] Trenches		[Y] Training
[ ] Piping	[ ] Storage Vault		[Y] Organization
[Y] Shielding	[ ] Fire Suppression		[Y] Lessons-Learned
[ ] Distance	[ ] Alarm System		[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[Y] Protective Clothing			[Y] Records
[ ] Remote Handling			[Y] Standards
[ ] Confinement System			[ ] External Regulation
[ ] Burial Ground			[ ] Surveillance
[ ] Tanks			[ ] Personnel Reliability Assurance Program
[Y] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[ ] Emergency Response
[ ] Other-specify			[ ] Other-specify
[ ] None			

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: Cage

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

The samples are sealed in steel cans, glass vials, steel and nickel capsules, in plastic bags in a lead barricade that is locked with security locks with the keys controlled. The barricade is in a locked cage inside a room that requires key card access. This area is inside a building inside the guarded perimeter of ICPP on the INEL. The room air is HEPA filtered before it exhausts up the stack. A employees who work with these-samples are certified fissile material handlers and are required to wear protective clothing..

Public/Environment Barrier Narrative:

The public is 13.7 km from the facility. The CCA is located in one room in a facility covered by a filtered off-gas system.

Criticality Barrier Narrative:

The mass limit criticality areas are limited by mass to 350 grams of U-235. There are not credible criticality scenarios. The CCA contained in one room. A hood is located in the room for use of material.

Administrative Barrier Narrative:

This facility is a Mass Limit Criticality Control Area. Administrative controls limit the amount of fissile material to 350 gm of U-2 less. Procedures implement this limit.

Many of the administrative barriers listed under "Barrier Types" are implemented in the procedures governing use of Mass Limi Criticality Control Areas. The major administrative barriers are material limits and procedure controls.

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-109

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality[1,2]	Administrative Barrier[3]
[ ] Gloveboxes	[Y] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[Y] HVAC/Confinement	[ ] Double Contingency Not Applied (specify) (e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike		[ ] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines		[ ] Configuration Control
[ ] Vault	[ ] Canyons		[Y] Quality Assurance
[Y] Room	[ ] Pads		[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary		[Y] Authorization Basis
[ ] Hood	[ ] Trenches		[Y] Training
[ ] Piping	[ ] Storage Vault		[Y] Organization
[ ] Shielding	[ ] Fire Suppression		[Y] Lessons-Learned
[ ] Distance	[ ] Alarm System		[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[Y] Protective Clothing			[Y] Records
[ ] Remote Handling			[Y] Standards
[ ] Confinement System			[ ] External Regulation
[ ] Burial Ground			[Y] Surveillance
[ ] Tanks			[ ] Personnel Reliability Assurance Program
[ ] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[ ] Emgergency Response
[ ] Other-specify Locks			[ ] Other-specify
[N] None			

1. Barriers between HEU and worker.
2. Barriers between HEU and public/environment.
3. Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.

06/21/98

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-109

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

All samples are locked in a cabinet - The locks are security locks and the keys are controlled. The cabinet is in a locked laboratory and the area requires key card access to enter. All of this is in a building inside the ICPP guarded perimeter of ICPP on the INEL. The samples are all sealed in at least plastic bags and stored in a HEPA filtered laboratory. All empoyees who work with these samples are certified fissile material handlers.

Public/Environment Barrier Narrative:

The public is 13.7 km from the facility. The CCA is located in one room in a facility covered by a filtered off-gas system.

Criticality Barrier Narrative:

The mass limit criticality areas are limited by mass to 350 grams of U-235. There are not credible criticality scenarios. The CCA is contained in one room. A hood is located in the room for use of material.

Administrative Barrier Narrative:

This facility is a Mass Limit Criticality Control Area. Administrative controls limit the amount of fissile material to 350 gm of U-235 or less. Procedures implement this limit.

Many of the administrative barriers listed under "Barrier Types" are implemented in the procedures governing use of Mass Limit Criticality Control Areas. The major administrative barriers are material limits and procedure controls.

SITE: INEL	FACILITY (Building or Location) ICPP-602
	PARTITIONED AREA: Cage

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Oxides	Weapons	Pure oxides	SS Capsules,	Other-specify Cage	14	15	0.0020

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Stainless steel capsules inside a plastic bag in an open can.

Describe material at risk, which constitutes a source term.
Material at risk is limited to the contents of one container.

SITE: INEL	FACILITY (Building or Location) ICPP-602
	PARTITIONED AREA: Cage

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Oxides	Very Highly	Pure oxides 233	SS Capsules,	Other-specify Cage	14	9	0.00

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Stainless Steel Capsules inside a Plastic Bag in an open Can.

Describe material at risk, which constitutes a source term.

Material at risk is limited to the contents of one container.

SITE: INEL	FACILITY (Building or Location) ICPP-602
	PARTITIONED AREA: L-207

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Metal	Very Highly	Pure metal	B1, G1, G2, P2	Other-specify Locked Cabinet	15-30	20	0.2340

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Glass or plastic bottles provide initial containment, with plastic providing secondary containment

Describe material at risk, which constitutes a source term.
Material at risk is limited to the contents of one container.

SITE: INEL	FACILITY (Building or Location) ICPP-602
	PARTITIONED AREA: L-212

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Metal	Very Highly	Pure metal	B1, G1, G2, P2	Other-specify Locked Cabinet	15-30	37	0.2[illegible]

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Glass or plastic bottles provide initial containment, with plastic providing secondary containment.

Describe material at risk, which constitutes a source term.

Material at risk is limited to the contents of one container.

SITE: INEL	FACILITY (Building or Location) ICPP-602
	PARTITIONED AREA: LC-100

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	Enriched	Other	G1, P0	Other-specify Alarmed Storage Room	2	34	1.0070

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Glass bottle provides initial containment, plastic vial provides secondary containment.

Describe material at risk, which constitutes a source term.

Material at risk is limited to the contents of one container.

SITE: INEL	FACILITY (Building or Location) ICPP-602
	PARTITIONED AREA: L-109

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor fuel	Very Highly	Other Metal/Ceramic	Paper/Classified	Other-specify Cabinet	6	1	0.00

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Paper envelope contains solid material.

This is classified.

Describe material at risk, which constitutes a source term.
Material at risk is limited to the contents of one container.

SITE: INEL	FACILITY (Building or Location) ICPP-602
	PARTITIONED AREA: L-109

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Oxides	Very Highly	Pure oxides	Steel Cans	Other-specify Cabinet	11	1	0.0010

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Steel cans provide containment of the material.

Describe material at risk, which constitutes a source term.

Material at risk is limited to the contents of one container.

06/21/96

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-207

Question 4: POTENTIAL CAUSES

Facility

- [ ] Process Material Transfer
- [ ] Inadvertent Transfers
- [ ] Aging/Degradation
- [ ] Equipment Failure
- [ ] Change in Mission
- [ ] Other Collocated Hazards
- [ ] Corrosion/Embrittlement
- [ ] Inadequate Configuration Knowledge
- [ ] Combustible Loading
- [ ] Inadequate Seals
- [ ] Water Sources
- [ ] Inadequate Drains
- [ ] Preventive Maintenance Failure
- [ ] Administrative Control
- [Y] Human Error
- [ ] Chemical Reactions
- [ ] Contamination
- [ ] Inadequacy of Design Basis
- [ ] Design Deficiency
- [ ] Flooding
- [ ] Fire
- [ ] Other SAR Accidents
- [ ] Other-specify

Material

- [ ] Aging
- [ ] Container Seal Degradation
- [ ] Pressurization
- [ ] Pyrophoricity
- [ ] Radioactivity
- [ ] Chemical Reactivity
- [ ] Radiolysis
- [ ] Volumetric Expansion
- [ ] Oxidation
- [ ] Flammability
- [ ] Toxicity
- [ ] Hydroloysis
- [ ] Crystallization
- [ ] Other - Specify

External

- [ ] Fire
- [ ] Explosion
- [ ] Earthquakes
- [ ] Subsidence
- [ ] Winds
- [ ] Floods
- [ ] Extreme Temperature
- [ ] Snow
- [ ] Ash Loading
- [ ] Aircraft Crash
- [ ] Vehicle Accident
- [ ] Onsite Transporation
- [ ] Adjacent Facility Acci
- [ ] Other-specify

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-207

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Facility: Administrative controls restrict handling or removing of material from mass limit criticality control area, minimizing human error.

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-212

Question 4: POTENTIAL CAUSES

Facility	Material	External
☐ Process Material Transfer	☐ Aging	☐ Fire
☐ Inadvertent Transfers	☐ Container Seal Degradation	☐ Explosion
☐ Aging/Degradation	☐ Pressurization	☐ Earthquakes
☐ Equipment Failure	☐ Pyrophoricity	☐ Subsidence
☐ Change in Mission	☐ Radioactivity	☐ Winds
☐ Other Collocated Hazards	☐ Chemical Reactivity	☐ Floods
☐ Corrosion/Embrittlement	☐ Radiolysis	☐ Extreme Temperature
☐ Inadequate Configuration Knowledge	☐ Volumetric Expansion	☐ Snow
☐ Combustible Loading	☐ Oxidation	☐ Ash Loading
☐ Inadequate Seals	☐ Flammability	☐ Aircraft Crash
☐ Water Sources	☐ Toxicity	☐ Vehicle Accident
☐ Inadequate Drains	☐ Hydroloysis	☐ Onsite Transporation
☐ Preventive Maintenance Failure	☐ Crystallization	☐ Adjacent Facility Accident
☐ Administrative Control	☐ Other - Specify	☐ Other-specify
Y Human Error		
☐ Chemical Reactions		
☐ Contamination		
☐ Inadequacy of Design Basis		
☐ Design Deficiency		
☐ Flooding		
☐ Fire		
☐ Other SAR Accidents		
☐ Other-specify		

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SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-212

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Facility: Administrative controls restrict handling or removing of material from mass limit criticality control area, minimizing human error.

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: LC-100

Question 4: POTENTIAL CAUSES

Facility	Material	External
[ ] Process Material Transfer	[ ] Aging	[ ] Fire
[ ] Inadvertent Transfers	[ ] Container Seal Degradation	[ ] Explosion
[ ] Aging/Degradation	[ ] Pressurization	[Y] Earthquakes
[ ] Equipment Failure	[ ] Pyrophoricity	[ ] Subsidence
[ ] Change in Mission	[ ] Radioactivity	[ ] Winds
[ ] Other Collocated Hazards	[ ] Chemical Reactivity	[ ] Floods
[ ] Corrosion/Embrittlement	[ ] Radiolysis	[ ] Extreme Temperature
[ ] Inadequate Configuration Knowledge	[ ] Volumetric Expansion	[ ] Snow
[ ] Combustible Loading	[ ] Oxidation	[ ] Ash Loading
[ ] Inadequate Seals	[ ] Flammability	[ ] Aircraft Crash
[ ] Water Sources	[ ] Toxicity	[ ] Vehicle Accident
[ ] Inadequate Drains	[ ] Hydroloysis	[ ] Onsite Transporation
[ ] Preventive Maintenance Failure	[ ] Crystallization	[ ] Adjacent Facility Accident
[ ] Administrative Control	[ ] Other - Specify	[ ] Other-specify
[Y] Human Error		
[ ] Chemical Reactions		
[ ] Contamination		
[ ] Inadequacy of Design Basis		
[ ] Design Deficiency		
[ ] Flooding		
[ ] Fire		
[ ] Other SAR Accidents		
[ ] other-specify		

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: LC-100

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Administrative controls restrict handling of material in the CCA, minimizing human error.

A severe earthquake could breach containers; however, material would be confined to a small area.

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: Cage

Question 4: POTENTIAL CAUSES

Facility	Material	External
[ ] Process Material Transfer	[ ] Aging	[ ] Fire
[ ] Inadvertent Transfers	[ ] Container Seal Degradation	[ ] Explosion
[ ] Aging/Degradation	[ ] Pressurization	[ ] Earthquakes
[ ] Equipment Failure	[ ] Pyrophoricity	[ ] Subsidence
[ ] Change in Mission	[ ] Radioactivity	[ ] Winds
[ ] Other Collocated Hazards	[ ] Chemical Reactivity	[ ] Floods
[ ] Corrosion/Embrittlement	[ ] Radiolysis	[ ] Extreme Temperature
[ ] Inadequate Configuration Knowledge	[ ] Volumetric Expansion	[ ] Snow
[ ] Combustible Loading	[ ] Oxidation	[ ] Ash Loading
[ ] Inadequate Seals	[ ] Flammability	[ ] Aircraft Crash
[ ] Water Sources	[ ] Toxicity	[ ] Vehicle Accident
[ ] Inadequate Drains	[ ] Hydroloysis	[ ] Onsite Transporation
[ ] Preventive Maintenance Failure	[ ] Crystallization	[ ] Adjacent Facility Accident
[ ] Administrative Control	[ ] Other - Specify	[ ] Other-specify
[Y] Human Error		
[ ] Chemical Reactions		
[ ] Contamination		
[ ] Inadequacy of Design Basis		
[ ] Design Deficiency		
[ ] Flooding		
[ ] Fire		
[ ] Other SAR Accidents		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: Cage

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Facility: Adinistrative controls restrict handling or removing of material from mass limit criticality control area, minimizing human error.

SITE: INEL	FACILITY (Building or Location): ICPP-602 PARTITIONED AREA: L-109

Question 4: POTENTIAL CAUSES

Facility	Material	External
[ ] Process Material Transfer	[ ] Aging	[ ] Fire
[ ] Inadvertent Transfers	[ ] Container Seal Degradation	[ ] Explosion
[ ] Aging/Degradation	[ ] Pressurization	[ ] Earthquakes
[ ] Equipment Failure	[ ] Pyrophoricity	[ ] Subsidence
[ ] Change in Mission	[ ] Radioactivity	[ ] Winds
[ ] Other Collocated Hazards	[ ] Chemical Reactivity	[ ] Floods
[ ] Corrosion/Embrittlement	[ ] Radiolysis	[ ] Extreme Temperature
[ ] Inadequate Configuration Knowledge	[ ] Volumetric Expansion	[ ] Snow
[ ] Combustible Loading	[ ] Oxidation	[ ] Ash Loading
[ ] Inadequate Seals	[ ] Flammability	[ ] Aircraft Crash
[ ] Water Sources	[ ] Toxicity	[ ] Vehicle Accident
[ ] Inadequate Drains	[ ] Hydroloysis	[ ] Onsite Transporation
[ ] Preventive Maintenance Failure	[ ] Crystallization	[ ] Adjacent Facility Accident
[ ] Administrative Control	[ ] Other - Specify	[ ] Other-specify
[Y] Human Error		
[ ] Chemical Reactions		
[ ] Contamination		
[ ] Inadequacy of Design Basis		
[ ] Design Deficiency		
[ ] Flooding		
[ ] Fire		
[ ] Other SAR Accidents		
[ ] Other-specify		

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SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-109

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Facility: Administrative controls restrict handling or removing of material from mass limit criticality control area, minimizing human error.

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-207

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integrity
[Y] Contamination	[ ] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Criticality
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[ ] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[Y] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-207

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Contamination of the facility could occur if the packages are opened and the U material dispersed. In addition, the radioactivity level of the facility may increase if the material is removed from the shielded area.

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-212

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integrity
[Y] Contamination	[ ] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Criticality
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[ ] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[Y] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-212

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Contamination of the facility could occur if the packages are opened and the U material dispersed. In addition, the radioactivity level of the facility may increase if the material is removed from the shielded area.

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: LC-100

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[Y] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integrity
[Y] Contamination	[ ] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Criticality
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[ ] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[Y] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: LC-100

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Facility:
Contamination of the facility could occur if the packages are opened and the U material dispersed. In addition, the radioactivity level of the facility may increase if the material is removed from the shielded area.

Material:
If the U is removed from its packages, placed in an optimal array and moderator is added to the array a criticality is possible. There is no credible mechanism to assembly such a critical configuration. Building off gas system would prevent external problems.

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: Cage

Question 5: POTENTIAL EFFECTS

Facility	Material	External
☐ Fire	☐ Criticality	☐ Loss of Site Integry
☐ Explosion	☐ Material Release	☐ Loss of Building Iregrity
[Y] Contamination	☐ Breach of Packaging	☐ Release of Materis
☐ Criticality	☐ Fire	☐ Radiation and Releases from Cricality
☐ Leakage/Spills	☐ Other-specify	
☐ Other Accidents-specify		
☐ Structural Failure		
☐ Equipment Failure		
☐ Material Release		
[Y] Increased Radioactivity Level		
☐ Other-specify		

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: Cage

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Contamination of the facility could occur if the packages are opened and the U material dispersed. In addition, the radioactivity level of the facility may increase if the material is removed from the shielded area.

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-109

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integr[illegible]
[Y] Contamination	[ ] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Critica[illegible]
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[ ] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[Y] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-109

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Contamination of the facility could occur if the packages are opened and the U material dispersed. In addition, the radioactivity level of the facility may increase if the material is removed from the shielded area.

SITE: INEL	FACILITY (Building or Location) CPP-602 PARTITIONED AREA: L-207

Question 6: POTENTIAL CONSEQUENCES

Effect	Worker			Environment			Public		
	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Contamination (Facility)									

Explanation

Quantity of material handled precludes impact to the environment, public, and the worker.

Applicable References

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: L-212

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Contamination (Facility)									

Explanation

Quantity of material handled precludes impact to the environment and public.

Applicable References

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: LC-100

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Criticality (Facility)									

Explanation

Criticality is not a credible scenario.

Applicable References

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: Cage

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Contamination (Facility)									

Explanation

Quantity of material handled precludes impact to the environmental public.

Applicable References

SITE: INEL	FACILITY (Building or Location) ICPP-602
	PARTITIONED AREA: L-109

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Contamination (Facility)									

Explanation

Quantity of material handled precludes impact to the environment, worker and public.

Applicable References

SITE: INEL	FACILITY (Building or Location): ICPP-602
	PARTITIONED AREA: LC-100

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Contamination (Facility)									

Explanation

Quantity of material handled precludes impact to the environment, and public.

Applicable References

SITE: INEL	FACILITY (Building or Location) CPP-627
	FUNCTION: Laboratory Facility

Question 1: SITE

DOE Headquarters Facility Landlord: EM
DOE Headquarters Program Sponsor: EM
Design Life: 40
Facility Age: 41

Location of Facility on Site and Distance to Site Boundary

CPP-627 is located on Birch Street, west of the Process Building, CPP-601.

Design Mission, Interim Mission, Current Use

Several laboratories for conducting chemical research and chemical analyses are located in CPP-627. These laboratories are the Special Analysis Laboratory (SAL), the Remote Analytical Facility (RAF), the Multicurie Cell, the Decontamination Development Laboratory, and the Emission Spectroscopy Laboratory. These laboratories are used for sample preparation and analysis of radioactiv samples in support of INEL environmental sampling, INEL process support, support of other DOE sites, and other DOE-approved programs. The RAF can be used to support the above processes when the Remote Analytical Laboratory (RAL), CPP-684, is unavailable.

Operational Status

In use

Historical Information

The facility was built in 1955 and the laboratory facility provided routine chemical analysis support for the reprocessing of spent nucle fuel. Also provided were facilities for special studies on highly radioactive components (multi-curie cell). The routine chemical analys functions were moved to the Remote Analytical Laboratory in 1986.

List Authorization Basis

Auditable Safety Analysis Report for the Remote Analytical Facility, CPP-627, Addendum to PSD 9.1C, WIN-107-9.1C-ADD Rev. 1, March 1995

SITE: INEL	FACILITY (Building or Location) CPP-627
	FUNCTION: Laboratory Facility
Question 1: SITE	

Describe Important or Unique Design Features

The SAL, located on the second floor of CPP-627, contains laboratory bench space and is used for radioactive sample preparation and nonroutine analyses. It contains 6 Type II hoods, 3 Type III gloveboxes, 2 glovebox trains, sinks, compressed gas system, distillation apparatus, and physical measurement instruments.

The RAF is located on the first floor of CPP-627. The RAF contains two parallel lines of shielded analytical boxes with a cave on the west end of A Line, the northernmost line. The boxes are constructed of stainless steel and set against a shielding wall. Lead glass viewing windows are located in the front of each box. The cave on the west end of A Line is a Type III cave with master slave manipulators and is used for sample archiving. The boxes are not currently in use.

Room 105 is a storage closet in the southeast comer of CPP-627 on the first floor.

Describe Weaknesses in the Design Basis

Seismic design may not meet current seismic standards.

Structural Design

Reinforced concrete

Partitioned Areas of HEU within facility

SAL

RAF

Rm 105

Description of Partitioned Areas

SAL - Special Analysis Laboratory

RAF - Remote Analytical Facility

Rm 105 - Storage closet in NE comer of the building.

Amount & Location of Hazardous Material Collocated or Commingled with HEU

The SAL and RAF contain typical laboratory chemicals including nitric acid. Room 105 is a storage closet and contains only the HEU stored items.

Process Material Transfers

None

On-Site Transportation

HEU is transferred by personnel trained as fissile material handlers. The mass limit CCAs are monitored by a CCA custodian. The fissile material is double-contained during transport.

Staff Levels & Experience

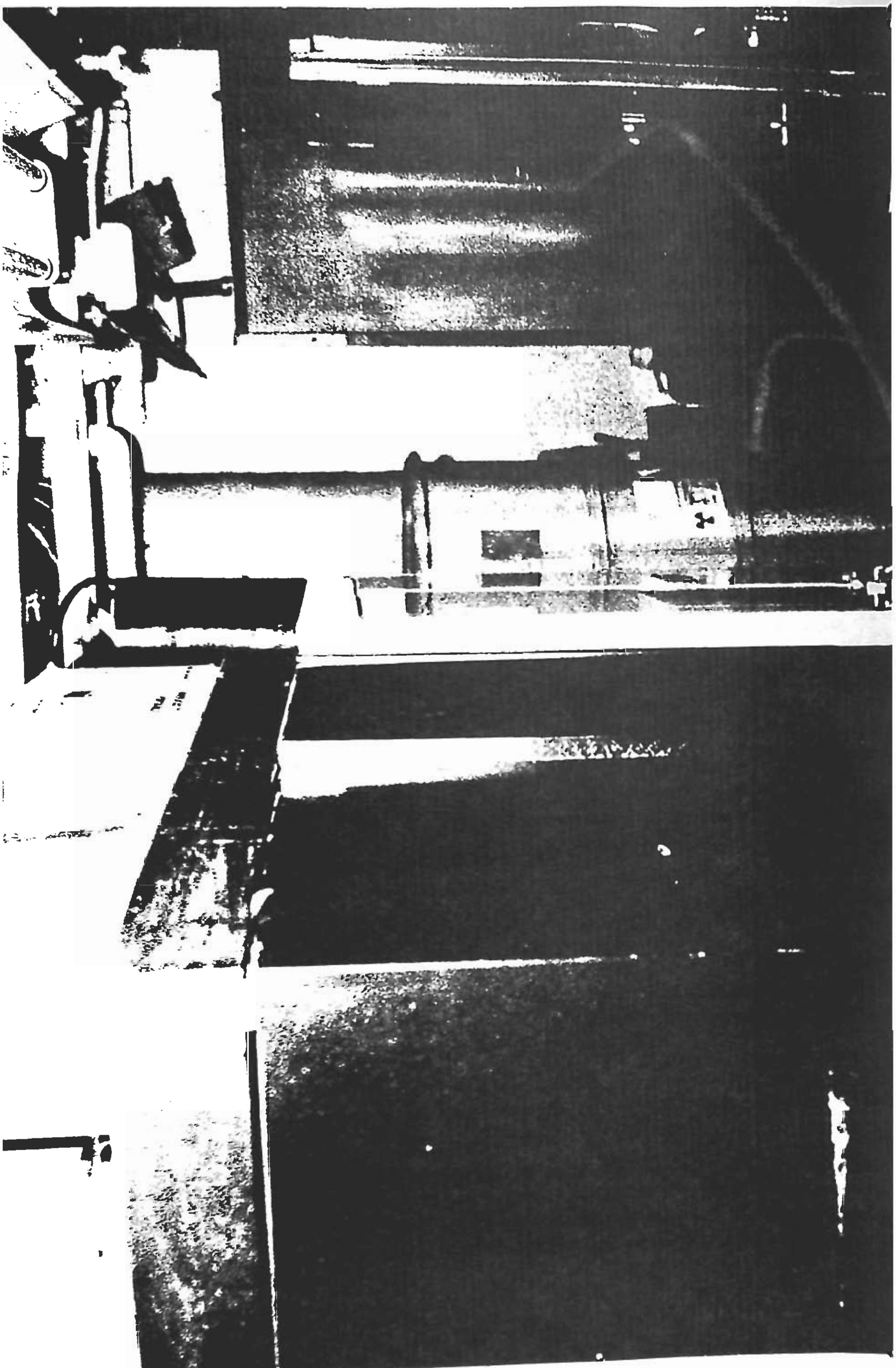
The fissile material is transferred by personnel trained as fissile material handlers. The mass limit CCAs are monitored by a CCA custodian. Six CCA custodians, scientists/engineers, with a range of 5-25 years experience.

Applicable References

ICPP Plant Safety Document 9.1C, "Laboratory Facilities", February 1994

ICPP Hazards Assessment, March 1995

ICPP Plant Safety Document 9.1C - ADD, "Auditable Safety Analysis for the Remote Analytical Facility, CPP-627", March 1995.



CPP-627 Room 105

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: SAL

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality [1,2]	Administrative Barrier[3]
[Y] Gloveboxes	[Y] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[Y] HVAC/Confinement	[ ] Double Contingency Not Applied (specify) (e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike		[ ] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines		[Y] Configuration Control
[ ] Vault	[ ] Canyons		[ ] Quality Assurance
[ ] Room	[ ] Pads		[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary		[Y] Authorization Basis
[Y] Hood	[ ] Trenches		[Y] Training
[ ] Piping	[ ] Storage Vault		[Y] Organization
[ ] Shielding	[ ] Fire Suppression		[Y] Lessons-Learned
[ ] Distance	[ ] Alarm System		[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[Y] Protective Clothing			[Y] Records
[ ] Remote Handling			[ ] Standards
[ ] Confinement System			[ ] External Regulation
[ ] Burial Ground			[Y] Surveillance
[ ] Tanks			[ ] Personnel Reliability Assurance Program
[ ] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[ ] Emgergency Response
[ ] Other-specify			[ ] Other-specify
[ ] None			

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: SAL

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Handling HEU containers inside hood or gloveboxes in the SAL provides personnel protection. Procedures require use of protective clothing to minimize personnel contamination.

Public/Environment Barrier Narrative:

The environment and public is protected from exposure by the facility/building containment of the HEU materials, and the distance to the site boundary. Filtered off-gas also prevents public exposure.

Criticality Barrier Narrative:

Mass

The SAL is a mass limit criticality control area and is limited to 350 gm U-235 or less. Procedures implement this limit. Trained fissile material handlers perform all HEU handling. No credible criticality seconarios have been identified.

Administrative Barrier Narrative:

Many of the administrative barriers listed under "Barrier Types" are implemented in the procedures governing use of Mass Limit Criticality Control Areas. The major administrative barriers are material limits and procedure controls.

SITE: INEL	**FACILITY (Building or Location):** CPP-627
	PARTITIONED AREA: RAF

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]

- [ ] Gloveboxes
- [ ] Transfer System
- [ ] Duct
- [ ] Filter
- [ ] Vault
- [ ] Room
- [Y] Hot Cell/Canyon
- [ ] Hood
- [ ] Piping
- [Y] Shielding
- [ ] Distance
- [ ] Respiratory Protection
- [ ] Protective Clothing
- [Y] Remote Handling
- [ ] Confinement System
- [ ] Burial Ground
- [ ] Tanks
- [ ] Alarm System
- [ ] Temporary Barriers
- [ ] Other-specify
- [ ] None

Public/Environmental Barrier[2]

- [Y] Facility/Building Boundary
- [Y] HVAC/Confinement
- [ ] Liquid Containment/Dike
- [ ] Bay, Cells, Magazines
- [ ] Canyons
- [ ] Pads
- [Y] Site Boundary
- [ ] Trenches
- [ ] Storage Vault
- [ ] Fire Suppression
- [ ] Alarm System
- [ ] Other - Specify

Criticality[1,2]

- [Y] Double Contingency Applied
- [ ] Double Contingency Not Applied (specify) (e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)

Administrative Barrier[3]

- [Y] Procedure: Operation, Maint.
- [Y] Material Limts
- [ ] Monitoring
- [Y] Configuration Control
- [ ] Quality Assurance
- [Y] Conduct of Operations
- [Y] Authorization Basis
- [Y] Training
- [Y] Organization
- [Y] Lessons-Learned
- [ ] Testing
- [ ] Trending
- [Y] Records
- [ ] Standards
- [ ] External Regulation
- [Y] Surveillance
- [ ] Personnel Reliability Assurance Program
- [Y] Worker/Access Occupancy Limits
- [ ] Emgergency Response
- [ ] Other-specify

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: RAF
Question 2: BARRIER TYPES	

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

The HEU in the RAF is located in a shielded Type III cave with master slave manipulators for personnel protection.

Public/Environment Barrier Narrative:

The environment and public are protected from exposure by the facility/building containment of the HEU materials, and the distance [illegible] the site boundary. Filtered off-gas also prevents public exposure.

Criticality Barrier Narrative:

The RAF is a mass limit criticality control area and is limited to 350 gm U-235 or less. Procedures implement this limit. No credible criticality scenarios have been identified.

Administrative Barrier Narrative:

Many of the administrative barriers listed are implemented in the procedures governing use of Mass Limit Criticality Control Areas. [illegible] major administrative barriers are material limits and procedure controls.

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: Rm 105

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality[1,2]	Administrative Barrier[3]
[ ] Gloveboxes	[Y] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[Y] HVAC/Confinement	[ ] Double Contingency Not Applied (specify) (e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike		[ ] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines		[Y] Configuration Control
[ ] Vault	[ ] Canyons		[ ] Quality Assurance
[Y] Room	[ ] Pads		[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary		[Y] Authorization Basis
[ ] Hood	[ ] Trenches		[Y] Training
[ ] Piping	[ ] Storage Vault		[Y] Organization
[ ] Shielding	[ ] Fire Suppression		[Y] Lessons-Learned
[ ] Distance	[ ] Alarm System		[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[ ] Protective Clothing			[Y] Records
[ ] Remote Handling			[ ] Standards
[ ] Confinement System			[ ] External Regulation
[ ] Burial Ground			[Y] Surveillance
[ ] Tanks			[ ] Personnel Reliability Assurance Program
[ ] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[ ] Emergency Response
[ ] Other-specify			[ ] Other-specify
[ ] None			

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: Rm 105

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Locked room limits worker access.

Public/Environment Barrier Narrative:

The environment and public are protected from exposure by the facility/building containment of the HEU materials, and the distance to the site boundary. Filtered off-gas also prevents public exposure.

Criticality Barrier Narrative:

Room 105 is a mass limit criticality control area and is limited to 350 gm U-235 or less. Procedures implement this limit. No credible criticality scenarios have been identified.

Administrative Barrier Narrative:

Many of the administrative barriers listed are implemented in the procedures governing use of Mass Limit Criticality Control Areas. The major administrative barriers are material limits and procedure controls.

SITE: INEL	FACILITY (Building or Location) CPP-627
	PARTITIONED AREA: SAL

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Solutions	Enriched	Nitric acid	P0, B1	Other-specify Locked cabinet, hood	2	30	0.0930

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Containment is provided by a sealed poly bottle in a poly bag.

Describe material at risk, which constitutes a source term.

Material at risk usually is limited to one container being handled. Maximum loading per container is 5 gm fissile uranium.

SITE: INEL	FACILITY (Building or Location) CPP-627
	PARTITIONED AREA: SAL

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Solutions	Enriched	Other	P1	Other-specify Locked Cabinet	1	5	0.042

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Solution contained in poly bottle with screw cap.

Describe material at risk, which constitutes a source term.

Material at risk usually is limited to one container being handled. Maximum loading per containers 42 gm fissile uranium.

SITE: INEL	FACILITY (Building or Location) CPP-627
	PARTITIONED AREA: SAL

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	Enriched	Other Solids & Nitric Acid solutions	C0, B0	Other-specify Locked cabinet	4	1	0.0430

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Containment is provided by a plastic bag in sealed metal cans.

Describe material at risk, which constitutes a source term.

Material at risk usually is limited to one container being handled. Maximum loading per container is 43 gm fissile uranium.

SITE: INEL	FACILITY (Building or Location) CPP-627 PARTITIONED AREA: RAF

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mas (k
Sources and Samples	Enriched	Other Solid materials	F2, F0, C3	Other-specify RAF Cave	10 yrs	35	(2

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Some HEU material is in a metal can; some is wrapped in lead foil; some in screw cap metal containers and some in metal foil.

Total mass in RAF cave is 35 gm in a total of 35 packages. There are 4 different types of packages.

NOTE: Packaging types above also includes C4

Describe material at risk, which constitutes a source term.

Material at risk is usually limited to one container being handled. Maximum loading per container is <2 gm total uranium.

SITE: INEL	FACILITY (Building or Location) CPP-627
	PARTITIONED AREA: Rm 105

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor fuel	Enriched	Slightly irradiated	P0, Drums	Other-specify Room 105	10 years	2	0.1320

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

HEU material pieces are multiple-bagged for contamination control. These bagged items are placed in a drum or a shielded cask to protect the worker from excessive radiation exposure.

Describe material at risk, which constitutes a source term.

Material at risk is usually limited to the contents of the 1 container being handled. One container was an approximate 130 gm total U loading; however, the maximum loading in the remaining containers is 70 gram total U.

06/03/96

SITE: INEL	FACILITY (Building or Location) CPP-627
	PARTITIONED AREA: Rm 105

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Ma (k
Process residues	Enriched	Incinerator ash	P0, B1	Other-specify Cabinet	10 years	11	[illegible]

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

All HEU material whether pieces or contained in bottles or cans is multiple-bagged for contamination control.

Describe material at risk, which constitutes a source term.

Material at risk is usually limited to the contents of 1 container being handled. One container has approximately 130 gm total U loadin
however the maximum loading in the remaining containers is 70 gm total U.

SITE: INEL	FACILITY (Building or Location) CPP-627
	PARTITIONED AREA: Rm 105

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Process residues	Enriched	Filters	P0, B1	Other-specify Cabinet	5 years	19	0.1970

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

All HEU material whether pieces or contained in bottles or cans, is multiple-bagged for contamination control.

Describe material at risk, which constitutes a source term.

Material at risk is usually limited to the contents of 1 container being handled. One container has an approximate 130 gm total U loading; however, the maximum loading in the remaining containers is 70 gm total U.

SITE: INEL	FACILITY (Building or Location) CPP-627
	PARTITIONED AREA: Rm 105

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor fuel	Enriched	Slightly irradiated	B1	Other-specify Room 105	10 yrs	1	0.003(

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

HEU material is multiple bagged for contamination control.

Describe material at risk, which constitutes a source term.

Material at risk is usually limited to the contents of 1 container being handled. One container has approximately 130 gm total U loading; however the maximum loading in the remaining containers is 70 gm total U

SITE: INEL	FACILITY (Building or Location) CPP-627
	PARTITIONED AREA: Rm 105

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor fuel	Enriched	Slightly irradiated	B1, C0	Other-specify Room 105 Cabinet	10 years	2	0.1350

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

HEU material pieces contained in or cans is multiple-bagged for contamination control.

Describe material at risk, which constitutes a source term.

Material at risk is usually limited to the contents of 1 container being handled. One container has approximately 130 gm total U loading; however, the maximum loading in the remaining containers is 70 gm total U.

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SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: SAL

Question 4: POTENTIAL CAUSES

Facility	Material	External
[ ] Process Material Transfer	[ ] Aging	[ ] Fire
[ ] Inadvertent Transfers	[ ] Container Seal Degradation	[ ] Explosion
[ ] Aging/Degradation	[ ] Pressurization	[Y] Earthquakes
[ ] Equipment Failure	[ ] Pyrophoricity	[ ] Subsidence
[ ] Change in Mission	[ ] Radioactivity	[ ] Winds
[ ] Other Collocated Hazards	[ ] Chemical Reactivity	[ ] Floods
[ ] Corrosion/Embrittlement	[ ] Radiolysis	[ ] Extreme Temperature
[ ] Inadequate Configuration Knowledge	[ ] Volumetric Expansion	[ ] Snow
[ ] Combustible Loading	[ ] Oxidation	[ ] Ash Loading
[ ] Inadequate Seals	[ ] Flammability	[ ] Aircraft Crash
[ ] Water Sources	[ ] Toxicity	[ ] Vehicle Accident
[ ] Inadequate Drains	[ ] Hydroloysis	[ ] Onsite Transporation
[ ] Preventive Maintenance Failure	[ ] Crystallization	[ ] Adjacent Facility Acci
[ ] Administrative Control	[ ] Other - Specify	[ ] Other-specify
[Y] Human Error		
[ ] Chemical Reactions		
[ ] Contamination		
[ ] Inadequacy of Design Basis		
[ ] Design Deficiency		
[ ] Flooding		
[ ] Fire		
[ ] Other SAR Accidents		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: Rm 105

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Facility: Administrative controls cover handling or removing of material from mass limit criticality control areas, minimizing human error.

No credible release/failure mechanisms have been identified for the HEU. Intentional uncontrolled breach of the packages by personnel is covered by administrative controls.

Falling debris due to earthquake could damage the packaging described in question 3.

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: RAF

Question 4: POTENTIAL CAUSES

Facility	Material	External
☐ Process Material Transfer	☐ Aging	☐ Fire
☐ Inadvertent Transfers	☐ Container Seal Degradation	☐ Explosion
☐ Aging/Degradation	☐ Pressurization	[Y] Earthquakes
☐ Equipment Failure	☐ Pyrophoricity	☐ Subsidence
☐ Change in Mission	☐ Radioactivity	☐ Winds
☐ Other Collocated Hazards	☐ Chemical Reactivity	☐ Floods
☐ Corrosion/Embrittlement	☐ Radiolysis	☐ Extreme Temperature
☐ Inadequate Configuration Knowledge	☐ Volumetric Expansion	☐ Snow
☐ Combustible Loading	☐ Oxidation	☐ Ash Loading
☐ Inadequate Seals	☐ Flammability	☐ Aircraft Crash
☐ Water Sources	☐ Toxicity	☐ Vehicle Accident
☐ Inadequate Drains	☐ Hydroloysis	☐ Onsite Transporation
☐ Preventive Maintenance Failure	☐ Crystallization	☐ Adjacent Facility Accid
☐ Administrative Control	☐ Other - Specify	☐ Other-specify
[Y] Human Error		
☐ Chemical Reactions		
☐ Contamination		
☐ Inadequacy of Design Basis		
☐ Design Deficiency		
☐ Flooding		
☐ Fire		
☐ Other SAR Accidents		
☐ Other-specify		

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: RAF
Question 4: POTENTIAL CAUSES	

Describe Each Potential Cause Identified Above:

Facility: Administrative controls cover handling or removing of material from mass limit criticality control areas, minimizing human error.

No credible release/failure mechanisms have been identified for the HEU. Deliberate or gross negligence would be necessary to breach the confinement features of the HEU stored in this area.

Falling debris due to earthquake could damage the packaging described in question 3.

SITE: INEL

FACILITY (Building or Location): CPP-627

PARTITIONED AREA: Rm 105

Question 4: POTENTIAL CAUSES

Facility

- [ ] Process Material Transfer
- [ ] Inadvertent Transfers
- [ ] Aging/Degradation
- [ ] Equipment Failure
- [ ] Change in Mission
- [ ] Other Collocated Hazards
- [ ] Corrosion/Embrittlement
- [ ] Inadequate Configuration Knowledge
- [ ] Combustible Loading
- [ ] Inadequate Seals
- [ ] Water Sources
- [ ] Inadequate Drains
- [ ] Preventive Maintenance Failure
- [ ] Administrative Control
- [Y] Human Error
- [ ] Chemical Reactions
- [ ] Contamination
- [ ] Inadequacy of Design Basis
- [ ] Design Deficiency
- [ ] Flooding
- [ ] Fire
- [ ] Other SAR Accidents
- [ ] Other-specify

Material

- [ ] Aging
- [ ] Container Seal Degradation
- [ ] Pressurization
- [ ] Pyrophoricity
- [ ] Radioactivity
- [ ] Chemical Reactivity
- [ ] Radiolysis
- [ ] Volumetric Expansion
- [ ] Oxidation
- [ ] Flammability
- [ ] Toxicity
- [ ] Hydroloysis
- [ ] Crystallization
- [ ] Other - Specify

External

- [ ] Fire
- [ ] Explosion
- [Y] Earthquakes
- [ ] Subsidence
- [ ] Winds
- [ ] Floods
- [ ] Extreme Temperature
- [ ] Snow
- [ ] Ash Loading
- [ ] Aircraft Crash
- [ ] Vehicle Accident
- [ ] Onsite Transporation
- [ ] Adjacent Facility Acc
- [ ] Other-specify

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: RAF

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Facility: Administrative controls cover handling or removing of material from mass limit criticality control areas, minimizing human error.

No credible release/failure mechanisms have been identified for the HEU. Deliberate or gross negligence would be necessary to breach the confinement features of the HEU stored in this area.

Falling debris due to earthquake could damage the packaging described in question 3.

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: SAL

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[Y] Material Release	[ ] Loss of Building Integ
[Y] Contamination	[Y] Breach of Packaging	[ ] Release of Material
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Critical
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[ ] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[ ] Increased Radioactivity Level		
[ ] Other-specify		

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SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: SAL
Question 5: POTENTIAL EFFECTS	

Describe Each Effect Identified Above:

Contamination of the facility and exposure to personnel could occur if the packages are opened and the HEU material dispersed.

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: RAF

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[Y] Material Release	[ ] Loss of Building Integrity
[Y] Contamination	[Y] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Criticality
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[ ] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[Y] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: RAF

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Contamination of the facility and exposure to personnel could occur if the packages are opened and the HEU material dispersed. In addition, the radioactivity level of the facility would increase if the material is removed from the shielded cave.

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: Rm 105

Question 5: POTENTIAL EFFECTS

Facility

- [ ] Fire
- [ ] Explosion
- [Y] Contamination
- [ ] Criticality
- [ ] Leakage/Spills
- [ ] Other Accidents-specify

- [ ] Structural Failure
- [ ] Equipment Failure
- [ ] Material Release
- [Y] Increased Radioactivity Level
- [ ] Other-specify

Material

- [ ] Criticality
- [Y] Material Release
- [Y] Breach of Packaging
- [ ] Fire
- [ ] Other-specify

External

- [ ] Loss of Site Integ
- [ ] Loss of Building In
- [ ] Release of Materi
- [ ] Radiation and Releases from

060

SITE: INEL	FACILITY (Building or Location): CPP-627
	PARTITIONED AREA: Rm 105

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Contamination of the facility and exposure to personnel could occur if the packages are opened and the HEU material dispersed. In addition, the radioactivity level of the facility would increase if the material in the shielded cask or the drum is removed.

SITE: INEL	FACILITY (Building or Location):CPP-627
	PARTITIONED AREA: SAL

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Material Release (Material)									

Explanation

Quantity of material handled precludes impact to the worker, environment and public.

Applicable References

SITE: INEL	FACILITY (Building or Location):CPP-627
	PARTITIONED AREA: RAF

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	**Contamination**	**Exposure**	**Injury**	**Ground**	**Water**	**Air**	**Contamination**	**Exposure**	**Injury**
Material Release (Material)									

Explanation

Quantity of material handled precludes impact to workers, environment and public.

Applicable References

SITE: INEL	FACILITY (Building or Location):CPP-627
	PARTITIONED AREA: Rm 105

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Material Release (Material)									

Explanation

Quantity of material handled precludes impact to the worker, environment and public.

Applicable References

SITE: INEL	FACILITY (Building or Location) CPP-637
	FUNCTION: Experimental and Laboratory
Question 1: SITE	

DOE Headquarters Facility Landlord: EM
DOE Headquarters Program Sponsor: EM
Facility Age: 10

Design Life: 40

Location of Facility on Site and Distance to Site Boundary

ICPP-637 is located on Oak Avenue, Redwood Street, and Birch Street. The facility consists of the Process Improvement Facility (PIF), the low bay, high bay, and Hazardous Chemical Waste Handling and Neutralization (HCWHN) Facility. The facility is located 13.7 km from the INEL boundary.

Design Mission, Interim Mission, Current Use

The facility consists of offices, small scale general chemistry laboratories, and experimental facilities. The operations in the facility are in direct support of ICPP waste management development, spent fuels, and development activities. Experimental programs are carried out to study and further develop processes in use or planned for use.

Operational Status

In use

Historical Information

The PIF was constructed in 1959, the High bay added in 1968, the low bay in the 1970s and the High-low bay and HCWHN in the 1980s.

ICPP Hazards Assessment
PSD 9.2, "Experimental Facilities"

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SITE: INEL	FACILITY (Building or Location) CPP-637
	FUNCTION: Experimental and Laboratory

Question 1: SITE

List Authorization Basis

PSD 9.2, "Experiemental Facilities," April 1994
INEL Radiological Control Manual, January 1995
Criticality Safety Program Requirements Manual, PRD 112, November 1995
ICPP Safety Analysis Report, INEL-92/022, 1995
PSD 9.3, "Mass Limit Criticality Control Areas," September 1992
PSD 9.1C, "Laboratory Facilities," February 1994

Describe Important or Unique Design Features

ICPP-637 is covered by a criticality alarm system. Constant air monitors are located in the area. A fire-sprinkler system and ventilation system covers the area. ICPP-637 is seismically qualified for uniform building code zone 11B. Control of the fissile material in the mass limit CCAs is done administratively.

Describe Weaknesses in the Design Basis

The facility is an aging facility.

Structural Design

Other- specify Steel frame/concrete blocks

Partitioned Areas of HEU within facility

637 Laboratories

Description of Partitioned Areas

The facility contains numerous *small similar* labs.

Amount & Location of Hazardous Material Collocated or Commingled with HEU

In Laboratories 107 and L-111, typical laboratory chemicals are used, such as nitric acid and propane.

Process Material Transfers

None

On-Site Transportation

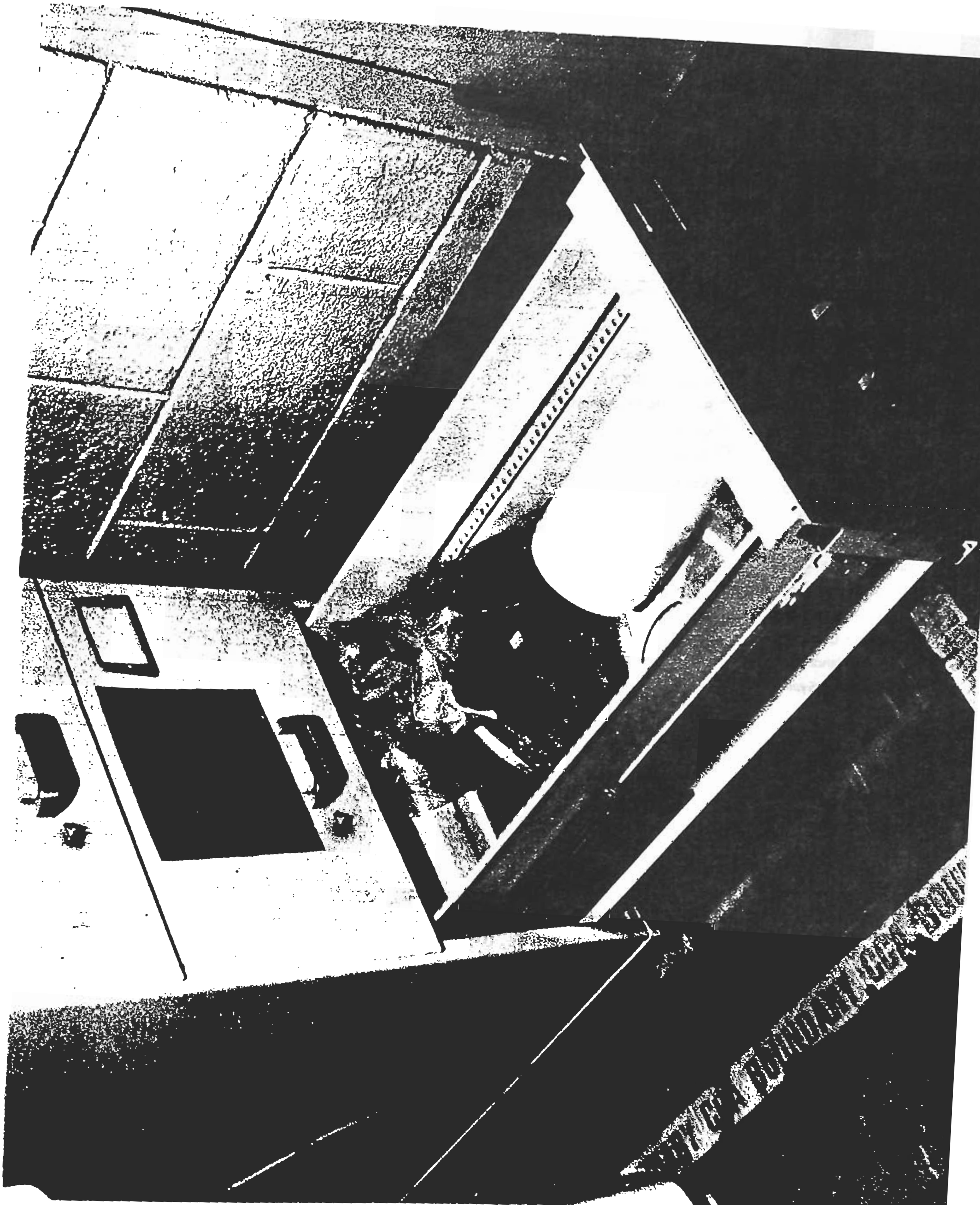
The fissile material is transferred by personnel trained as fissile material handlers. The mass limit CCAs are monitored by a CCA custodian. The fissile material is transported doubly contained.

Staff Levels & Experience

The fissile material is transferred by personnel trained as fissile material handlers. The mass limit CCAs are monitored by a CCA custodian. Two fellow scientists with > 25 years experience.

Applicable References

PSD 9.2, "Experiemental Facilities", April 1994
INEL Radiological Control Manual, January 1995
Criticality Safety Program Requirements Manual, PRD 112, November 1995
ICPP Safety Analysis Report, INEL-92/022, 1995
PSD 9.3, "Mass Limit Criticality Control Areas," September 1992
PSD 9.1C, "Laboratory Facilities," February 1994
ICPP Hazards Assessment, March 1995



CPP-637 - Lab 107 HEU storage cabinet

SITE: INEL	FACILITY (Building or Location): CPP-637
	PARTITIONED AREA: 637 Laboratories

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality[1,2]	Administrative Barrier[1]
[ ] Gloveboxes	[Y] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[Y] HVAC/Confinement	[ ] Double Contingency Not Applied (specify) (e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike		[ ] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines		[ ] Configuration Control
[ ] Vault	[ ] Canyons		[ ] Quality Assurance
[ ] Room	[ ] Pads		[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary		[Y] Authorization Basis
[Y] Hood	[ ] Trenches		[Y] Training
[ ] Piping	[ ] Storage Vault		[ ] Organization
[ ] Shielding	[ ] Fire Suppression		[ ] Lessons-Learned
[ ] Distance	[ ] Alarm System		[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[Y] Protective Clothing			[Y] Records
[ ] Remote Handling			[ ] Standards
[ ] Confinement System			[ ] External Regulation
[ ] Burial Ground			[Y] Surveillance
[ ] Tanks			[ ] Personnel Reliability Assurance Program
[ ] Alarm System			[ ] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[ ] Emergency Response
[ ] Other-specify			[ ] Other-specify
[ ] None			

1. Barriers between HEU and worker.

2. Barriers between HEU and public/environment.

3. Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.

SITE: INEL	FACILITY (Building or Location) ICPP CPP-651
	FUNCTION: Unirradiated Fuel Storage

Question 1: SITE

Staff Levels & Experience

POSITION	# EMPLOYEES	AVERAGE BUILDING EXPERIENCE (Y)	RANGE (Y)
Supervisory	1	> 3 years	1-4 years
Nuclear Material Custodian (Technical)	1	> 2 years	1-3 years
Certified Fuel Handler (Operators)	5-10	INEL Certified	3-20 years
Radiation Technician	1	INEL Trained	2-20 years
Security Officer (outside building)	2	INEL Trained	1-20 years

Applicable References

See Historical Information and Authorization Basis

SITE: INEL	FACILITY (Building or Location): ICPP CPP-651
	PARTITIONED AREA: One partition for whole building.

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]

- [ ] Gloveboxes
- [ ] Transfer System
- [ ] Duct
- [ ] Filter
- [Y] Vault
- [ ] Room
- [ ] Hot Cell/Canyon
- [ ] Hood
- [ ] Piping
- [Y] Shielding
- [Y] Distance
- [ ] Respiratory Protection
- [ ] Protective Clothing
- [Y] Remote Handling
- [ ] Confinement System
- [ ] Burial Ground
- [ ] Tanks
- [Y] Alarm System
- [ ] Temporary Barriers
- [ ] Other-specify

Limits

- [N] None

Public/Environmental Barrier[2]

- [Y] Facility/Building Boundary
- [ ] HVAC/Confinement
- [ ] Liquid Containment/Dike
- [ ] Bay, Cells, Magazines
- [ ] Canyons
- [ ] Pads
- [Y] Site Boundary
- [ ] Trenches
- [ ] Storage Vault
- [Y] Fire Suppression
- [ ] Alarm System
- [ ] Other - Specify

Criticality[1,2]

- [Y] Double Contingency Applied
- [ ] Double Contingency Not Applied (specify)

(e.g., Mass
Absorbers
Geometry
Interaction
Concentration
Moderation
Enrichment
Reflection
Volume)

Administrative Barrier[3]

- [Y] Procedure: Operation, Maint.
- [Y] Material Limts
- [Y] Monitoring
- [Y] Configuration Control
- [Y] Quality Assurance
- [Y] Conduct of Operations
- [Y] Authorization Basis
- [Y] Training
- [Y] Organization
- [Y] Lessons-Learned
- [Y] Testing
- [ ] Trending
- [Y] Records
- [Y] Standards
- [Y] External Regulation
- [Y] Surveillance
- [Y] Personnel Reliability Assurance Program
- [Y] Worker/Access Occupancy Limits
- [Y] Emgergency Response
- [ ] Other-specify

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): CPP-637
	PARTITIONED AREA: 637 Laboratories
Question 2: BARRIER TYPES	

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

A hood is located in the room for use of material. Protective clothing is used while using uranium. The uranium is placed in multiple layers of plastic wrap. It is locked in a safe or cabinet.

Public/Environment Barrier Narrative:

The Environment and Public is protected from exposure by the facility/building containment of the HEU materials, and the distance to the site boundary. Filtered off-gas also prevents public exposure.

Criticality Barrier Narrative:

The mass limit criticality areas (CCA) are limited by mass to 350 grams of U-235. There are no credible critcality scenarios. The CCA is contained in one room. It is locked in a safe or cabinet.

The facility ICPP-637 contains the material. The distance to the site boundary (13.7 km) protects the public from loss of material from the CCA.

Administrative Barrier Narrative:

The facility is a Mass Limit Criticality Control Area. Administrative controls limit the amount of fissile material to 350 grams of U-235 or less. Procedures implement this limit.

Many of the other administrative barriers listed under "Barrier Types" are implemented in the procedures governing use of Mass Limit Criticality Control Areas. The major administrative barriers are material limits and procedure controls.

SITE: INEL	FACILITY (Building or Location) CPP-637
	PARTITIONED AREA: 637 Laboratories

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Metal	Enriched	Alloys	B0	Other-specify Laboratory Safe	10-20 years	3	<1.0

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Multiple layers of plastic bags or plastic vial and drums to contain alpha radiation.

Describe material at risk, which constitutes a source term.

Material at risk is limited to the contents of one container.

SITE: INEL	FACILITY (Building or Location) CPP-637
	PARTITIONED AREA: 637 Laboratories

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Oxides	Enriched	Other -specify Unknown	B0	Other-specify Laboratory Safe	10-20 years	6	<1.0000

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Multiple layers of plastic wrap or plastic vial or bottle and drums to contain alpha radiation.

Describe material at risk, which constitutes a source term.

Material at risk is limited to the contents of one container.

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SITE: INEL	FACILITY (Building or Location) CPP-637
	PARTITIONED AREA: 637 Laboratories

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor Fuel	Enriched	Unknown	BO	Other-specify Laboratory Safe	10-20 years	1	<1.

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Multiple layers of plastic wrap or plastic vial or bottle to contain alpha radiation..

Describe material at risk, which constitutes a source term.
Material at risk is limited to the contents of one container.

SITE: INEL	FACILITY (Building or Location): CPP-637
	PARTITIONED AREA: 637 Laboratories

Question 4: POTENTIAL CAUSES

Facility	Material	External
☐ Process Material Transfer	☐ Aging	☐ Fire
☐ Inadvertent Transfers	☐ Container Seal Degradation	☐ Explosion
☐ Aging/Degradation	☐ Pressurization	☐ Earthquakes
☐ Equipment Failure	☐ Pyrophoricity	☐ Subsidence
☐ Change in Mission	☐ Radioactivity	☐ Winds
☐ Other Collocated Hazards	☐ Chemical Reactivity	☐ Floods
☐ Corrosion/Embrittlement	☐ Radiolysis	☐ Extreme Temperature
☐ Inadequate Configuration Knowledge	☐ Volumetric Expansion	☐ Snow
☐ Combustible Loading	☐ Oxidation	☐ Ash Loading
☐ Inadequate Seals	☐ Flammability	☐ Aircraft Crash
☐ Water Sources	☐ Toxicity	☐ Vehicle Accident
☐ Inadequate Drains	☐ Hydroloysis	☐ Onsite Transporation
☐ Preventive Maintenance Failure	☐ Crystallization	☐ Adjacent Facility Accident
☐ Administrative Control	☐ Other - Specify	☐ Other-specify
[Y] Human Error		
☐ Chemical Reactions		
☐ Contamination		
☐ Inadequacy of Design Basis		
☐ Design Deficiency		
☐ Flooding		
☐ Fire		
☐ Other SAR Accidents		
☐ Other-specify		

06/04/96

SITE: INEL	FACILITY (Building or Location): CPP-637
	PARTITIONED AREA: 637 Laboratories

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Facility: Administrative controls restrict handling or removing of material from mass limit criticality control area, minimizing human

SITE: INEL	FACILITY (Building or Location): CPP-637
	PARTITIONED AREA: 637 Laboratories

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integrity
[Y] Contamination	[ ] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Criiticality
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[ ] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[Y] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): CPP-637
	PARTITIONED AREA: 637 Laboratories
Question 5: POTENTIAL EFFECTS	

Describe Each Effect Identified Above:

Contamination of the facility could occur if the packages are deliberately opened and the U material dispersed. In addition, the radioactivity level of the facility may increase if the material is deliberately removed from the packages.

SITE: INEL	FACILITY (Building or Location):CPP-637
	PARTITIONED AREA: 637 Laboratories

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Contamination (Facility)									

Explanation

Quantity of material handled precludes impact to the environment, public, and workers.

Applicable References

SITE: INEL	FACILITY (Building or Location) CPP-640/Rover
	FUNCTION: Reclaiming HEU

Question 1: SITE

DOE Headquarters Facility Landlord: EM
DOE Headquarters Program Sponsor: EM
Facility Age: 18

Design Life: 20

Location of Facility on Site and Distance to Site Boundary

CPP-640 is located in the ICPP area of INEL. ICPP is approximately 13.5 km from the nearest INEL site boundary.

The Headend Processing Plant (HPP), CPP-640, which contains the Rover Fuels Processing Facility, was originally constructed in 1961. It consists of five heavily shielded cells (reinforced concrete) surrounded by operating and access areas (see attached isometric figure). The HPP was designed and built for pilot-plant scale demonstration of fuel reprocessing operations. The Rover system was installed (in 1978-82) in cells 2, 3, and 4 of the HPP and in a new mechanical handling cave (MHC) built above cells 3 and 4. A modular wall between cells 3 and 4 was removed to accommodate the fuel burners.

The Rover process consisted of two largely separate operations: the dry side, involving fuel handling, burners, and ash handling; and the wet side involving aqueous dissolution of the ash. On the dry side the graphite fuel rods (in cardboard tubes) were remotely charged from the MHC to a fluidized-bed burner where most of the graphite was burned away and the uranium was converted to oxides. The ash from this primary burner was pneumatically transferred via the MHC to a secondary fluidized-bed burner to further reduce the carbon content of the ash. The uranium-bearing product ash was then charged in batches to a critically-safe dissolver in cell 2, where the ash was dissolved in nitric and hydrofluoric acids. After fluoride ion complexing, the product solution was transferred to CPP-601 for solvent extraction recovery of the uranium.

The dry process vessels are not critically safe by geometry and must be kept dry for criticality safety. After ending of the Rover fuel reprocessing in 1984 and pneumatic removal of as much uranium oxide ash as possible from the dry process vessels, an estimated 100-150 kg U-235 remained in the burners in cells 3/4 and in the ash-handling vessels in the MHC. The distribution of U-235 among the burners and MHC vessels is not known. (See attached photo labeled Rover-2.) The bottom outlet of the primary ash collection vessel (VES-102) in the MHC became plugged late in the campaign; thus, a significant fraction of the U-235 is expected to be in that vessel. All uranium was rinsed from the dissolver system in cell 2.

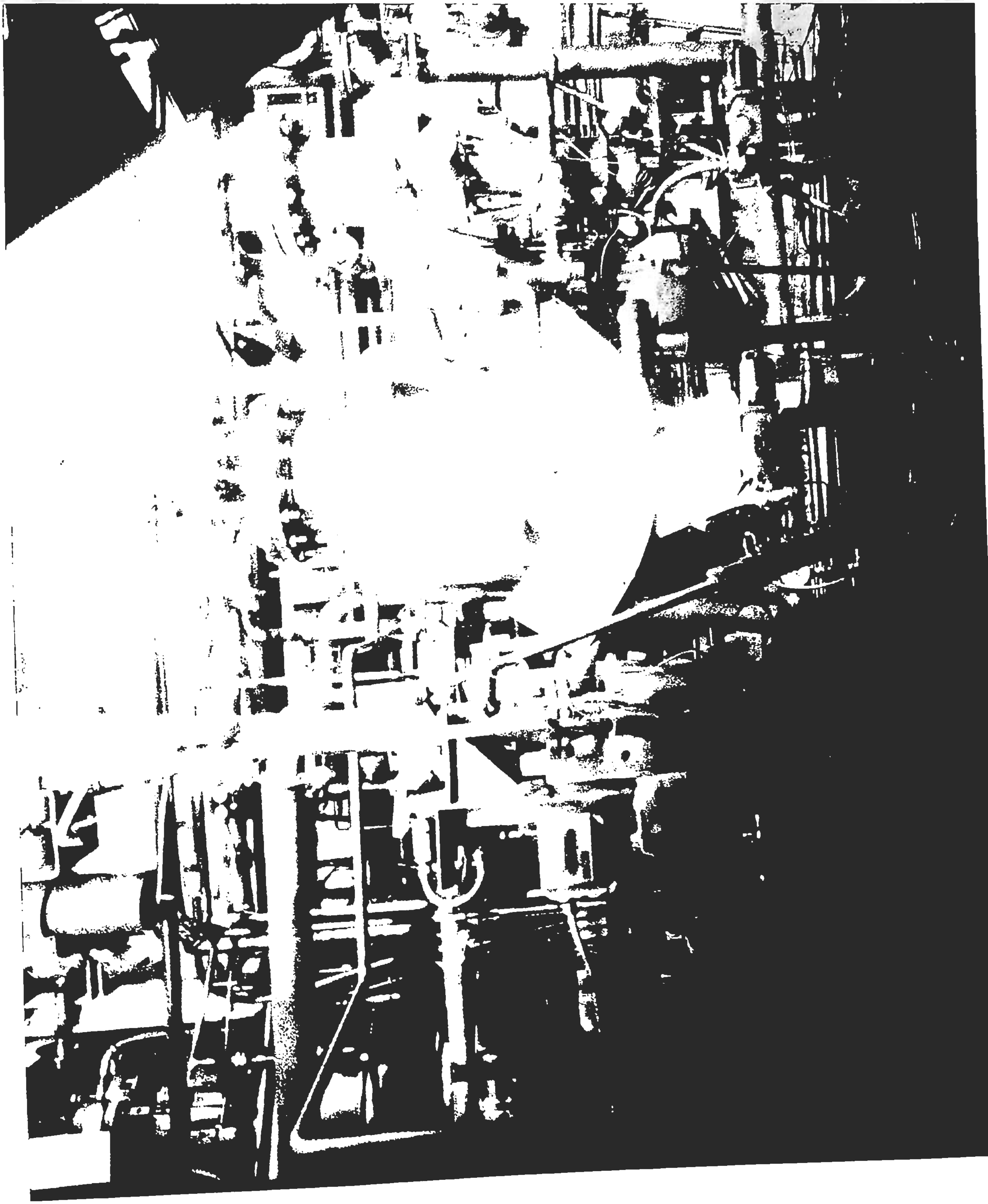


Photo Rover-2: MHC Ves 102 with lead blankets for shielding

SITE: INEL	FACILITY (Building or Location) CPP-640/Rover
	FUNCTION: Reclaiming HEU

Question 1: SITE

Design Mission, Interim Mission, Current Use

The Rover facility comprises a headend reprocessing system for reclaiming HEU from unrradiated and irradiated Rover graphite fuels from the Atomic Energy Commission (AEC) Nuclear Rocket Engine Program. Rover fuels containing approximately 3200 kg U-235 were processed in the system during 1983-84. The system has been shut down since 1984, with approximately 100-150 kg U-235 still remaining in the system as ash and burner bed material. The current plans are to remove and can the remaining HEU-bearing material in stainless steel cans, and dispose of the process vessels as they are emptied. Dismantling of the process vessels and piping will be necessary to gain access to some of the HEU-bearing solids for removal and canning. The early phases of this equipment dismantling are currently in progress.

Operational Status

Transition

Historical Information

In the past few years, four Occurrence Reports have been issued for the CPP-640 Rover facility:

ID–LITC-PHASEOUT-1995-0003 (Unusual) "Loss of Controlled Barrier Against Inadvertent Transfer of Fissile Material" - Pneumatic controllers for two air jets on the burners in cells 3/4 which were required to be administratively controlled by lock or seal in the OSRs were physically removed, preventing compliance with the OSRs.

ID–LITC-PHASEOUT-1996-0001 (Off-Normal) "Procedure Violation Results in Burning of Pre-Filter" - Sparks from remotely-controlled metal cutting operations in the Rover MHC caused a smoldering fire in the ventilation exhaust pre-filter in the MHC. The downstream HEPA filter was not damaged. (See attached photo labeled Rover-1.)

ID–LITC-PHASEOUT-1996-0002 (Unusual) "Violation of Technical Standard 5.5C1 'Surveillance Requirements for the Rover Mechanical Handling Cave and Cell 3 of CPP-640' " - A water-cooled welding torch was taken into the moderator-controlled cells 3/4 area of the Rover facility without logging the water content of the welding torch and its supply hoses into the moderator inventory required by Technical Standard 5.5C1. The water content of the torch and its hoses did not exceed the moderator limit for cells 3/4, however.

ID–LITC-PHASEOUT-1996-0003 (Unusual) "Nuisance Evacuation of Idaho Chemical Processing Plant (ICPP)" - The recently-installed, neutron-detecting criticality alarm system (CAS) for the Rover facility inadvertently alarmed when an arc welder was started nearby, apparently due to high-frequency electromagnetic noise emitted by the welder.

In the final report of an independent oversight evaluation of ES&H programs at the INEL performed by DOE-HQ/EH in June-September 1995, it was noted that the safety analysis strategy for the Rover uranium removal project had changed from that stated earlier in the ICPP SAR/TSR Implementation Plan. The 1994 Implementation Plan had called for a DOE 5480.23 SAR for the project; however, budget and schedule constraints led to a shift in strategy toward shorter, more focused safety assessments to be written as the project proceeds. The EH report expressed concern that such a strategy might not allow consideration of the full spectrum of accidents, vital support system degradation by aging, and interdependencies of systems shared with adjoining buildings. These concerns are being addressed in a uranium removal addendum in preparation. Reference: 'Independent Oversight Evalution of Environment, Safety and Health Programs at the Idaho National Engineering Laboratory,' October 1995; issued under Tara O'Toole memo: 'Idaho National Engineering Laboratory Safety Management Evaluation Report,' dated December 1, 1995"

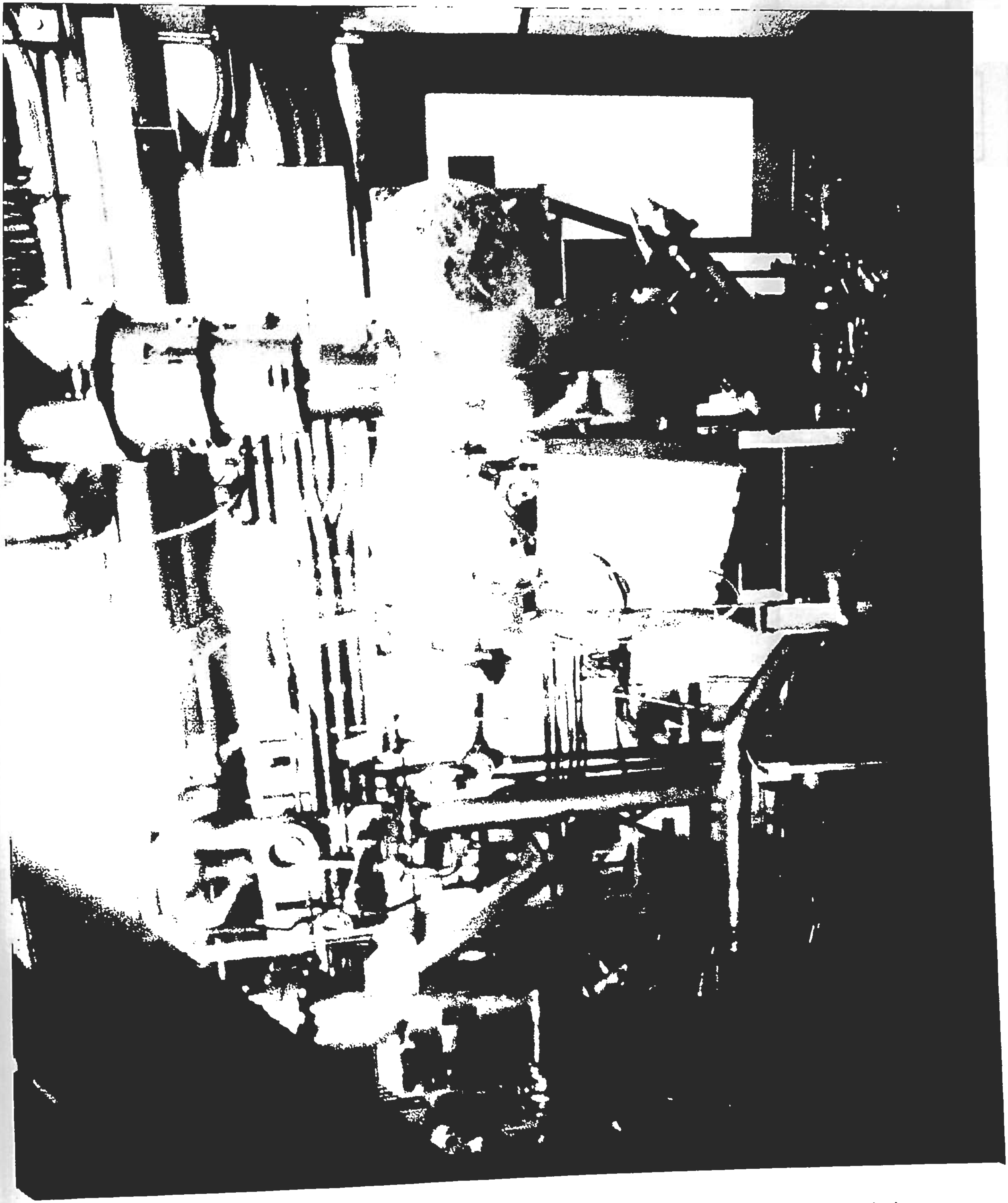


Photo Rover-1: Tortuous path shield over MHC HEPA and pre-filter to deflect sparks during cutting and grinding

SITE: INEL	FACILITY (Building or Location) CPP-640/Rover
	FUNCTION: Reclaiming HEU
Question 1: SITE	

List Authorization Basis

The Rover facility is currently covered by an SAR (Section 5.5 of the ICPP Plant Safety Document, WIN-107) and OSRs in the form of Technical Standards. The SAR was originally approved by DOE in April 1983, with minor revisions made in October 1983 and December 1995. A Status Addendum to the SAR was issued in August 1993 (updated in 12/95) to clarify which parts of the SAR still applied to the shutdown system. The OSRs (Technical Standards) have been kept up to date to reflect the system's shutdown status. A new addendum to the SAR is in preparation to extend the authorization basis to cover final HEU removal and canning.

Describe Important or Unique Design Features

No seismic design criteria nor qualification information is available for CPP 640 (constructed in 1961); however, the central portion of the building housing the Rover system consists of thick, reinforced concrete walls for shielding purposes and is considered rather robust. The mechanical handling cave and process equipment installed by the Rover project was designed to withstand the design basis earthquake at the time (0.24g horiz., 0.16g vert.).

The cells in which the Rover process equipment is located are kept under a slight vacuum relative to surrounding accessible operating areas by an HVAC exhaust system, which includes HEPA filters for confinement of airborne contamination. The high-temperature vessels and piping were constructed of Hastelloy X for heat resistance; the remainder of the process equipment is 300-series stainless steel. A neutron-detection criticality alarm system compliant with ANSI/ANS-8.3 was installed recently for uranium removal activities. The CAS monitors cells 3/4 and the MHC. The MHC is supplied with remote manipulators (master-slave and PaR), which are being used for remotely dismantling the MHC process equipment.

Describe Weaknesses in the Design Basis

No seismic qualification for CPP-640, although considered rather robust (see above). The dry process vessels are large and not critically safe by geometry, especially the burners (VES-100,-104) in cells 3/4. Exclusion of moderator (i.e., liquids) from the HEU-bearing material is essential for criticality safety. The roof of the MHC is not water tight; thus, a water-proof tarp is required (by OSRs) to be spread across the rooftop to ensure that water from fire sprinklers and piping above the cave cannot leak into the cave.

Structural Design

Reinforced concrete

Partitioned Areas of HEU within facility

Rover Dry Process

Description of Partitioned Areas

The residual HEU in the Rover system is located in three places that comprise a single partitioned area: the primary burner VES-100, the secondary burner VES-104, (both in cells 3/4), and the ash handling vessels in the MHC, especially VES-102, whose bottom outlet became plugged during the latter part of the processing campaign. The distribution of U-235 among these three vessels is not known accurately, nor is the total quantity of residual U-235 remaining in the process. The total amount is estimated by 100-150 kg based on a material balance around the system (fuel charged minus U-235 recovered in dissolver product solutions).

Amount & Location of Hazardous Material Collocated or Commingled with HEU

The bulk of the material in the burners is aluminum oxide, with smaller amounts of carbon, niobium oxide, niobium uranium oxide, plus other extraneous materials that probably accompanied the fuel into the burners (e.g., silicon dioxide as rocks, which would have melted and resolidified in the primary burner). A small amount of fission products is present also.

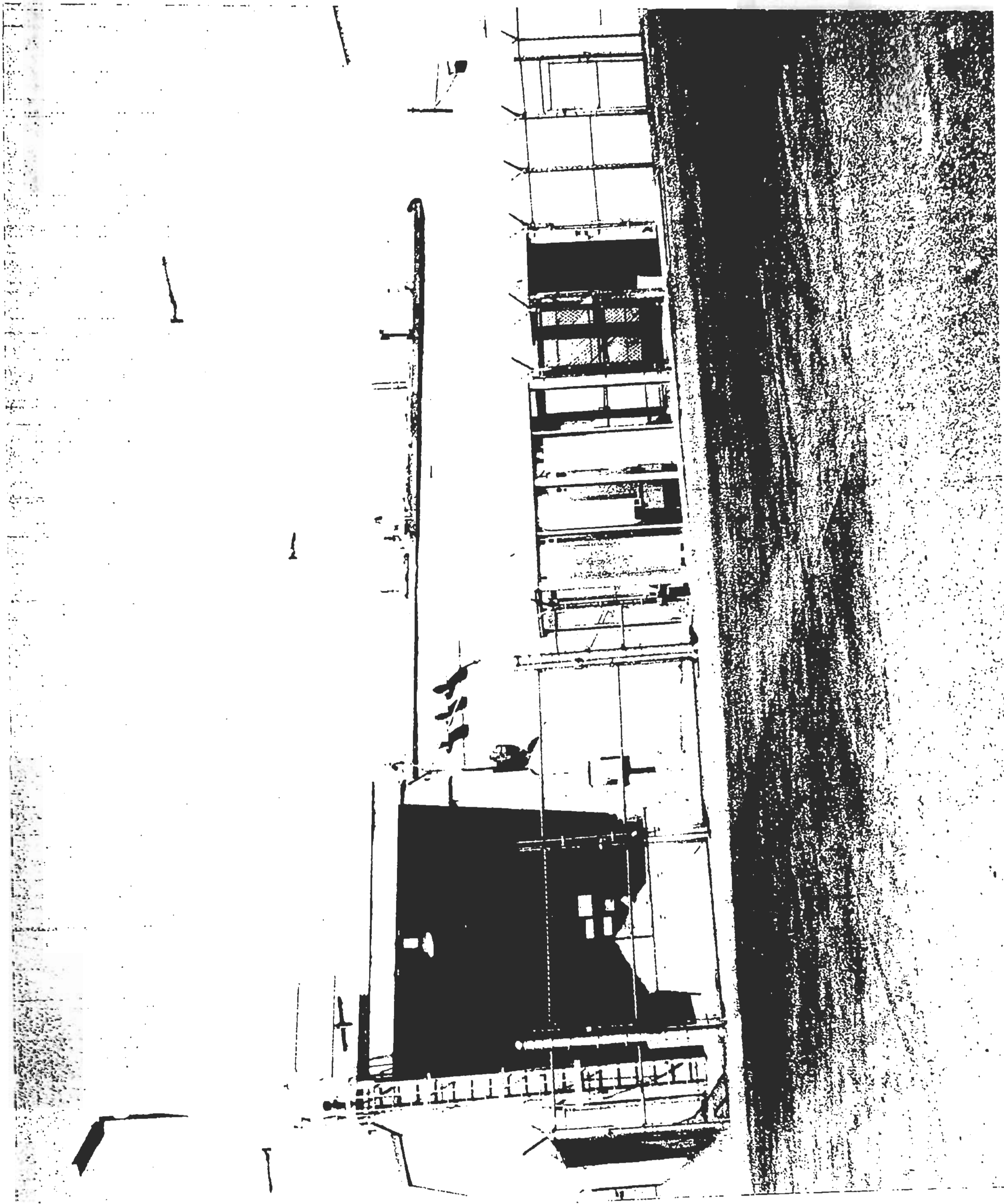
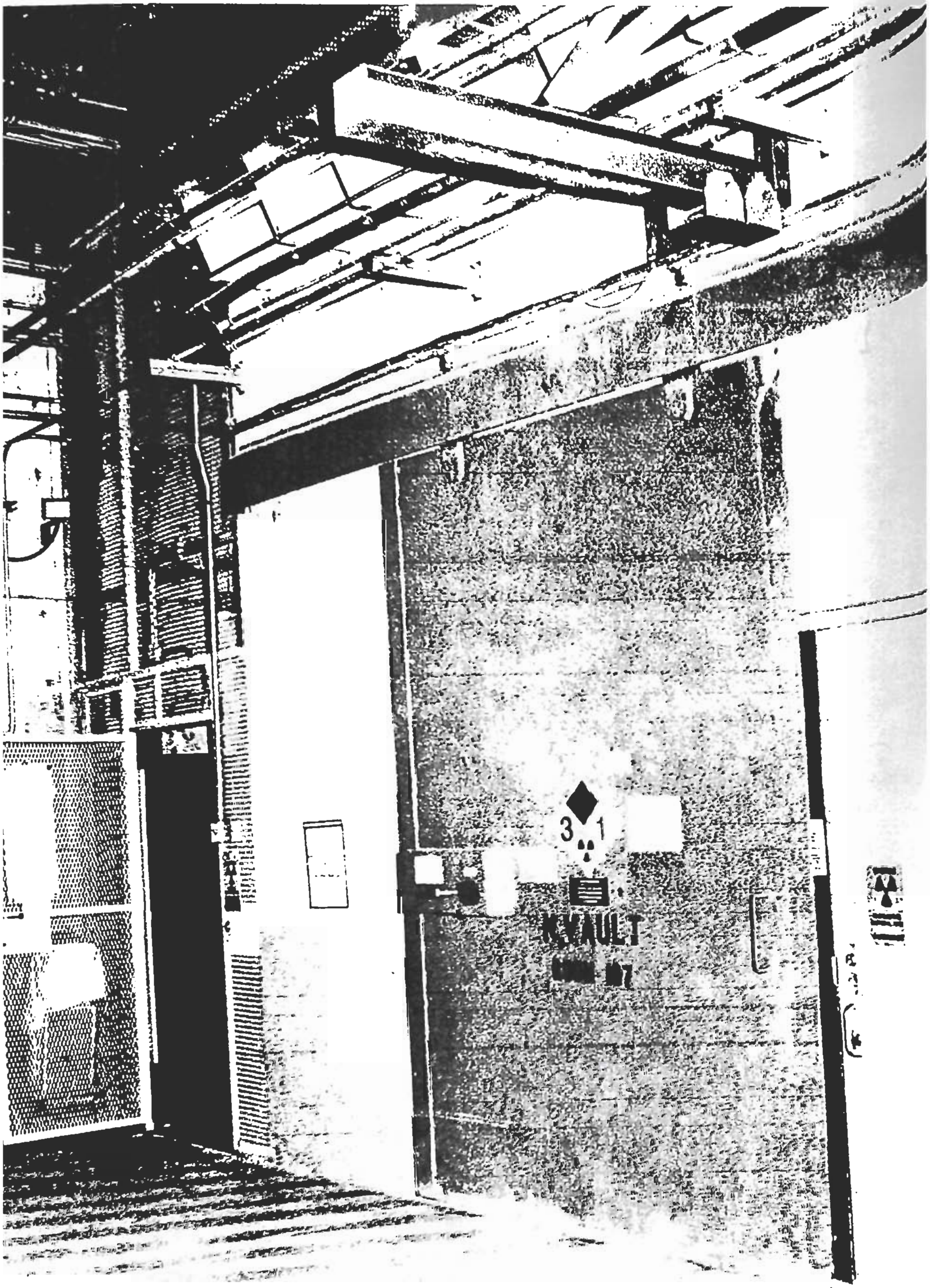


Photo CPP-651-1: CPP-651 Entrance



.oto CPP-651-2: CPP 651 North Vault Entrance

Photo CPP-651-3: CPP 651 South Vault

SITE: INEL	FACILITY (Building or Location) ICPP CPP-651
	FUNCTION: Unirradiated Fuel Storage

Question 1: SITE

each approximately 10 feet by 12 feet. Reinforced concrete walls one foot thick divide adjacent compartments. Each compartment is secured against access by a welded chain-link security fence containing a locked access gate. An aisle, eight-feet wide for half its length, and seven-feet wide for its remainder, runs the length of the South Vault for access to the individual storage areas. This aisle is called Area 100 and is designated as a criticality control area (CCA) for loading and unloading shipping containers, repackaging, and inventory of fissile material. No fuel storage is permitted in Area 100. Storage areas 101 through 106 are individual CCAs. Material in approved shipping or storage packages is stored by Transport Index in the South Vault except areas 102 and 104. (See Photo CPP-651-3).

The annulus storage area is in the annulus between the facility outer walls and the North and South Vaults. One hundred storage wells have been constructed on the north, east, and south sides of the annulus between the Unirradiated Fuel Storage Facility outer walls and the North and South Vaults. There are three rows of wells on the north side and one row on each of the east and south sides. These wells consist of 8-in. diameter steel pipe embedded vertically in concrete. Each well is 8 feet 2 inches deep and has a bolted-on steel cover. Each row of storage wells is served by a 1-ton monorail hoist (five hoists total) for lifting the storage racks out of the storage wells and is subject to inventory for material accountability purposes every four years. The containers will never be opened in the facility. A storage rack assembly fits within the 8-in. pipe storage well. The rack will store seven ICPP uranium oxide product containers in a linear array when placed in a well. The storage rack is an aluminum structure consisting of a rolled aluminum sheet strongback with the back side a solid semi-circular section. The rack has seven compartments, each of which holds one and only one product container. Aluminum plate shelves support the product containers, which are held in baskets, in a linear array. The product containers are 6 in. diameter by 11 in. long. The storage rack compartments are 13 in. high, providing a 2-in. spacing between containers. Each compartment has a hinged aluminum door on the front side which is also a semi-circular section. The door is held closed by a removable pin. The strongback and doors are rolled on a 3.25-in. radius, resulting in an approximately 6.5-in. outside diameter. A storage rack loaded with seven product containers weighs approximately 400 lbs. If drums are stored in annulus area, this material is stored by transport index.

Process: Storage

Unirradidated fuel is delivered using trucks, manlifts, and forklifts. After delivery, the fuel is offloaded and taken inside. Vehicles are not allowed inside the facility except for an electric forklift and hydraulic-powered lift equipment. The fuel is placed into the storage vault location by hand. Within the building, fuel handling is necessary for inspection, storage, accountability, transfer into and out of the facility and, in some instances, the repackaging of stored fuel.

The security systems are operated by security personnel. All other systems are operated by the building custodians. The fuel is handled by certified fissile material handlers.

The number of personnel in the facility varies depending on the type of operation. For fuel shipments, 9 to 14 people may be inside depending on the type of fuel being handled. Normally, three to five people enter the building for standard evolutions.

Amount & Location of Hazardous Material Collocated or Commingled with HEU
See classified addendum.

Process Material Transfers
Storage facility limited to storage materials.

On-Site Transportation
The ICPP is located on the INEL and is remote from major population centers, waterways, and interstate transportation routes. The INEL has no permanent residents, and ingress and egress of site personnel for performance of their duties and visiting personnel on official business are strictly controlled. No casual visitations are permitted, except for persons driving through the INEL on one of four public highways and visitors to the Experimental Breeder Reactor Number 1 (EBR-1), National Historical Monument, which is open to the public during the summer months. There are no recreational activities within the INEL, but limited grazing is allowed.

Unirradiated fuel is delivered using trucks, manlifts, and forklifts. After delivery, the fuel is offloaded and taken inside. Vehicles are not allowed inside the facility except for an electric forklift and hydraulic powered lift equipment.

SITE: INEL	FACILITY (Building or Location) ICPP CPP-651
	FUNCTION: Unirradiated Fuel Storage
Question 1: SITE	

Describe Important or Unique Design Features

1. Seismic Design: The CPP-651 building design criteria for the outer building meets present criteria for a PC-3 (Category 2) facility. The inner building design criteria meets the present criteria for horizontal acceleration. The vertical acceleration for the inner building is presently under review. A safeguards system within CPP-651 was evaluated and meets present criteria.

2. Fire Protection: Building construction of concrete and metal. The North Vault and South Vault are equipped with Halon fire suppression systems. There are 14 smoke detectors associated with the two Halon fire extinguishing systems, four in the North Vault and ten in the South Vault. South Vault has no sprinkler system. The North Vault, Receiving Area, and Annulus have a dry-pipe sprinkler system.

3. Ventilation: Receiving Area variable speed exhaust blower on the north end and air supply at the south end of the Receiving Area and around the main doors.

4. Criticality Control: Engineered controls for racks and areas within CPP-651. Administrative controls for mass and moderator for handling and storage of containers and bundles.

5. Shielding: Berm and concrete shielding

6. Structural Design: Reinforced concrete outer shell. Earth berm covered except for roof. Non-structural concrete slabs covering the berm. Inner concrete building with concrete north vault and south vault. Areas within south vault are separated by concrete dividers (Areas 101-106). Concrete north vault (Area 107).

Describe Weaknesses in the Design Basis

Seismic response for the inner building vertical acceleration is still under review.

Structural Design

Reinforced concrete

Partitioned Areas of HEU within facility

One partition for whole building.

Description of Partitioned Areas

Facility: ICPP-651

The building is a two-compartment inner-vault building approximately 42 feet wide by 45 feet long, surrounded by a reinforced concrete shell. A chain link fence on the north, east and south sides, and the reinforced concrete wall on the west side surround the facility. (See Photo CPP-651-1)

The outer shell also provides a 20 foot wide interior receiving area on the west end for use in receiving and preparing material shipments.

Access to the building is through a set of five hydraulically operated double doors on the south end of the receiving pad. These doors are ganged so that either half may be opened for personnel passage or both halves for material or equipment passage.

The North Vault Storage Area (Area 107) is 25 feet long and 19 feet wide. Access is from the receiving area through a combination-locked sliding door followed by key-locked, hinged, double doors. Material in approved shipping or storage packages is stored by Transport Index in the North Vault. (See Photo CPP-651-2.)

The South Vault Storage Area is an L-shaped area which includes the remainder of the 42-foot by 45-foot internal vault area. Access is from the receiving area through a combination-locked sliding door followed by key-locked, hinged, double doors. A second door, previously used for emergency exit, was welded closed in the 1984 security upgrade. The South Vault is divided into 6 storage areas,

SITE: INEL	FACILITY (Building or Location) ICPP CPP-651
	FUNCTION: Unirradiated Fuel Storage

Question 1: SITE

List Authorization Basis

1. Plant Safety Document WIN-107-4.8 "Safety Analysis for Handling and Storage of Fuels in the Unirradiated Fuel Storage Facility (UFSF), CPP-651," August 1993
2. Plant Safety Document WIN-107-4.8B, Addendum B, "Safety Analysis Report CPP-651 Rover Storage Racks (For LANL Fuel Scraps)," October 1986
3. Plant Safety Document WIN-107-4.8C, Addendum C, "Assessment of CPP-651 Safeguards Modifications for Personnel Safety," March 1989
4. Plant Safety Document WIN-107-4.8D, Addendum D, "Safety Analysis Report for the Handling and Storage of Unirradiated Fuel in Area 104 of the Unirradiated Fuel Storage Facility (CPP-651)," August 1990
5. Plant Safety Document WIN-107-4.8E, Addendum E, "Safety Analysis Report for ICPP-651 Annulus Storage," September 1994
6. Idaho Chemical Processing Plant Implementation Plan for DOE Order 5480 22, "Technical Safety Requirements," and DOE Order 5480.23, "Nuclear Safety Analysis Report," Revision 1, 1996 (draft)
7. Technical Standard TS 4.8A1, "Approved Fuel Listing for the Unirradiated Fuel Storage Facility, CPP-651," May 10, 1995
8. Technical Standard TS 4.8A3, "Requirements for Handling Fuel Outside of Approved Storage in the Unirradiated Fuel Storage Facility," May 10, 1995
9. Technical Standard TS 4.8B1, "Identification Requirements for Storage of Fuel in the Unirradiated Fuel Storage Facility," November 19, 1990
10. Technical Standard TS 4.8B2, "Fire Loading Restrictions for the Unirradiated Fuel Storage Facility (CPP-651)," November 19, 1990
11. Technical Standard TS 4.8B3, "Firefighting Requirement for the Unirradiated Fuel Storage Facility (CPP-651)," May 10, 1995
12. Technical Standard TS 4.8B4, "Group I Instruments for Unirradiated Fuel Storage Facility (CPP-651)," August 31, 1993
13. Technical Standard TS 4.8C1, "Surveillance Requirements for the Unirradiated Fuel Storage Facility," May 10, 1995
14. INEL Site-Wide EIS

Safety Analysis update and reformatting will merge safety documents and addendum C&D. This is scheduled for completion 1st Q FY-97. Technical Standards will be reevaluated according to TSR.

SITE: INEL	FACILITY (Building or Location) ICPP CPP-651
	FUNCTION: Unirradiated Fuel Storage
Question 1: SITE	

DOE Headquarters Facility Landlord: EM
DOE Headquarters Program Sponsor: EM **Design Life:** 40
Facility Age: 21

Location of Facility on Site and Distance to Site Boundary

The CPP-651 Unirradiated Fuel Storage Facility is located within the ICPP along Redwood Street parallel with the west fence of the ICPP. The shortest distance from the ICPP to the INEL site boundary is 13.7 kilometers (8.5 miles) to the south. Other non-ICPP facilities nearby include Test Reactor Area at 2,000 m and Central Facilities Area at 4,000 m.

Design Mission, Interim Mission, Current Use

Designed to provide secure storage of a variety of unirradiated fuel materials for subsequent shipment to other facilities for use.

Operational Status

In use

Historical Information

Occurrence Reports for past two years (includes USQ concerns)

1. ID–LITC–LANDLORD-1994-0004, 08/08/1995, Inaccurate Fuel Inventory Records
2. ID–LITC-LANDLORD-1994-0005, 12/06/1995, Discrepancies Found During Unirradiated Fuel Storage (CPP-651) Fuel Inventory
3. ID–LITC-LANDLORD-1994-0006, 08/08/1995, Shipping Container Labeling Discrepancies Found During Fuel Storage (CPP-651) Fuel Inventory
4. ID--LITC-LANDLORD-1995-0006, 10/06/1995, Technical Standard Violations During Unirradiated Fuel Storage Inventory (CPP-651)
5. ID--LITC-LANDLORD-1995-0009, 10/06/1995, Violation of Technical Standard 4.8A1
6. ID--LITC-LANDLORD-1995-0011, 04/30/1996, Inaccuracies Discovered During Fuel Inventory at CPP-651
7. ID--LITC-LANDLORD-1995-0012, 10/06/1995, Improper Storage of Fuel Type in CPP-651
8. ID--LITC-LANDLORD-1995-0015, 01/04/1996, Unapproved Fuel Container Storage Mode In CPP-651
9. ID–LITC-LANDLORD-1995-0019, 12/06/1995, Potential Unreviewed Safety Questions for CPP-651
10. ID–LITC-LANDLORD-1996-0001, 04/30/1996, Drums Stored With Incorrect Transport Index at CPP-651
11. ID--LITC-LANDLORD-1996-0003, 03/20/1996, Deteriorated Storage Containers at CPP-651
12. ID–LITC-LANDLORD-1996-0004, 04/25/1996, Inventory Discrepancies With Drum RF-9918
13. ID--LITC-LANDLORD-1996-0006, 03/22/1996, Safety Limit Violation in CPP-651
14. ID--LITC-LANDLORD-1996-0008, 04/25/1996, Unauthorized Testing Activities at CPP-651
15. ID–WINC-LANDLORD-1994-0011, 08/08/1995, Inaccurate Indentification of Fuel and Fuel Storage Positions
16. ID--WINC-LANDLORD-1994-0014, 08/08/1995, Improper Packaging of Uranium Oxide in a Storage Container, Violation TS 4.8A1
17. ID–WINC-LANDLORD-1994-0015, 08/08/1995, Packages Stored With Incorrect Transport Index, Violation TS 4.8A1

1. DNFSF: Question on seismic design of CPP-651 (1993) (See seismic structure discussion)

1. Injuries: No injuries in the past two years in ORPS

06/03/96

SITE: INEL	FACILITY (Building or Location):CPP-640/Rover
	PARTITIONED AREA: Rover Dry Process

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Fire (Material)									

Explanation

HEPA filter fire in HVAC exhaust system could cause spread of airborne contamination, however, highly unlikely due to the multiple sets of HEPA filters in the system.

Applicable References

SITE: INEL	FACILITY (Building or Location): CPP-640/Rover
	PARTITIONED AREA: Rover Dry Process

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Structural Failure (Facility)	Y	Y	Y						

Explanation

A severe earthquake or extremely high winds could cause structural failure in CPP-640, possibly compromising confinement features and process vessels, resulting in localized spread of contamination.

Applicable References

SITE: INEL	FACILITY (Building or Location):CPP-640/Rover
	PARTITIONED AREA: Rover Dry Process

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Criticality (Facility)	Y	Y	Y	Y		Y			

Explanation

Potentially fatal radiation doses to workers if inside cells 3/4 or MHC during criticality accident. Local spread of contamination within ICPP. Possible spread of airborne contamination, causing on-site ground contamination in the vicinity of ICPP. No significant off-site dose or contamination is foreseen.

Applicable References

SAR, WIN-107-5.5

SITE: INEL	FACILITY (Building or Location): CPP-640/Rover
	PARTITIONED AREA: Rover Dry Process

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Criticality in process vessel due to moderator introduction, resulting in vessel rupture and spread of contamination.

Adjacent facility fire or other accident could cause a breach of confinement in the MHC area, resulting in contamination spread.

HEPA filter fire in the HVAC exhaust system could cause spread of airborne contamination.

Severe earthquake or extremely high winds could cause failure of confinement features and spills/release of HEU bearing solids from process equipment and possible contamination spread.

SITE: INEL	FACILITY (Building or Location): CPP-640/Rover PARTITIONED AREA: Rover Dry Process

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[Y] Fire	[Y] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[Y] Material Release	[Y] Loss of Building Integrity
[Y] Contamination	[ ] Breach of Packaging	[Y] Release of Materials
[Y] Criticality	[ ] Fire	[Y] Radiation and Releases from Criticality
[Y] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[Y] Structural Failure		
[Y] Equipment Failure		
[Y] Material Release		
[ ] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): CPP-640/Rover
	PARTITIONED AREA: Rover Dry Process

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Facility/Process Equipment: Aging degradation of moderator isolation barriers or human error could cause moderator introduction and criticality accident in process vessel.

MHC HEPA filter fire could contribute to possible fire in the 640 plant filtration system.

External: Flooding from external sources could cause water intrusion into process cell, reducing margin of criticality safety.

Water flooding into the process cells from broken pipes or external sources combined with inadequate drains from cell floors would reduce the margin of criticality safety. RCRA closure of some liquid waste collection tanks in CPP-640 would interfere with the ability to remove water from cell floors. Fire in the MHC area could compromise contamination confinement features (tent, glovebox).

Severe earthquake, extremely high winds or aircraft crash could damage CPP-640 structural features, possibly causing breach of confinement structures and spread of contamination. Fire or other adjacent facility accident could also cause a breach of confinement features, especially in the MHC area.

SITE: INEL	FACILITY (Building or Location): CPP-640/Rover PARTITIONED AREA: Rover Dry Process

Question 4: POTENTIAL CAUSES

Facility	Material	External
[ ] Process Material Transfer	[ ] Aging	[Y] Fire
[ ] Inadvertent Transfers	[ ] Container Seal Degradation	[ ] Explosion
[Y] Aging/Degradation	[ ] Pressurization	[Y] Earthquakes
[ ] Equipment Failure	[ ] Pyrophoricity	[ ] Subsidence
[ ] Change in Mission	[ ] Radioactivity	[Y] Winds
[ ] Other Collocated Hazards	[ ] Chemical Reactivity	[Y] Floods
[ ] Corrosion/Embrittlement	[ ] Radiolysis	[ ] Extreme Temperature
[ ] Inadequate Configuration Knowledge	[ ] Volumetric Expansion	[ ] Snow
[ ] Combustible Loading	[ ] Oxidation	[ ] Ash Loading
[ ] Inadequate Seals	[ ] Flammability	[Y] Aircraft Crash
[Y] Water Sources	[ ] Toxicity	[ ] Vehicle Accident
[Y] Inadequate Drains	[ ] Hydroloysis	[ ] Onsite Transporation
[ ] Preventive Maintenance Failure	[ ] Crystallization	[Y] Adjacent Facility Accident
[ ] Administrative Control	[ ] Other - Specify	[ ] Other-specify
[Y] Human Error		
[ ] Chemical Reactions		
[ ] Contamination		
[ ] Inadequacy of Design Basis		
[ ] Design Deficiency		
[Y] Flooding		
[Y] Fire		
[ ] Other SAR Accidents		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location) CPP-640/Rover
	PARTITIONED AREA: Rover Dry Process

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Holdup	Weapons	Materials in pipes, tanks, ducts, etc	Flanged	Process Area	18	3	160.00

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

The Rover burners (VES-100,-104) and ash vessel (VES-102) are isolated and provide containment.

Describe material at risk, which constitutes a source term.

The bed material in the burners (VES-100,-104) is primarily aluminum oxide and the uranium is present as uranium oxide, and niobium uranium oxide. The burner bed material also contains unburned carbon, niobium oxide, and small amounts of fission products. The residual ash material consists primarily of uranium oxides and carbon dust.

SITE: INEL	FACILITY (Building or Location): CPP-640/Rover
	PARTITIONED AREA: Rover Dry Process

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Shielded cells, remote handling equipment, administrative control of distance from radiation sources provide for keeping radiation doses to workers ALARA and mitigating consequences of a criticality accident.

Confinement Systems consisting of corrosion-resistant process equipment, confinement tents, MHC access glovebox, hot cells and HEPA-filtered HVAC exhaust system (ducts, blowers, etc.) provide for control of airborne contamination.

Protective Clothing and Respiratory Protection are used during cell entries for preventing uptake of airbome radioactivity.

Criticality Alarm System mitigates excessive radiation doses from a criticality accident by prompt worker evacuation.

Public/Environment Barrier Narrative:

Cells, Building, HVAC/Confinement (filters), fire suppression systems, Stack Monitor Alarm prevent airborne radioactivity releases and provide early warning of any loss of effectiveness of exhaust filters.

Criticality Barrier Narrative:

Double Contingency protects against criticality as demonstrated in SAR descriptions of criticality scenarios.

Corrosion-resistant process vessels and piping, isolation of lines leading to dry process vessels prevent introduction of moderator liquids into the dry process vessels.

Administrative controls on moderator materials taken into dry process cells prevent moderator introduction into spilled ash or burner bed material from dry process vessels.

Administrative Barrier Narrative:

A DOE approved Authorization Basis (SAR, OSRs) is in place, along with a DOE approved Basis for Interim Operations (BIO) per DOE 5480.23. The OSRs (Tech. Stds.) specify material limits, surveillance and monitoring requirements, supervisor/operator training and qualification, and procedures requirements.

Operating and Maintenance Procedures, Configuration Control, QA, Training, Conduct of Operations Manual, Mgmt. Control Organization, safety system testing and calibration standards, operating records, lessons learned program assure that operations and equipment configurations remain within the Authorization Basis, and operating experience is factored into keeping the AB current.

Emergency Response Plan mitigates consequences of accidents.

Worker Access and Personnel Reliability Assurance Program minimize potential for diversion of fissile material from approved custodianship.

SITE: INEL	FACILITY (Building or Location): CPP-640/Rover
	PARTITIONED AREA: Rover Dry Process

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality[1,2]	Administrative Barrier[3]
[Y] Gloveboxes	[Y] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[Y] HVAC/Confinement	[ ] Double Contingency Not Applied (specify) (e.g., Mass, Absorbers, Geometry, Interaction, Concentration, Moderation, Enrichment, Reflection, Volume)	[Y] Material Limts
[Y] Duct	[ ] Liquid Containment/Dike		[Y] Monitoring
[Y] Filter	[Y] Bay, Cells, Magazines		[Y] Configuration Control
[ ] Vault	[ ] Canyons		[Y] Quality Assurance
[ ] Room	[ ] Pads		[Y] Conduct of Operations
[Y] Hot Cell/Canyon	[ ] Site Boundary		[Y] Authorization Basis
[ ] Hood	[ ] Trenches		[Y] Training
[Y] Piping	[ ] Storage Vault		[Y] Organization
[Y] Shielding	[Y] Fire Suppression		[Y] Lessons-Learned
[Y] Distance	[Y] Alarm System		[Y] Testing
[Y] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[Y] Protective Clothing			[Y] Records
[Y] Remote Handling			[Y] Standards
[Y] Confinement System			[ ] External Regulation
[ ] Burial Ground			[Y] Surveillance
[Y] Tanks			[Y] Personnel Reliability Assurance Program
[Y] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[Y] Emgergency Response
[ ] Other-specify			[ ] Other-specify
[ ] None			

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location) CPP-640/Roverr
	FUNCTION: Reclaiming HEU

Question 1: SITE

Process Material Transfers

None at the present time.

On-Site Transportation

None

Staff Levels & Experience

The Rover uranium removal project is staffed with a facility manager, one project manager, and one project engineer (8-20) years experience at ICPP); plus a total of 7 supervisors and 15 senior operators in four shift crews (average experience 10 yearss), which cover CPP-640 and other former reprocessing transition facilities.

Applicable References

See above sections.

SITE: INEL	FACILITY (Building or Location): ICPP CPP-651
	PARTITIONED AREA: One partition for whole building.

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Worker Barrier:

- Mass limits in containers protect worker from criticality from fuel in storage
- Mass limits and moderator limits protect workers from criticality during handling
- Most fuel is double contained
- Limits in storage containers, configuration control of racks, limits for handling ops, exhaust vent.

Vault: Provide shielding from work in other areas within CPP-651.

Shielding: Vault walls and storage wells in annulus.

Remote Handling and Distance: Remote handling equipment allows remote handling of product for loading annulus wells, thereby reducing worker exposure due to distance

Alarm System: Constant air monitor alarms allow those in other areas to escape in event of a radiological release.

Public/Environment Barrier Narrative:

The facility is a containment building. Also, the distance to the site boundary is so large there is no issue.

Fire Suppression minimizes airborne release in the event of a fire.

Criticality Barrier Narrative:

Operation philosophy: 1) fuel storage configurations to be critically safe for all degrees of moderation and full water reflection and 2) controls used to maintain fuel configuration and handling operations integrity to be based on triple contingency criteria.

- Facility design above flood level and exceeds seismic requirements (inner structure vertical response is under review)
- Poison storage racks (fluorinel and denitrator sample cabinet) and physical dividers (spacing), mass limit control for storage racks, storage containers limits, configuration control for structure and racks
- Mass and moderator limits for handling

Currently triple contingency controls and design protect worker from a criticality. Double contingency controls will be applied in the new SAR.

Administrative Barrier Narrative:

1. Material type limits, mass limits, moderator limits, external regulations for transportation containers, training of certified fuel handlers, worker access and occupancy limits, custodian surveillance.

2. Basic programs defense-in-depth: conduct of operations, operational and maintenance procedures, emergency response, radiation protection, criticality protection, material limits, monitoring, configuration control, quality assurance, authorization basis, training, organization, lessons learned, testing, records, standards, external regulations, surveillance, personnel reliability assurance program.

3. Controls protect worker from a criticality, inhalation, ingestion, skin contamination, radiation exposure.

SITE: INEL	FACILITY (Building or Location) ICPP CPP-651
	PARTITIONED AREA: One partition for whole

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	Enriched	Other PO,PI,UO	D1, D2, Metal	Vault	0-30	39	Classified

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

CPP-651 is not used for source storage.

Samples are stored in:

1. An enclosed metal cabinet. A Product Sample Cabinet with locking front doors is located in Area 104 of the South Vault. The cabinet is 36 inches wide, 16.75 inches deep, and 75 inches high. It contains five horizontal storage shelves. Each shelf contains a compartmented tray which is fabricated of 1/16 inch thick cadmium sheet on the bottom and sides of each compartment, with a carbon steel sheet cover. The cadmium provides neutron isolation between adjacent compartments and between trays. The cabinet is bolted to the south wall of Area 104. A seismic analysis performed for a fully loaded cabinet has determined that the cabinet shelves, storage trays, and anchoring bolts will withstand the DBE without compromising the integrity of the individual components or contents thereof.

2. Approved Shipping Packages. Approved shipping packages contain various types of fissile materials, including samples. The packages are stored in CCAs specifically approved for them under Transport Index (TI) less than or equal to 50 units. The TI is assigned in accordance with government regulations covering the specific package, usually DOT. The TI must be assigned based on criticality safety. Shipping packages are stored on the floor or in special racks designed for storage efficiency and accessibility.

Shipping packages intended for storage are usually opened only for inventory and accountability purposes. Occasionally material are transferred from shipping packages to other forms of storage, such as racks, or to other shipping packages. All such handling an storage operations are governed by approved procedures controlled by appropriate CSEs and safety documentation. These operations are performed only in Area 100, a CCA approved for fuel handling. Fuel storage is not permitted in Area 100.

Currently in use in CPP-651 are DOT-6M drums, DOT-6L drums, DOT-17C drums, DOT-17H drums, CONT-YDC-900 drums, an CONT-YDC-910 drums.

3. Annulus Storage Wells. The annulus storage wells consist of a rack and well arrangement. The storage rack is an aluminum structure consisting of a rolled aluminum sheet strong back with the back side a solid semi-circular section. The rack has seven compartments, each of which holds one and only one product or product sample container. Aluminum plate shelves support the sample containers, which are held in baskets in a linear array. The product containers are 6 in. diameter by 11 in. long. The stora rack compoartments are 13 in. high, providing a 2-in. spacing between containers.

Each compartment has a hinged aluminum door on the front side which is also a semi-circular section. The door is held clos a removable pin. The strong back and doors are rolled on a 3.25-in. radius, resulting in an approximately 6.5 in. outside diamete storage rack loaded with seven product containers weighs approximately 400 lbs.

This storage rack assembly fits within the 8-in. pipe storage well. The dimensions guarantee that no failure could result in containers coming together in any side-by-side array in storage. The top of the storage rack has a 2-in. thick stainless steel sh plate to provide radiation protection to workers who may be working above a storage well containing fuel. The rack doors are d

SITE: INEL	FACILITY (Building or Location) ICPP CPP-651
	PARTITIONED AREA: One partition for whole

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)

so they can be opened and closed from a distance using the gate tool.

Describe material at risk, which constitutes a source term.

Denitrator Product Samples. The sample bottle is a nominal 15 ml glass bottle with a plastic cap. The glass bottle is contained within a polyethylene outer container. Both the bottle and the outer container are sealed with vinyl tape. The U0-3 sample is about 83 wt% uranium, and the enrichment ranges from 50% to 97% U-235.

LANL Sample Material. Assorted oxides and carbides of uranium mixed with graphite.

SITE: INEL	FACILITY (Building or Location) ICPP CPP-651
	PARTITIONED AREA: One partition for whole

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Metal	Enriched	Alloys	Metal Rack, D1,	Vault	0 to 30	20	Classi

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

1. Approved Shipping Packages. Approved shipping packages contain various types of fissile materials, including metals. The packages are stored in CCAs specifically approved for them under TI less than or equal to 50 units. The TI is assigned in accordance with government regulations covering the specific package, usually DOT. The TI must be assigned based on criticality safety. Shipping packages are stored on the floor or in special racks designed for storage efficiency and accessibility.

Shipping packages intended for storage are usually opened only for inventory and accountability purposes. Occasionally mater are transferred from shipping packages to other forms of storage, such as racks, or to other shipping packages. All such handling a storage operations are governed by approved procedures controlled by appropriate CSEs and safety documentation. These operations are performed only in Area 100, a CCA approved for fuel handling. Fuel storage is not permitted in Area 100.

Currently in use in CPP 651 are DOT-6M drums, DOT-6L drums, DOT-17C drums, DOT-17H drums, CONT-YDC drums, and CONT-YDC -910 drums.

2. Fluorinel (A and B Racks). Fluorinel fuel is stored in poisoned racks (A and B) which are permanently installed in Area 102 of South Vault. The A rack constructed of angle iron, is 3 feet wide, 3 feet deep, and approximately 8 feet high. It contains 60 stora slots, each 4 inches wide, 4.5 inches high, and 36 inches deep. The B rack is of the same construction as the A rack, but differs and configuration. The B rack contains three different sized storage slots: 42 slots - 5 inches by 7 inches by 60 inches long; 18 5 inches by 7 inches by 72 inches long; and 4 slots - 12 inches by 14 inches by 84 inches long. Both types of racks have cadmi sheet insets above, below, and on both sides of each storage position. Both are provided with a door and a hasp to permit lock security, accountability, and storage configuration control. A drawer approximately 6 inches deep is provided in the bottom of th for storing miscellaneous material. The drawer is within the locked doors, and for storage purposes, is considered as one stora

Describe material at risk, which constitutes a source term.

Fluorinel fuels are highly enriched fuel elements, pieces, and fines which vary from gram size samples to complete elements (

General U fuel - various.

ANL material consisting of:

Dross--Metal and metal oxide residue from alloy preparation crucibles, and metal residue not suitable for remelt.

Fines--fine metal particles from pin shearing and process cleanup.

Pin Fines--small pieces of fuel pins remaining after pin processing operations.

Glass--pieces of Vycor or quarts glass molds that have been broken from a fuel pin along with uranium residue, alloy flake left in the bottom of the collection tray.

SITE: INEL	FACILITY (Building or Location) ICPP CPP-651
	PARTITIONED AREA: One partition for whole

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)

Describe material at risk, which constitutes a source term.

Ingot Bottom Heel--3"x3"x6" block of uranium alloy, small piece of metal (U-alloy) and flat disk of metal.

SITE: INEL	FACILITY (Building or Location) ICPP CPP-651
	PARTITIONED AREA: One partition for whole

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Compounds	Enriched	Other UO(Carbide), PI	C2, D1, P0, B1,	Vault	0-30	24	Classif

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).

1. Approved Shipping Packages: Approved shipping packages contain various types of fissile materials, including compounds. The packages are stored in CCAs specifically approved for them under TI less than or equal to 50 units. The TI is assigned in accordance with government regulations covering the specific package, usually DOT. The TI must be assigned based on criticality safety. Shipping packages are stored on the floor or in special racks designed for storage efficiency and accessibility.

Shipping packages intended for storage are usually opened only for inventory and accountability purposes. Occasionally materials are transferred from shipping packages to other forms of storage, such as racks, or to other shipping packages. All such handling and storage operations are governed by approved procedures controlled by appropriate CSEs and safety documentation. These operations are performed only in Area 100, a CCA approved for fuel handling. Fuel storage is not permitted in Area 100.

Currently in use in CPP-651 are DOT-6M drums, DOT-6L drums, DOT-17C drums, DOT-17H drums, CONT-YDC-900 drums, and CONT-YDC-910 drums.

2. LANL Material Racks: LANL material is stored in storage racks mounted on the walls above the fluorinel racks in Area 102 of the South Vault. These racks are modular and of all stainless steel construction. The racks are designed to survive the DBE seismic event while maintaining the storage configuration integrity. They are accessible from a working platform mounted above the fluorinel racks in Area 102, or from a moveable working platform. The racks are designed to contain cylindrical metal cans two deep by six wide on each shelf. Each modular unit has five such shelves, each shelf having an individually secured half-height, bottom-hinged door. The shelves are designed to contain the cans in upright position and to prevent the can lids from coming off while in storage. LANL material is received in plastic bottles and stored one bottle inside each metal can. Only one plastic bottle will physically fit in each metal can.

Describe material at risk, which constitutes a source term.

LANL Material: LANL scrap material consists of assorted oxides and carbides of uranium mixed with graphite. It is received packaged in 1-liter or 2-liter sealed plastic bottles. Each bottle may contain not more than 4.3 kg of U-235.

Generic U Fuel: Various.

SITE: INEL				FACILITY (Building or Location)		ICPP CPP-651	
				PARTITIONED AREA:		One partition for whole	
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Oxides	Enriched	Pure oxides Impure Oxides	C0, P0, C2, D1	Vault	0-30	49	Classified

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

1. SPERT Fuel Shipping Boxes: PWR Core 2 Seed 1 fuel is stored in five SPERT fuel shipping boxes. Storage of the material in these boxes has been evaluated and approved.

2. Stainless Steel Box: The PWR Core 2 Seed 2 Subassembly is stored in a steel box. Overall dimensions are 9-1/2 inches square and 10 feet long. Storage in this box has been evaluated and approved.

3. Approved Shipping Packages: Approved shipping packages contain various types of fissile materials, including oxides. The packages are stored in CCAs specifically approved for them under TI less than or equal to 50 units. The TI is assigned in accordance with government regulations covering the specific package, usually DOT. The TI must be assigned based on criticality safety. Shipping packages are stored on the floor or in special racks designed for storage efficiency and accessibility.

Shipping packages intended for storage are usually opened only for inventory and accountability purposes. Occasionally materials are transferred from shipping packages to other forms of storage, such as racks, or to other shipping packages. All such handling and storage operations are governed by approved procedures controlled by appropriate CSEs and safety documentation. These operations are performed only in Area 100, a CCA approved for fuel handling. Fuel storage is not permitted in Area 100.

Currently in use in CPP-651 are DOT-6M drums, DOT-6L drums, DOT-17C drums, DOT-17H drums, CONT-YDC-900 drums, and CONT-YDC-910 drums.

4. Annulus Storage Wells: The annulus storage wells consist of a rack and well arrangement. The storage rack is an aluminum structure consisting of a rolled aluminum sheet strong back with a semi-circular back side solid section. The rack has seven compartments, each of which holds one and only one product or product sample container. Aluminum plate shelves support the sample containers, which are held in baskets, in a linear array. The product containers are 6 in. diameter by 11 in. long. The storage rack compartments are 13 in. high, providing a 2-in. spacing between containers. Each compartment has a hinged aluminum door on the front side which is also a semi-circular section. The door is held closed by a removable pin. The strong back and doors are rolled on a 3.25 in. radius, resulting in an approximate 6.5 in. outside diameter. A storage rack loaded with seven product containers weighs approximately 400 lbs.

This storage rack assembly fits within the 8-in. pipe storage well. The dimensions guarantee that no failure could result in containers coming together in any side-by-side array in storage. The top of the storage rack has a 2 in. thick stainless steel shield plate to provide radiation protection to workers who may be working above a storage well containing fuel. The rack doors are designed so they can be opened and closed from a distance using the gate tool.

Describe material at risk, which constitutes a source term.

PWR Core 2. Seed 1 (Mockup): PWR Core 2, Seed 1 type fuel elements are a mockup known as Core A. The fuel elements are UO(2)Zr0(2) ceramic, clad with zircalloy.

06/26/96

SITE: INEL	FACILITY (Building or Location) ICPP CPP-651
	PARTITIONED AREA: One partition for whole

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)

Describe material at risk, which constitutes a source term.

PWR Core 2. Seed 2: Core 2, Seed 2 is a subassembly 265.43 cm long, of which 246.38 cm contains fuel. The cross section is 8.89 cm square. The subassembly contains 4841 grams of U-235 and 5240 grams total uranium.

Rocky Flats Material: Plutonium-contaminated uranium oxide.

ICPP Denitrator Product: UO(3)

Generic U Fuel: Various

SITE: INEL	FACILITY (Building or Location): ICPP CPP-651
	PARTITIONED AREA: One partition for whole building.

Question 4: POTENTIAL CAUSES

Facility	Material	External
[ ] Process Material Transfer	[Y] Aging	[ ] Fire
[ ] Inadvertent Transfers	[ ] Container Seal Degradation	[ ] Explosion
[ ] Aging/Degradation	[ ] Pressurization	[Y] Earthquakes
[ ] Equipment Failure	[ ] Pyrophoricity	[ ] Subsidence
[ ] Change in Mission	[Y] Radioactivity	[ ] Winds
[Y] Other Collocated Hazards	[ ] Chemical Reactivity	[ ] Floods
[ ] Corrosion/Embrittlement	[ ] Radiolysis	[ ] Extreme Temperature
[ ] Inadequate Configuration Knowledge	[ ] Volumetric Expansion	[ ] Snow
[ ] Combustible Loading	[ ] Oxidation	[ ] Ash Loading
[ ] Inadequate Seals	[ ] Flammability	[Y] Aircraft Crash
[Y] Water Sources	[ ] Toxicity	[ ] Vehicle Accident
[ ] Inadequate Drains	[ ] Hydroloysis	[ ] Onsite Transporation
[ ] Preventive Maintenance Failure	[ ] Crystallization	[ ] Adjacent Facility Accident
[ ] Administrative Control	[ ] Other - Specify	[ ] Other-specify
[Y] Human Error		
[ ] Chemical Reactions		
[ ] Contamination		
[Y] Inadequacy of Design Basis		
[Y] Design Deficiency		
[ ] Flooding		
[Y] Fire		
[ ] Other SAR Accidents		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): ICPP CPP-651
	PARTITIONED AREA: One partition for whole building.

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Earthquakes: It is not known whether a seismic event could cause damage to the inner building and associated storage racks due to the question on the vertical design for the inner building. Outer building seismic design exceeds design for Cat 2 facility. (Drums storaged in annulus above wells could damage fire alarm panel and compromise halon system material protection--not a vulnerability. Security UPS system not secured to floor which could cause loss of security equipment and some emergency lighting. No release of HEU).

Aircraft Crash - Probability 2.4 E-7/y, reference: Lockheed Idaho Technologies Company, INEL Report INEL-96/-0110, "Assessment of Aircraft Impact Probabilities at the Idaho Chemical Processing Plant," April 1996. On-site Transportation - A Chain link fence on the north east and south sides, and the reinforced concrete wall on the west side surround the facility. Building located within the ICPP security fence.

Human error could result in exceeding mass limits.

Water Source - Fire hose used in combating a fire could fill fuel storage cans.

Inadequate Design Basis - Cabinets in Room 102 are not seismic qualified.

Design Deficiency - Seismic vertical acceleration is under review for inner building.

Fire - Combustibles in the facility are controlled. Combustible loading is kept to a minimum.

Other Collocated Hazards - Potential chemical irritant release from activated denial system.

Aging - Embrittlement of poly bottles

Radioactivity - Radiation level buildup over time due to impurities in product the materials stored in the annulus occurs. However, the annulus design mitigates any increase in exposure to workers.

SITE: INEL	FACILITY (Building or Location): ICPP CPP-651
	PARTITIONED AREA: One partition for whole building.

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[Y] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integrity
[Y] Contamination	[Y] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Criticality
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[Y] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[ ] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): ICPP CPP-651
	PARTITIONED AREA: One partition for whole building.

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Facility:

Structural failure - Shifting of fuel and damage to rack from seismic event exceeding vertical response for the inner building. Damage racks with flooding from water necessary for criticality.

Contamination - Presence of oxides due to breach of packaging from various causes. A radiological release could expose on-site personnel or contaminate the building.

Materials:

Breach of Packaging - A criticality caused from excess moderator or mass or excess storage in racks from human error, from firehose or earthquake could be fatal to workers in the area. Due to aging, breach of packaging may occur; however, multiple packaging will contain contamination.

External:

Even though inner building may fail, external building would remain intact as a barrier.

SITE: INEL	FACILITY (Building or Location):ICPP CPP-651
	PARTITIONED AREA: One partition for whole building.

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Criticality (Material)	Y	Y	Y						

Explanation

Criticality: Fatal to worker but controlled by double contingencies on mass and moderator or mass and configuration. Minor releases from criticalities to the environment. Minor releases from criticalities and long distance to site boundary. Contamination will be contained within the facility. External injury/contamination from this accident does not fall within the criteria for a vulnerability. Release of materials expected to be minimal.

Applicable References

: INEL	FACILITY (Building or Location):ICPP CPP-651
	PARTITIONED AREA: One partition for whole building.

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
tural Failure (Facility)	Y	Y	Y						

lanation

cality: Fatal to worker, but controlled by double contingencies on mass and moderator or mass and configuration. Minor releases from criticalities to the environment. or releases from criticalities and long distance to site boundary. Contamination will be contained within the facility. External injury/contamination from this accident does not within the criteria for a vulnerability. Release of materials expected to be minimal.

licable References

SITE: INEL	FACILITY (Building or Location): ICPP CPP-651 PARTITIONED AREA: One partition for whole building.

Question 6: POTENTIAL CONSEQUENCES

Effect	Worker			Environment			Public		
	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Contamination (Facility)									

Explanation

Multiple packaging will contain the contamination to a level below the criteria to constitute a vulnerability. Administrative barriers prevent the handling of any material with high risk for contamination.

Applicable References

SITE: INEL	FACILITY (Building or Location) ICPP-657
	FUNCTION: Security Standards

Question 1: SITE

DOE Headquarters Facility Landlord: EM

DOE Headquarters Program Sponsor: EM

Facility Age: 43

Design Life:

Location of Facility on Site and Distance to Site Boundary

ICPP-657, Safeguards Office, is located adjacent to ICPP-669, Main Guard House and ICPP-686, Safeguards and Security Office. It is nort of the Redwood St. and Oak Ave intersection. ICPP-657 is 13.7 km from the INEL site boundary.

Design Mission, Interim Mission, Current Use

ICPP-657 is the office area for Safeguards and Security. The material in ICPP-657 is used for portal monitor calibration. The 15 grams of are triply contained.

Operational Status

In use

Historical Information

ICPP-657 is the office area for Safeguards and Security. The building is covered by PSD 3.0, "Facilities Description."

List Authorization Basis

PSD 3.0, "Facilities Description"
Radiological Control Manual
ICP Safety Analysis Report, INEL-94/022

Describe Important or Unique Design Features

The source is triply contained. It is kept in a sealed container.

Describe Weaknesses in the Design Basis

The source is used for portal monitor calibration. It is maintained in the storage case while not in use.

Structural Design

Concrete/slab

Partitioned Areas of HEU within facility

Not Applicable

Description of Partitioned Areas

Facility

Amount & Location of Hazardous Material Collocated or Commingled with HEU

The area is an office area. No other hazards exist other than in an office area.

Process Material Transfers

N/A

On-Site Transportation

The source is hand carried.

Staff Levels & Experience

The staff is trained to use the source.

1 technician 5 yrs. experience
1 technical specialist 5 yrs. experience
3 staff engineer/scientist 8 yrs. experience
1 custodian 20 yrs. experience

SITE: INEL	FACILITY (Building or Location) ICPP-657
	FUNCTION: Security Standards
Question 1: SITE	

Applicable References

PDS 3.0, "Facilities Description"
Radiological Control Manual
ICPP Safety Analysis Report, INEL-94/022

SITE: INEL	FACILITY (Building or Location): ICPP-657
	PARTITIONED AREA: Not Applicable

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]

- [ ] Gloveboxes
- [ ] Transfer System
- [ ] Duct
- [ ] Filter
- [ ] Vault
- [ ] Room
- [ ] Hot Cell/Canyon
- [ ] Hood
- [ ] Piping
- [ ] Shielding
- [ ] Distance
- [ ] Respiratory Protection
- [ ] Protective Clothing
- [ ] Remote Handling
- [Y] Confinement System
- [ ] Burial Ground
- [ ] Tanks
- [ ] Alarm System
- [ ] Temporary Barriers
- [ ] Other-specify
- [ ] None

Public/Environmental Barrier[2]

- [Y] Facility/Building Boundary
- [ ] HVAC/Confinement
- [ ] Liquid Containment/Dike
- [ ] Bay, Cells, Magazines
- [ ] Canyons
- [ ] Pads
- [Y] Site Boundary
- [ ] Trenches
- [ ] Storage Vault
- [Y] Fire Suppression
- [ ] Alarm System
- [ ] Other - Specify

Criticality[1,2]

- [ ] Double Contingency Applied
- [Y] Double Contingency Not Applied (specify) (e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)

Administrative Barrier[3]

- [Y] Procedure: Operation, Maint.
- [Y] Material Limts
- [ ] Monitoring
- [Y] Configuration Control
- [ ] Quality Assurance
- [Y] Conduct of Operations
- [Y] Authorization Basis
- [Y] Training
- [Y] Organization
- [Y] Lessons-Learned
- [ ] Testing
- [ ] Trending
- [Y] Records
- [ ] Standards
- [ ] External Regulation
- [Y] Surveillance
- [ ] Personnel Reliabil Assurance Progra
- [Y] Worker/Access Occupancy Limit
- [ ] Emgergency Re
- [ ] Other-specify

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): ICPP-657
	PARTITIONED AREA: Not Applicable

Question 2: BARRIER TYPES

escribe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Sealed source.

Public/Environment Barrier Narrative:

The public is 13.7 km from the facility. The CAA is located in one room in a facility covered by a filtered off-gas system.

Criticality Barrier Narrative:

Not Applicable.

Administrative Barrier Narrative:

Many of the administrative barriers listed under "Barrier Types" are implemented in the procedures governing use of Mass Limit Criticality Control Areas. The major administrative barriers are material limits and procedure controls.

SITE: INEL	FACILITY (Building or Location) ICPP-657
	PARTITIONED AREA: Not Applicable

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	Enriched	Sealed Sources PO	G1, P0	Other-specify	19, 10	2	0.0180

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Source is in sealed glass container, in a plastic container, in an open plexiglass carrier.

Describe material at risk, which constitutes a source term.

Material at risk is limited to source.

SITE: INEL	FACILITY (Building or Location): ICPP-657
	PARTITIONED AREA: Not Applicable

Question 4: POTENTIAL CAUSES

Facility	Material	External
[ ] Process Material Transfer	[ ] Aging	[ ] Fire
[ ] Inadvertent Transfers	[ ] Container Seal Degradation	[ ] Explosion
[ ] Aging/Degradation	[ ] Pressurization	[ ] Earthquakes
[ ] Equipment Failure	[ ] Pyrophoricity	[ ] Subsidence
[ ] Change in Mission	[ ] Radioactivity	[ ] Winds
[ ] Other Collocated Hazards	[ ] Chemical Reactivity	[ ] Floods
[ ] Corrosion/Embrittlement	[ ] Radiolysis	[ ] Extreme Temperature
[ ] Inadequate Configuration Knowledge	[ ] Volumetric Expansion	[ ] Snow
[ ] Combustible Loading	[ ] Oxidation	[ ] Ash Loading
[ ] Inadequate Seals	[ ] Flammability	[ ] Aircraft Crash
[ ] Water Sources	[ ] Toxicity	[ ] Vehicle Accident
[ ] Inadequate Drains	[ ] Hydroloysis	[ ] Onsite Transporation
[ ] Preventive Maintenance Failure	[ ] Crystallization	[ ] Adjacent Facility Accident
[ ] Administrative Control	[ ] Other - Specify	[ ] Other-specify
[Y] Human Error		
[ ] Chemical Reactions		
[ ] Contamination		
[ ] Inadequacy of Design Basis		
[ ] Design Deficiency		
[ ] Flooding		
[ ] Fire		
[ ] Other SAR Accidents		
[ ] Other-specify		

06/04/96

SITE: INEL	FACILITY (Building or Location): ICPP-657
	PARTITIONED AREA: Not Applicable

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Procedure control use of sources, minimizing human error.

SITE: INEL	FACILITY (Building or Location): ICPP-657
	PARTITIONED AREA: Not Applicable

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integrity
[Y] Contamination	[ ] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Criiticality
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify	Not Applicable	
[ ] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[Y] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): ICPP-657
	PARTITIONED AREA: Not Applicable

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Slight increase in contamination and radiation levels if human error resulted in source being crushed.

SITE: INEL	FACILITY (Building or Location): ICPP-657
	PARTITIONED AREA: Not Applicable

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Other - specify (Facility)									

Explanation

Deliberate removal of material from sealed package could expose worker. However, containment, procedures and site boundaries would protect the environment and public.

Applicable References

SITE: INEL	FACILITY (Building or Location)	CPP-666 FDP Cell
	FUNCTION:	Uranium Dissolution

Question 1: SITE

DOE Headquarters Facility Landlord: EM

DOE Headquarters Program Sponsor: DOE HEADQUARTERS

Design Life: 40

Facility Age: 11

Location of Facility on Site and Distance to Site Boundary

The Fluorinel Dissolution Process and Fuel Storage (FAST) facility is located in the southwest quadrant of the Chemical Processing Plant (CPP) at the south end of Maple Street or Ash Avenue.

Design Mission, Interim Mission, Current Use

The Fluorinel Dissolution Process and Fuel Storage (FAST) Facility is a combination of a fuel storage facility and a headend dissolution process. The Fuel Storage Area (FSA) provides facilities for receiving, preparing for storage, storing, transferring, and preparing for processing various fuels received at the CPP. The FSA adjoins the Fluorinel Dissolution Process Area (FDPA), which is no longer in use.

Operational Status

Not operating

Historical Information

The FDP was last operated in 1988 after two campaigns. All three FDP dissolution trains have undergone chemical flushing followed by water rinses. The uranium mass inside the dissolution trains is less than 15 g.

List Authorization Basis

The Idaho Chemical Processing Plant Safety Document Status Addendum, Section 5.6B, "Fluorinel Dissolution Process," March 1996.

Describe Important or Unique Design Features

The FDP cell is constructed with five feet thick concrete shielded walls and provided with viewing windows, a remotely operated bridge crane, manipulators at each window, and an electromechanical manipulator for remote changeout of equipment components. The roof level is located to provide sufficient headroom for manipulating fuel units in the FDP cell and for vessel removal. The cell is designed f remote operation and for remote replacement of most equipment except major vessels and piping runs.

SITE: INEL	FACILITY (Building or Location)	CPP-666 FDP Cell
	FUNCTION:	Uranium Dissolution

Question 1: SITE

Describe Weaknesses in the Design Basis
None

Structural Design
Reinforced concrete

Partitioned Areas of HEU within facility

FDP cell

Description of Partitioned Areas
FDP Cell

Amount & Location of Hazardous Material Collocated or Commingled with HEU
The FDP equipment contains less than 15 g of uranium. In addition, 6 g of metal fuel samples are stored in the FDP cell. No other hazardous material is colocated or commingled with the HEU material.

Process Material Transfers
None

On-Site Transportation
The 15 g of HEU in the process equipment is not retrievable. The 6 g of HEU stored in the FDP cell is transferred by personnel trained as fissile material handlers. The mass limit CCA is monitored by a CCA custodian.

Staff Levels & Experience
The fissile material is transferred by personnel trained as fissile material handlers. The mass limit CCA is monitored by a CCA custodian. One engineer with 12 years experience and one supervisor with two years experience.

Applicable References
"Fluorinel Dissolution Process and Fuel Storage Facility Final Safety Analysis Report," Volumes I and II, WIN-105-5.6, May 1994 and May 1992, respectively.

Idaho Chemical Processing Plant Safety Document Status Addendum, Section 5.6B, "Fluorinel Dissolution Process," March 1996.

SITE: INEL	FACILITY (Building or Location): CPP-666 FDP Cell
	PARTITIONED AREA: FDP cell

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]

- [ ] Gloveboxes
- [ ] Transfer System
- [ ] Duct
- [ ] Filter
- [ ] Vault
- [ ] Room
- [Y] Hot Cell/Canyon
- [ ] Hood
- [ ] Piping
- [Y] Shielding
- [ ] Distance
- [ ] Respiratory Protection
- [ ] Protective Clothing
- [Y] Remote Handling
- [ ] Confinement System
- [ ] Burial Ground
- [ ] Tanks
- [ ] Alarm System
- [ ] Temporary Barriers
- [ ] Other-specify
- [ ] None

Public/Environmental Barrier[2]

- [Y] Facility/Building Boundary
- [Y] HVAC/Confinement
- [ ] Liquid Containment/Dike
- [ ] Bay, Cells, Magazines
- [ ] Canyons
- [ ] Pads
- [Y] Site Boundary
- [ ] Trenches
- [ ] Storage Vault
- [ ] Fire Suppression
- [ ] Alarm System
- [ ] Other - Specify

Criticality[1,2]

- [Y] Double Contingency Applied
- [ ] Double Contingency Not Applied (specify)
  (e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)

Administrative Barrier[3]

- [Y] Procedure: Operation, Maint.
- [Y] Material Limts
- [ ] Monitoring
- [Y] Configuration Control
- [ ] Quality Assurance
- [Y] Conduct of Operations
- [Y] Authorization Basis
- [Y] Training
- [Y] Organization
- [Y] Lessons-Learned
- [ ] Testing
- [ ] Trending
- [Y] Records
- [ ] Standards
- [ ] External Regulation
- [Y] Surveillance
- [ ] Personnel Reli Assurance Prc
- [Y] Worker/Acces Occupancy Li
- [ ] Emergency
- [ ] Other-specif

1. Barriers between HEU and worker.
2. Barriers between HEU and public/environment.
3. Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.

SITE: INEL	FACILITY (Building or Location): CPP-666 FDP Cell
	PARTITIONED AREA: FDP cell
Question 2: BARRIER TYPES	

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

HEU is contained in the FDP cell or adjacent liquid sample cell. Exposure to personnel is prevented by the cell shielding and remote handling capabilities.

Public/Environment Barrier Narrative:

The environment and public is protected from exposure by the facility/building containment of the HEU material, and the distance to the site boundary. Filtered off-gas also prevents public exposure.

Criticality Barrier Narrative:

FDP cell is a mass limit Criticality Control Area (CCA) and is limited to 350 g U-235. There are no credible criticality scenarios. Mass limit is implemented by approved procedures.

Administrative Barrier Narrative:

This facility is a Mass Limit Criticality Control Area. Administrative controls limit the amount of fissile material to 350 g of U-235 or less. Procedures implement this limit.

Many of the administrative barriers listed under "Barrier Types" are implemented in the procedures governing use of Mass Limit Criticality Control Areas. The major administrative barriers are material limits and procedure controls.

SITE: INEL	FACILITY (Building or Location) CPP-666 FDP Cell PARTITIONED AREA: FDP cell

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Holdup	Enriched	Materials in pipes, tanks, ducts, etc Enriched	W1	Other-specify process area		0	0.01

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

None.

Describe material at risk, which constitutes a source term.

Holdup material is not at risk since it is not retrievable.

Questions 4 and 5 are not applicable for this material.

SITE: INEL	FACILITY (Building or Location) CPP-666 FDP Cell
	PARTITIONED AREA: FDP cell

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor fuel	Enriched	Slightly irradiated	C3, W1	Other-specify process area		14	0.0060

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Metal fuel samples are individually packaged in galvanized metal piping sections with metal caps. One piece (1 g) is canned in a metal can and sealed.

Describe material at risk, which constitutes a source term.

Material at risk would be limited to the contents of the one container being handled. The maximum loading per container is 1 g.

SITE: INEL	FACILITY (Building or Location): CPP-666 FDP Cell
	PARTITIONED AREA: FDP cell

Question 4: POTENTIAL CAUSES

Facility	Material	External
☐ Process Material Transfer	☐ Aging	☐ Fire
☐ Inadvertent Transfers	☐ Container Seal Degradation	☐ Explosion
☐ Aging/Degradation	☐ Pressurization	☐ Earthquakes
☐ Equipment Failure	☐ Pyrophoricity	☐ Subsidence
☐ Change in Mission	☐ Radioactivity	☐ Winds
☐ Other Collocated Hazards	☐ Chemical Reactivity	☐ Floods
☐ Corrosion/Embrittlement	☐ Radiolysis	☐ Extreme Temperature
☐ Inadequate Configuration Knowledge	☐ Volumetric Expansion	☐ Snow
☐ Combustible Loading	☐ Oxidation	☐ Ash Loading
☐ Inadequate Seals	☐ Flammability	☐ Aircraft Crash
☐ Water Sources	☐ Toxicity	☐ Vehicle Accident
☐ Inadequate Drains	☐ Hydroloysis	☐ Onsite Transporation
☐ Preventive Maintenance Failure	☐ Crystallization	☐ Adjacent Facility Acc
☐ Administrative Control	☐ Other - Specify	☐ Other-specify
☒ Human Error		
☐ Chemical Reactions		
☐ Contamination		
☐ Inadequacy of Design Basis		
☐ Design Deficiency		
☐ Flooding		
☐ Fire		
☐ Other SAR Accidents		
☐ Other-specify		

SITE: INEL	FACILITY (Building or Location): CPP-666 FDP Cell
	PARTITIONED AREA: FDP cell

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

FACILITY

Administrative Controls:
Administrative controls cover handling or removing of material from mass limits criticality control area to minimize human error.

SITE: INEL	FACILITY (Building or Location): CPP-666 FDP Cell
	PARTITIONED AREA: FDP cell

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integrity
[Y] Contamination	[ ] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Criticality
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[ ] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[Y] Increased Radioactivity Level		
[ ] Other-specify		

P

SITE: INEL	FACILITY (Building or Location): CPP-666 FDP Cell
	PARTITIONED AREA: FDP cell
Question 5: POTENTIAL EFFECTS	

Describe Each Effect Identified Above:

Facility:

Contamination of the facility could occur if the packages are opened and the HEU material dispersed. In addition, the radioactivity level of the facility would increase if the material is removed from the packages or the shielded FDP cell/liquid sample cell.

INEL	FACILITY (Building or Location):CPP-666 FDP Cell PARTITIONED AREA: FDP cell

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
e of Materials									

nation

are no vulnerabilities due to the nature of the HEU material. The material in CPP-666 is metal fuel samples exposure to which would not meet the dose threshold.

cable References

SITE: INEL	FACILITY (Building or Location) TRA-603 HR4
	FUNCTION: Storage Vault
Question 1: SITE	

DOE Headquarters Facility Landlord: EM
DOE Headquarters Program Sponsor: NE **Design Life:** 50
Facility Age: 30

Location of Facility on Site and Distance to Site Boundary
Steel-walled walk-in vault located next to MTR Reactor. The distance to the nearest site boundary is 10.53 kilometers (see Figure 1).

Design Mission, Interim Mission, Current Use
Storage facility.

Operational Status
In use

Historical Information
Criticality safety assessment performed ~ 20 years ago allows for storage of 250 grams of fissile material.

List Authorization Basis
Safety Analysis Report for the Engineering and Research Application Test Reactor Area Laboratories, ERASAR-93-01-TRA, September 1993.

Describe Important or Unique Design Features
Administration controls for criticality, vault is locked to restrict access.

Describe Weaknesses in the Design Basis
None identified.

Structural Design
Steel frame

Partitioned Areas of HEU within facility
Vault

Description of Partitioned Areas
Six-and-one-half inch thick steel roof, side walls and door. Floor is the MTR Reactor floor and back wall is the MTR Reactor Shield wall.

Amount & Location of Hazardous Material Collocated or Commingled with HEU
50 grams in Nuclear Accident Dosimeters (NADs) and 20 grams in 2 cans of Pu-239.

Process Material Transfers
NADs infrequently transferred to and from other locations IAW standard shipping and accountability procedures.

On-Site Transportation
Follow DOT rules as applicable; material is hand carried or pushed on cart for laboratory uses.

Staff Levels & Experience
Approximately six physicists, all with >10 years experience, who may use these materials. All are appropriately trained, all have appropriate security clearances.

2 Junior Scientists < 10 yrs. experience
1 Technician > 10 yrs. experience

Applicable References
Safety Analysis Report for the Engineering and Research Application Test Reactor Laboratories, ERASAR-93-01-TRA,

	FACILITY (Building or Location)	TRA-603 HR4
	FUNCTION:	Storage Vault

Question 1: SITE

1993.

TRA 603 vault

SITE: INEL	FACILITY (Building or Location): TRA-603 HR4
	PARTITIONED AREA: Vault

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality[1,2]	Administrative Barrier[3]
[ ] Gloveboxes	[Y] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[ ] HVAC/Confinement	[ ] Double Contingency Not Applied (specify) (e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike		[Y] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines		[ ] Configuration Control
[Y] Vault	[ ] Canyons		[ ] Quality Assurance
[ ] Room	[ ] Pads		[ ] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary		[Y] Authorization Basis
[ ] Hood	[ ] Trenches		[Y] Training
[ ] Piping	[Y] Storage Vault		[ ] Organization
[Y] Shielding	[ ] Fire Suppression		[ ] Lessons-Learned
[Y] Distance	[ ] Alarm System		[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[ ] Protective Clothing			[Y] Records
[ ] Remote Handling			[ ] Standards
[ ] Confinement System			[ ] External Regulation
[ ] Burial Ground			[Y] Surveillance
[ ] Tanks			[ ] Personnel Reliability Assurance Program
[ ] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[ ] Emergency Response
[ ] Other-specify Can			[ ] Other-specify
[N] None			

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): TRA-603 HR4
	PARTITIONED AREA: Vault
Question 2: BARRIER TYPES	

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Materials stored in a shielded vault, maintaining distance from normal work areas.

Public/Environment Barrier Narrative:

Storage Vault, Facility/Building Boundary, and site boundary provide containment and distance protection.

Criticality Barrier Narrative:

Amount of material limited, geometry controlled.

Administrative Barrier Narrative:

Procedure: Procedures control entry, exit, accountability, and use of the materials.

Material Limits: Amount of material is limited.

Monitoring: Permanently installed radiation monitoring is utilized, and RCT monitoring used when required by the radiological work permit.

Authorization Basis: ERA-SAR-93-01-TRA, September 1993.

Training: Required training is completed within DOE 5480.20A.

Records: Records are kept of material inventories and transfers.

Surveillance: Monthly facility surveillance is performed.

Worker/Access: Access to HR-4 is limited.

Emergency Response: The TRA utilizes an Emergency Procedure Network (EPN) and Abnormal Operating Procedures (AOP's) to guide action during emergency/abnormal conditions.

SITE: INEL	FACILITY (Building or Location) TRA-603 HR4
	PARTITIONED AREA: Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Ma (kg
Oxides	Enriched	Pure oxides	C4	Vault HR-4	~20 years	5	0

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Paint cans with intact lids provide containment.

Describe material at risk, which constitutes a source term.

Material at risk is limited to the contents of one container.

FACILITY (Building or Location): TRA-[illegible]

PARTITIONED AREA: Vault

Question 4: POTENTIAL CAUSES

...cility	Material	External
...e Material Transfer	[ ] Aging	[ ] Fire
...rtant Transfers	[x] Container Seal Degradation	[ ] Explosion
...Degradation	[ ] Pressurization	[x] Earthquakes
...ment Failure	[ ] Pyrophoricity	[ ] Subsidence
...ge in Mission	[ ] Radioactivity	[ ] Winds
...Collocated Hazards	[ ] Chemical Reactivity	[ ] Floods
...sion/Embrittlement	[ ] Radiolysis	[ ] Extreme Temper...
...equate Configuration Knowledge	[ ] Volumetric Expansion	[ ] Snow
...bustible Loading	[ ] Oxidation	[ ] Ash Loading
...equate Seals	[ ] Flammability	[ ] Aircraft Crash
...er Sources	[ ] Toxicity	[ ] Vehicle Accide...
...lequate Drains	[ ] Hydrolysis	[ ] Onsite Transp...
...ventive Maintenance Failure	[ ] Crystallization	[ ] Adjacent Faci...
...ministrative Control	[ ] Other - Specify	[ ] Other-specify
...man Error		
...emical Reactions		
...ontamination		
...adequacy of Design Basis		
...esign Deficiency		
...looding		
Fire		
Other SAR Accidents		
Other-specify		

SITE: INEL	FACILITY (Building or Location): TRA-603 HR4
	PARTITIONED AREA: Vault

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Inner containment could leak (encapsulation, bottle, etc.). Would be found in six months with routine smear.

Can could leak due to relaxation of the compression fit of the lid.

Person could remove material and leave unattended (generic mishandling of material).

SITE: INEL	FACILITY (Building or Location): TRA-603 HR4
	PARTITIONED AREA: Vault

Question 5: POTENTIAL EFFECTS

Facility	Material	External
☐ Fire	☐ Criticality	☐ Loss of Site Integrity
☐ Explosion	Y Material Release	☐ Loss of Building Integrity
Y Contamination	☐ Breach of Packaging	☐ Release of Materials
☐ Criticality	☐ Fire	☐ Radiation and Releases from Criticality
☐ Leakage/Spills	☐ Other-specify	
☐ Other Accidents-specify		
☐ Structural Failure		
☐ Equipment Failure		
☐ Material Release		
Y Increased Radioactivity Level		
☐ Other-specify		

SITE: INEL	FACILITY (Building or Location): TRA-603 HR4
	PARTITIONED AREA: Vault

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Contamination - slight; must breach at least 2 barriers to get to vault; must then breach vault to get to facility. In addition, the radioactivity level of the facility may increase if the material is removed from the shielded area.

Material Release - container degradation may cause release of materials to outer containers. (See contamination above).

ITE: INEL	FACILITY (Building or Location):TRA-603 HR4 PARTITIONED AREA: Vault
Question 6: POTENTIAL CONSEQUENCES	

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
ontamination (Facility)									

xplanation

ontamination - should be none, if procedures are followed. Only in the case of human error, slight contamination could result if a barrier has been breached or degraded. dministrative controls, procedures and training are in place to prevent contamination spread.

pplicable References

SITE: INEL	FACILITY (Building or Location):TRA-603 HR4
	PARTITIONED AREA: Vault

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Material Release (Material)									

Explanation

Material Release - See explanation for contamination. Any material release from first barrier is expected to be contained within second barrier.

Applicable References

SITE: INEL	FACILITY (Building or Location) TRA-604
	FUNCTION: Radioanalytical Laboratory

Question 1: SITE

DOE Headquarters Facility Landlord: NE

DOE Headquarters Program Sponsor: EM

Design Life:

Facility Age: 30

Location of Facility on Site and Distance to Site Boundary

The distance to the nearest site boundary is 10.53 kilometers (see Figure 1).

Design Mission, Interim Mission, Current Use

TRA-604 is a multi-level annex building to the Materials Test Reactor (MTR). TRA-604 is a cement block building. The first floor is compri primarily of laboratories and offices. Laboratory activities involve chemical research, routine chemistry, physics research, instrumentation research, computer applications, and radioactive material counting. In Lab 112 in TRA-604, a fire resistant safe is used for storage of Highly Enriched Uranium (HEU). The lab is locked with key control maintained. Lab 112 is used for preparation and handling of neutron dosimeter materials and Area Test Reactor (ATR) experiment samples. It was originally designed to be a radiochemistry laboratory. The authorization basis document is Safety Analysis Report, ERASAR-93-01-TRA, September 1993. Four scientists and technicians use this laboratory; only uses the HEU material.

Operational Status

In use

Historical Information

None

List Authorization Basis

Safety Analysis Report for the Engineering and Research Application Test Reactor Area Laboratories, ERASAR-93-01-TRA, Septembe

Describe Important or Unique Design Features

None

Describe Weaknesses in the Design Basis

None Identified

Structural Design

Concrete/slab

Partitioned Areas of HEU within facility

Lab 112

Description of Partitioned Areas

Radioanalytical Laboratory

Amount & Location of Hazardous Material Collocated or Commingled with HEU

There are no collocated or commingled chemicals within the lab. There are quantities of Neptunium-237, Cobalt-60, Nickel (wit Colbalt-58), and Maganese-54. Also in the lab are small quantities of Plutonium-239 (<0.5g), and a few milligrams of Uranium

Process Material Transfers

Not Applicable

On-Site Transportation

Not Applicable

Staff Levels & Experience

Only one person has access to the HEU in Lab 112.

Advisory scientist 35 yrs. experience

SITE: INEL	FACILITY (Building or Location) TRA-604
	FUNCTION: Radioanalytical Laboratory
Question 1: SITE	

Applicable References

SAR

Pi

SITE: INEL	FACILITY (Building or Location): TRA-604
	PARTITIONED AREA: Lab 112

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality[1,2]	Administrative Barrier[3]
[ ] Gloveboxes	[Y] Facility/Building Boundary	[ ] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[Y] HVAC/Confinement	[Y] Double Contingency Not Applied (specify)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike	(e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)	[Y] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines		[Y] Configuration Control
[ ] Vault	[ ] Canyons		[ ] Quality Assurance
[Y] Room	[ ] Pads		[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary		[Y] Authorization Basis
[ ] Hood	[ ] Trenches		[Y] Training
[ ] Piping	[ ] Storage Vault		[Y] Organization
[Y] Shielding	[Y] Fire Suppression		[Y] Lessons-Learned
[Y] Distance	[ ] Alarm System		[Y] Testing
[ ] Respiratory Protection	[Y] Other - Specify Safe		[ ] Trending
[ ] Protective Clothing			[Y] Records
[ ] Remote Handling			[Y] Standards
[ ] Confinement System			[Y] External Regulation
[ ] Burial Ground			[Y] Surveillance
[ ] Tanks			[ ] Personnel Reliability Assurance Program
[ ] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[Y] Emgergency Resp
[ ] Other-specify Safe/Encapsulated Material			[ ] Other-specify
[N] None			

1. Barriers between HEU and worker.
2. Barriers between HEU and public/environment.
3. Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.

SITE: INEL	FACILITY (Building or Location): TRA-604
	PARTITIONED AREA: Lab 112

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Room is locked to keep out unauthorized persons.

Shielding reduces radiation from material.

Distance reduces radiation from material.

SAFE #412 is locked to keep out unauthorized persons. Only one person has access to the safe. All the material is in an encapsulated form.

Public/Environment Barrier Narrative:

Building and HVAC keep any material from being released to outside environment.

Fire Suppression keeps incinerated material wet to prevent airbourne.

Lab 112 is approximately 10 Km from nearest site boundary.

The facility minimizes release of material.

All material is handled in accordance with authorized Lockheed Idaho Technologies company procedures and administrative requirements.

Criticality Barrier Narrative:

Not Applicable

Administrative Barrier Narrative:

Administrative barriers control unauthorized access as well as continuous physical inventory with up-to-date records.

SITE: INEL	FACILITY (Building or Location) TRA-604
	PARTITIONED AREA: Lab 112

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages
Metal	Very Highly	Alloys MP, MA/NM	F1, B1, C2	Other-specify TRA-604, Lab 112	~20	21

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Encapsulated in metal foil in plastic bags in a can.

Describe material at risk, which constitutes a source term.
Material at risk is limited to the contents of one container.

1.
2.
3.

SITE: INEL	FACILITY (Building or Location) TRA-604
	PARTITIONED AREA: Lab 112

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Oxides	Very Highly	Pure oxides	G1, F1, B1	Other-specify TRA-604, Lab 112	~20	9	0.0046

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Encapsulated in metal foil in a glass jar with screw lid, in a plastic bag.

Describe material at risk, which constitutes a source term.

Material at risk is limited to the contents of one container.

SITE: INEL	FACILITY (Building or Location): TRA-604
	PARTITIONED AREA: Lab 112

Question 4: POTENTIAL CAUSES

Facility	Material	External
☐ Process Material Transfer	☐ Aging	☐ Fire
☐ Inadvertent Transfers	[Y] Container Seal Degradation	☐ Explosion
☐ Aging/Degradation	☐ Pressurization	☐ Earthquakes
☐ Equipment Failure	☐ Pyrophoricity	☐ Subsidence
☐ Change in Mission	☐ Radioactivity	☐ Winds
☐ Other Collocated Hazards	☐ Chemical Reactivity	☐ Floods
☐ Corrosion/Embrittlement	☐ Radiolysis	☐ Extreme Temperature
☐ Inadequate Configuration Knowledge	☐ Volumetric Expansion	☐ Snow
☐ Combustible Loading	☐ Oxidation	☐ Ash Loading
☐ Inadequate Seals	☐ Flammability	☐ Aircraft Crash
☐ Water Sources	☐ Toxicity	☐ Vehicle Accident
☐ Inadequate Drains	☐ Hydroloysis	☐ Onsite Transporation
☐ Preventive Maintenance Failure	☐ Crystallization	☐ Adjacent Facility Accid
☐ Administrative Control	☐ Other - Specify	☐ Other-specify
[Y] Human Error		
☐ Chemical Reactions		
☐ Contamination		
☐ Inadequacy of Design Basis		
☐ Design Deficiency		
☐ Flooding		
☐ Fire		
☐ Other SAR Accidents		
☐ Other-specify		

SITE: INEL	FACILITY (Building or Location): TRA-604
	PARTITIONED AREA: Lab 112

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

It is conceivable that the admininstrative controls could be inadvertantly bypassed.

Given enough time, the packaging seal(s) could degrade.

SITE: INEL	FACILITY (Building or Location): TRA-604
	PARTITIONED AREA: Lab 112

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integrit
[Y] Contamination	[ ] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Critical
[Y] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[ ] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[Y] Increased Radioactivity Level		
[Y] Other-specify Loss of material control		

SITE: INEL	FACILITY (Building or Location): TRA-604
	PARTITIONED AREA: Lab 112

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Loss of material control. Materials could leave the facility (by being carried out), without accountability.

Leakage and spills could spread contamination, increasing radiation levels.

TE: INEL	FACILITY (Building or Location): TRA-604
	PARTITIONED AREA: Lab 112

Question 6: POTENTIAL CONSEQUENCES

Effect	Worker			Environment			Public		
	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
ontamination (Facility)									

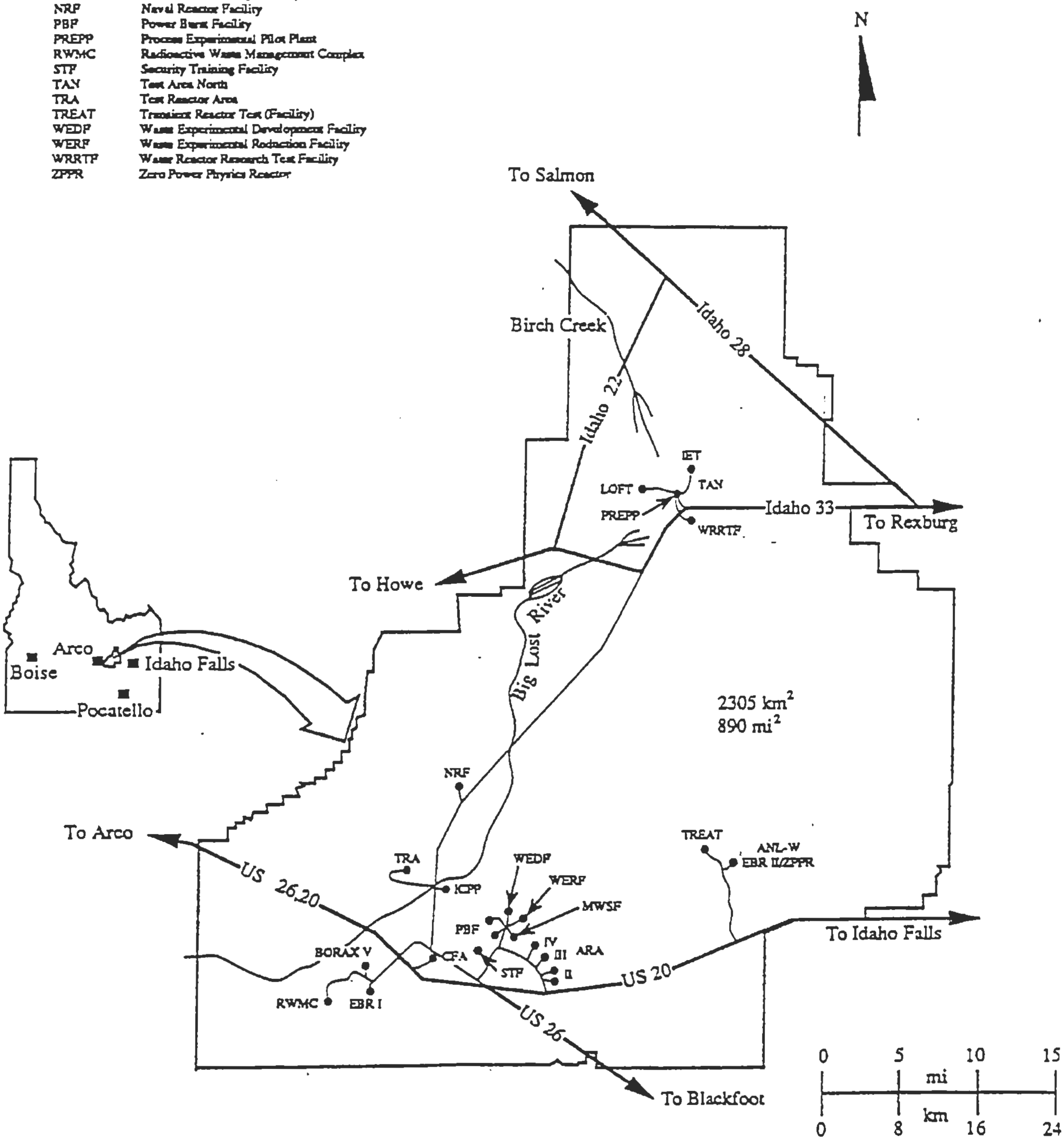
Explanation

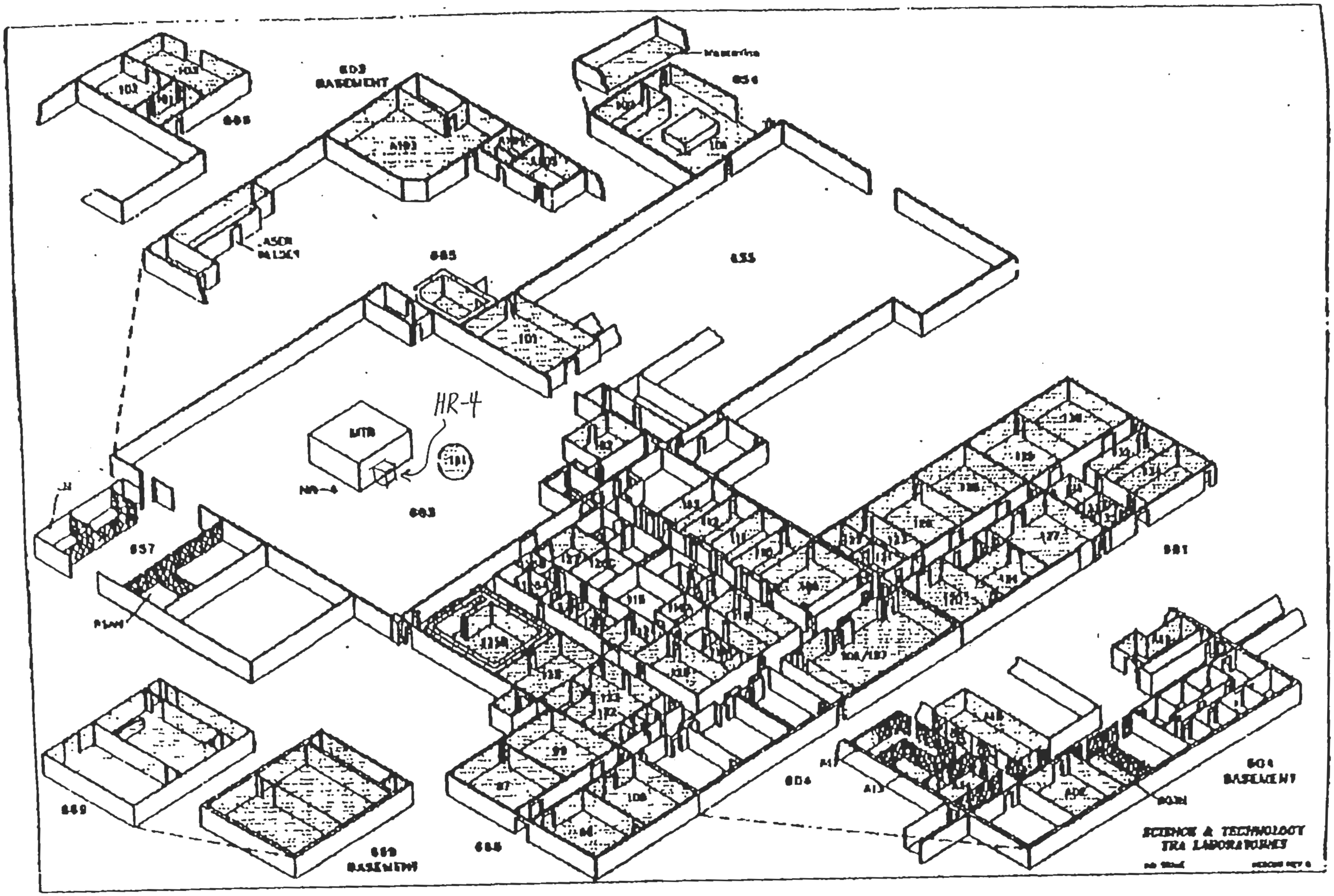
Loss of Controls

Even if the entire 10.6 gram inventory of HEU in Lab 112 were lost, there would be no adverse impact to the workers, environment, or the public.

Applicable References

ARA	Auxiliary Reactor Facility
ANL-W	Argonne National Laboratory - West
CFA	Central Facilities Area
EBR I	Experimental Breeder Reactor I
EBR II	Experimental Breeder Reactor II
ICPP	Idaho Chemical Processing Plant
IET	Initial Engineering Test
LOFT	Loss-of-Fluid Test (Facility)
MWSF	Mixed Waste Storage Facility
NRF	Naval Reactor Facility
PBF	Power Burst Facility
PREPP	Process Experimental Pilot Plant
RWMC	Radioactive Waste Management Complex
STF	Security Training Facility
TAN	Test Area North
TRA	Test Reactor Area
TREAT	Transient Reactor Test (Facility)
WEDF	Waste Experimental Development Facility
WERF	Waste Experimental Reduction Facility
WRRTF	Water Reactor Research Test Facility
ZPPR	Zero Power Physics Reactor




603
BASEMENT
654
633
665
101
HR-4
MTR
663
657
601
604
604
BASEMENT
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BASEMENT
658
SCIENCE & TECHNOLOGY
TRA LABORATORIES

SITE: INEL	FACILITY (Building or Location) TRA-621
	FUNCTION: Inspection and Storage

Question 1: SITE

DOE Headquarters Facility Landlord: EM

DOE Headquarters Program Sponsor: NE

Design Life: 30

Facility Age: 15

Location of Facility on Site and Distance to Site Boundary

Summary description of the facility:

The Nuclear Material Inspection and Storage (NMIS) Facility is owned by the Department of Energy (DOE) and Lockheed Martin Idaho Technologies (LMIT) is the contractor and operator of the facility. The NMIS Facility is located within the Test Reactor Area (TRA) protected area. In addition, the facility itself has specific entry and exit controls and security alarm systems in accordance with DOE Order 5632.2A. Like other TRA facilities, it is subject to routine security patrols. NMIS is a vault type structure with poured concrete exterior walls and a precast concrete beam roof with a poured concrete overlay. It is divided into four operational areas: the Special Nuclear Material (SNM) Storage Vault, the Quality Control (QC) Inspection Area, the Safeguards Assay Area, and the Staging Area. NMIS Facility dimensions are 88 by 85 ft. The SNM Storage Vault has a sloping roof with 12.67 ft average inside clear height.

Description of processes, process/material flows, operations, and storage:

1) The primary function of the Assay area is to perform receiving assays on Advanced Test Reactor (ATR) and other fuel types as well as measurements in support of periodic physical inventory verifications. All nuclear material which enters, leaves, or is stored in the NMIS Facility is subject to measurements according to the requirements of DOE Order 5633.3, DOE-ID Operations interpretive orders, and Safeguards and Material Management procedures. The measurement instrumentation currently used by Safeguards is described as follows:

The Isotopic Source Assay System (ISAS) is used to interrogate ATR elements (and possibly other materials in the future) with neutrons from a Californium source (8.24 x 107 neutrons per second) while detecting the emission of prompt gamma-rays and neutrons. This provides an integrated measurement of the nuclear material, poisons, and material geometry.

The Vertical Fuel Scanner (VFS) is used to measure the passive gamma-ray emission from nuclear materials with a low resolution NaI(T1) detector. This provides a background corrected integrated measurement and a fuel profile.

The high resolution Germanium detectors and low resolution portable NaI(T1) detectors are used to identify isotopic content and enrichment of nuclear material. It measures the passive gamma-ray emission of material.

The Active Well Coincidence Counter (AWCC) interrogates nuclear materials with neutrons from two Am-Li sources (range from 3.86E04 to 5.04E04 neutrons per second) while detecting the emission of coincidence neutrons. This provides an integrated measurement of the nuclear material and poisons while minimizing the effect of material geometry. The neutron sources identified above for instrumentation are registered and maintained in accordance with the Radiological Controls Manual.

2) The primary function of the QC Inspection Area is to receive, provide dimensional inspections of reactor fuel elements, and certify acceptance of fuel assemblies for reactor use. To accomplish those tasks, the QC Inspection Area is equipped with the following equipment:

Element Envelope Gage: Functional gage to determine whether or not a fuel element is properly sized for the reactor by physically inserting the element into the device.

Channel Probe Gage: Measures the dimensions of the coolant water gap between each fuel plate. The probe has an X-Y plotter that records the profile traces of the channel.

Surface Plates: Smooth horizontal granite surface for measuring the fuel elements and other items.

Vertical Gage: Device with self-contained vertical surface plate for measuring outside dimensions of fuel elements.

Transport Racks: Transports and stores fuel elements safely between the SNM Storage Vault, the Inspection Area or the Assay Area. ATR racks hold four ATR fuel elements.

3) The primary functions of the Staging Area include shipping, receiving and as an inventory area for fissile material.

4) The primary function of the vault is to receive, store, and ship ATR, ETR, GETR, and miscellaneous fuels in elements, rods, pellets, and other forms.

5) A small Clean Room is provided for handling material suspected of contamination and SNM in powder form. A HEPA filtered fume hood is provided in the Clean Room.

Location of the facility on the site and the distance to the site boundary: (Refer to Figure TRA-621 and 2)

NMIS is located within the TRA protected or perimeter security area located on the Idaho National Engineering Laboratory (INEL).

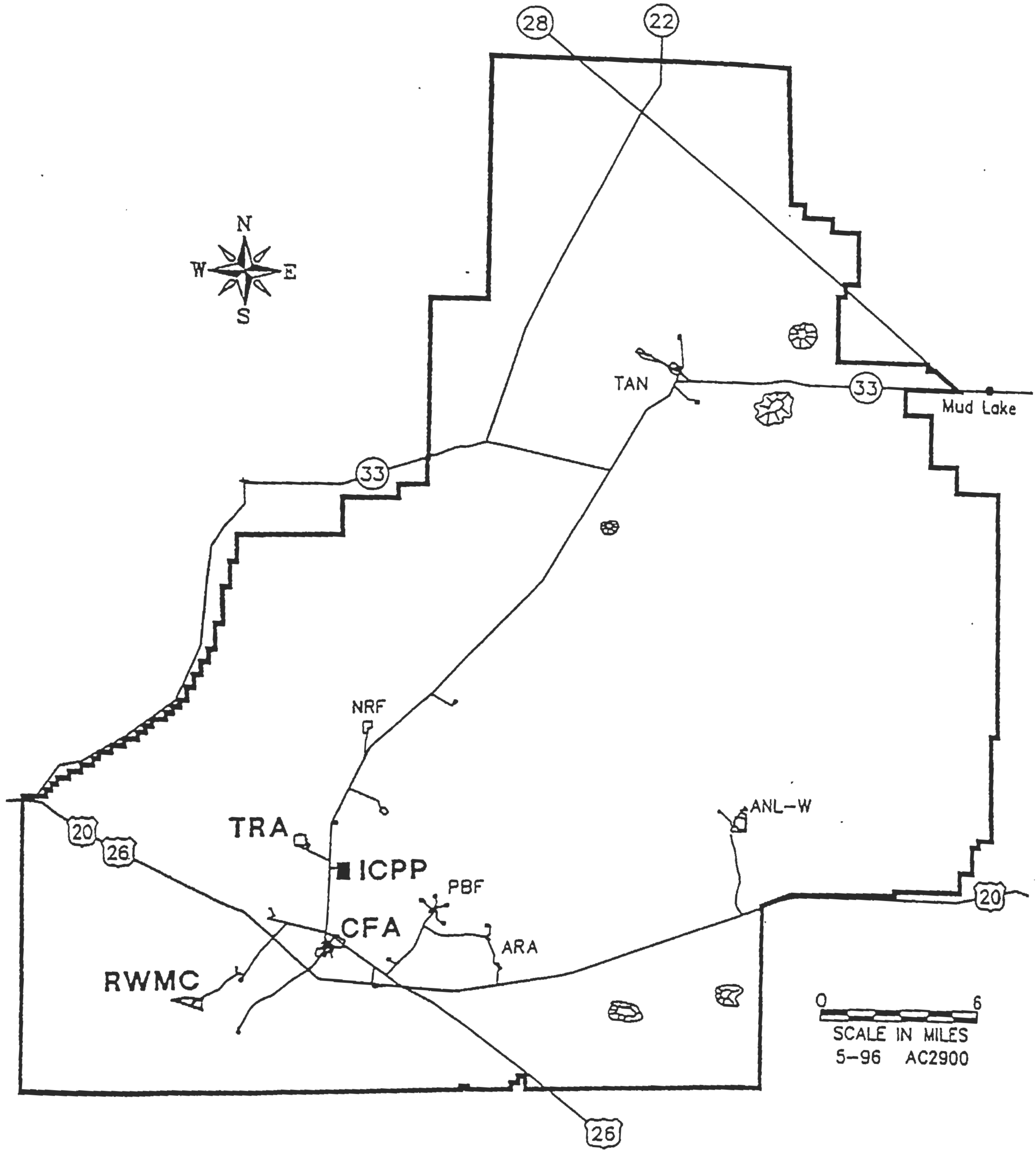


Figure TRA-621-1 INEL Site

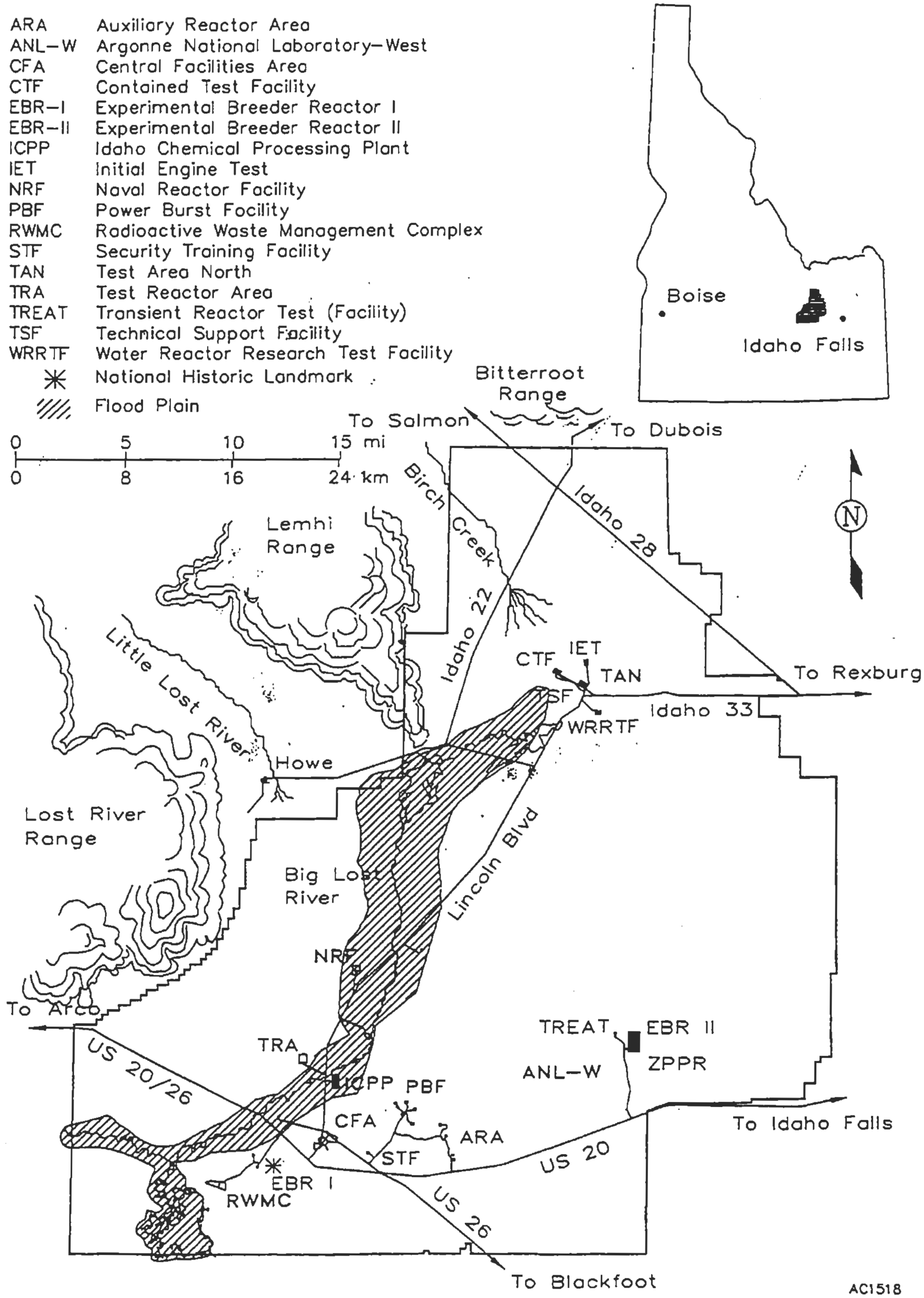


Figure TRA-621-2 INEL rivers, channels, and flood plains

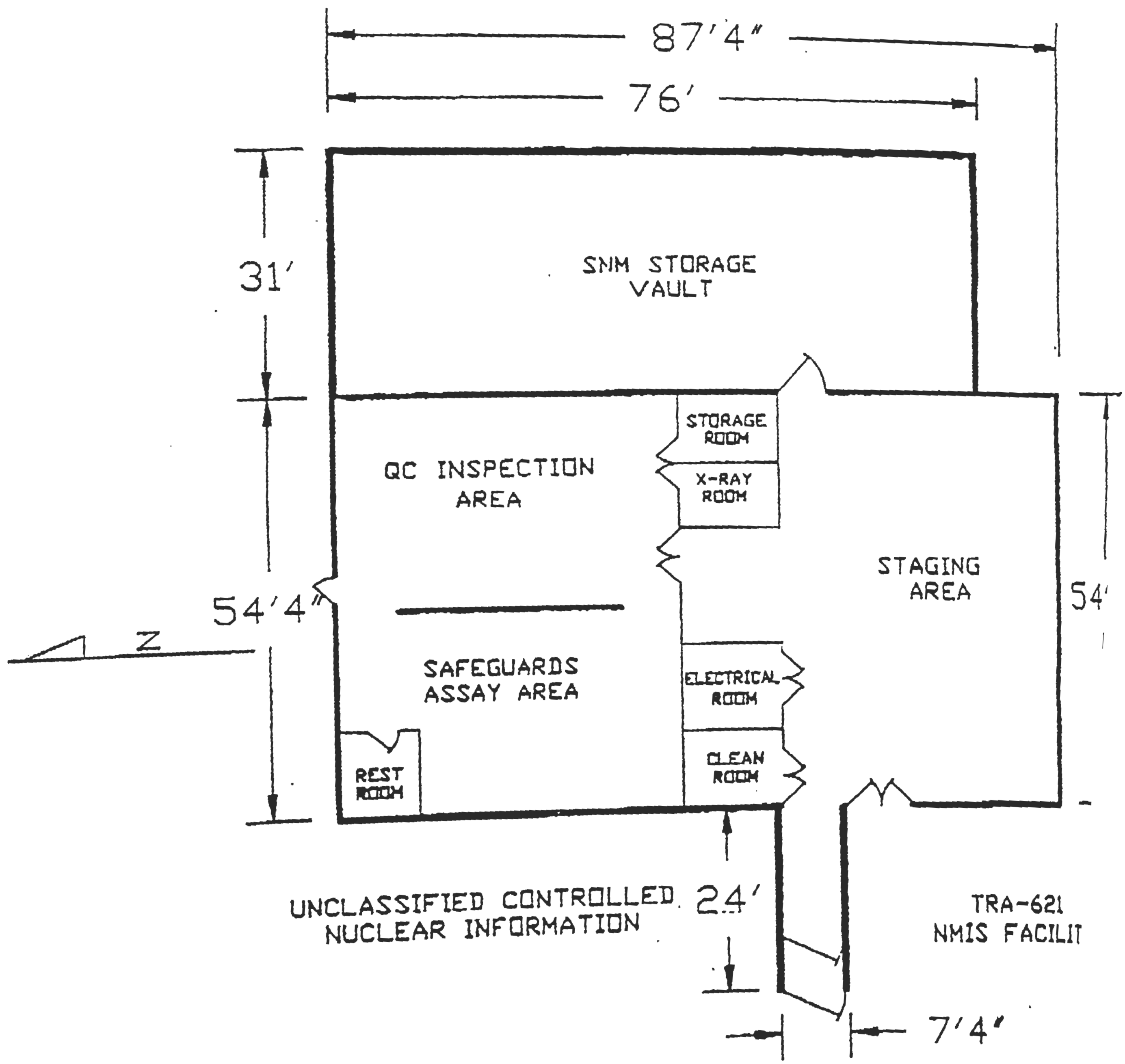


Figure TRA-621-3 NMIS Facility Floor Plan

SITE: INEL	FACILITY (Building or Location) TRA-621
	FUNCTION: Inspection and Storage
Question 1: SITE	

Design Mission, Interim Mission, Current Use

NMIS is a fuel storage, safeguards and security facility. The facility consolidates the storage of strategic quantities of special nuclear materials (SNM) located within the TRA. The NMIS Facility also consolidates the fuel inspection activities of Quality Control Engineering and the non destructive assay activities of Safeguards. Both fuel inspection and non-destructive assay are performed within the NMIS Facility, thereby eliminating the need to move fuel from a protective area for these activities. The consolidation of the fuel in the NMIS Facility significantly increases the safety and security of the fuel from (a) unauthorized access and (b) risk of damage due to handling when transporting fuel from the SNM Storage Vault to a less secure measurement area.

Operational Status

Operating

Historical Information

During the service life of this facility, no adverse consequences to personnel and the public have occurred.

List Authorization Basis

The "Safety Analysis Report for the Nuclear Material Inspection and Storage," Issue 2, December 8, 1992, and "Operational Safety Requirements for the Nuclear Materials Inspection and Storage Facility," Issue 3, dated November 8, 1992, provide an assessment of the environmental, safety and health risks associated with the operation of the Test Reactor Area (TRA) Nuclear Materials Inspection and Storage (NMIS) Facility. The objectives of the assessment are to (a) demonstrate that the NMIS Facility and safety related systems can be operated without undue risk to the health and safety of operating personnel and the public, (b) demonstrate that adequate provisions exist to protect the environment, (c) provide a basis for development of a Operations Safety Requirements Document (OSRD) and (d) establish the hazard classification of the NMIS Facility and ensure that it conforms with the requirements of Section 2 of the EG&G Safety Manual and applicable chapters of DOE 5480.5 and DOE-ID Orders 5480.1A/5480.1 and 5481.1. DOE-ID approval of a Moderate Hazard Activity classification for the NMIS Facility was received before the addition of the new SNM Storage Vault.[1] The addition of the new vault does not change this hazard classification. This document evaluates the receipt, handling, storage, and examination of fissile materials within the facility. The NMIS Facility has improved security measures, assay capabilities, and inspection capabilities in addition to consolidating the storage of SNM. The results of this safety analysis indicate that operation of the NMIS Facility is warranted.

	FACILITY (Building or Location) TRA-621
	FUNCTION: Inspection and Storage

Question 1: SITE

tant or Unique Design Features

lt type structure with poured concrete exterior walls and a precast concrete beam roof with a poured concrete overlay.
or walls are metal stud and sheetrock construction.
separating the Assay and QC Areas from the Staging Area has 0.25 in. lead radiation shield incorporated in the

ing Area includes a receiving Inspection Area with a fume hood in the Clean Room for inspecting, packaging, or
owdered fuels. The fume hood in the Clean Room is a 6 ft bench with a 304 stainless steel interior, fluorescent lights
exhaust blower rated at a minimum air velocity through the hood door of 125 ft/min and an average flow of 150-200 cfm
oof-mounted with duct work connecting to the fume hood to maintain negative pressure. Since there is a minute chance
on, the exhaust system is equipped with prefilters and high-efficiency HEPA filters installed upstream of the blower.
aisson filters were designed to allow changeout with minimum of contamination spread. A fire system sprinkler head
the fume hood.
lity has no windows and only three access points: one personnel access door and one cargo access door in the Stag
ergency exit door is located in the QC Inspection Area.
tures are constructed to securely hold the fuel, positioned to maintain a minimum of 3-ft separation from fuel in adjace
mited to no more than one fuel unit in the test fixture.
MIS Facility was constructed to INEL Architectural Standards, which include provision for wind velocities of up to 80 mp
, "C" exposure factor and a fifty year recurrence frequency.
tion from potential flooding of the Big Lost River has been provided by diversion works in the southwest corner of the
onsists of a dam and a channel leading to several impounding areas where the water seeps into the ground. Localiz
surface flow of water occur occasionally as a result of unusual situations involving extended periods of above-freezing
, prolonged light rainfall, extensive areas of snow, and deeply frozen ground. However, the TRA is protected from fo
dikes and impoundment areas.
MIS Facility has been designed and constructed to meet Uniform Building Code (UBC) Zone 3 requirements as requ
chitectural Standards.
fuel element racks and earthquake gates were designed by dynamic analysis using specific criteria as outlined in the
l Standards.
NMIS Facility is designed and constructed to withstand the Design Basis Tornado (DBT).[15, 16, and 17] The DBT i
175 mph wind (150 mph rotational speed and 25 mph translational speed) with a pressure drop of 0.75 psi at a rate o
ond. The probability of a tornado at the INEL is 2 x 10-6 per year.[16] For purposes of analysis, missiles are defined
. by 12 ft wooden plank at 135 mph and a automobile at 65 mph.[18]
e nearest populated area to the INEL is Atomic City, located less than 1.5 miles from the southern INEL boundary, wi
ts. In 1980, the population residing within a 50 mile radius was approximately 147,000.
mbustible materials in the facility are low. The facility is primarily constructed of non-combustible materials and is eq
uppression systems. Fire detection and suppression systems at the NMIS Facility are designed to meet the "Improve
fined by DOE Order 5480.1[19] as implemented in Section 11 of the EG&G Safety Manual.[34] Sprinkler systems ar
ance with the National Fire Protection Association (NFPA) Code No. 13 and the Ordinary Hazard Occupancy, Group
ility fire detection and suppression is provided by two separate systems, a required[32] wet pipe sprinkler system co
ility, and a halon system in the SNM Storage Vault. The sprinklers are activated by fusible heads in all areas and ne
ower supply for support. Alarms are activated by smoke detectors in the Staging Area and in the SNM Storage Vault
will initiate a local alarm and a remote alarm at CFA DOE-ID Fire Department. There are five smoke detectors in the
Vault; three ionization types and two photoelectric types. The halon fire suppression system will be activated only wh
the above types of detector are activated (one ionization plus one photoelectric type). The SNM Storage Vault venti
will also be shut down if the halon system is activated. There are also five smoke detectors in the Staging Area, any
ill provide an alarm upon activation. The sprinkler system is only activated by the fusible head detectors inherent in
ay/Inspection Areas are protected by the function of sprinkler system in the same way. Backup manual fire protecti
d by three hand-held fire extinguishers located in the NMIS Facility. An ABC type and a metal fire type are located i
nd an ABC type is located in the Inspection Area. Routine operational tests and servicing of the fire system equipme
ed by periodic surveillance in accordance with Reference 51.
) Explosive materials are not permitted in the NMIS Facility.
) The SNM Storage Vault contains areas for storage of ATR, ETR, GETR, PBF fuel pins and rods, and miscellaneou
so provided for storage of drums containing fissile material controlled through use of transport indices.
) The storage configuration in the SNM Storage Vault is within metal racks with earthquake gates in front.

SITE: INEL	FACILITY (Building or Location) TRA-621
	FUNCTION: Inspection and Storage
Question 1: SITE	

17) The storage racks have metal fire shields. (Refer to Figure TRA-621 4 and 5)

18) The storage rack design allows the storage of ATR/ARMF/ETR/GETR fuel assembles plus miscellaneous material.[13] (Refer to Figures TRA-621 6, 7, 8 and 9)

19) The seismic analysis determined the NMIS fuel storage racks adequate for a Safe Shutdown Earthquake.

20) Heating and ventilation for the NMIS Facility is provided by a single package electric unit for cooling and heating. A multi-speed fan motor and automatic thermostat provides temperature control. The integrated heating and cooling system automatically maintain a temperature of 70 F plus or minus 2 , mitigating any temperature extremes. Heating for the Staging Area and the SNM Storage Vault is provided by electrical space heaters with integrated fans. The SNM Storage Vault exhaust system has a manually operated damper and blower system equipped with roughing type filters. The exhaust blower is rated at 500 CFM and exhausts at an elevation of approximately 6 ft above ground level.

21) Two power sources provide power requirements for the NMIS Facility. Commercial power to the NMIS Facility is provided at 208/480 V, 3 phase, 60 Hz from an adjacent facility, MTR-605. Power for lighting through individual switches or lighting contactors is commercial.

Commercial/Diesel power is also provided at 120-208/480 V, 3 phase, 60 Hz from the adjacent facility, MTR-605. Commercial/Diesel power is provided for the criticality alarm system, halon fire suppression system, and the lights and outlet receptacles in the SNM Storage Vault. Emergency lighting is supplied from individual battery-backed fixtures to allow personnel to safely exit the facility in a loss-of-power emergency.

Describe Weaknesses in the Design Basis

None Identified.

Structural Design

Partitioned Areas of HEU within facility

Inspection/Staging/Assay Areas

SNM Storage Vault

Description of Partitioned Areas

(1) Vault

(2) Inspection/Staging/Assay Areas.

Amount & Location of Hazardous Material Collocated or Commingled with HEU

All hazardous nonradioactive chemicals will be stored in approved flammable liquid storage cabinets in compliance with EG&G Safety Manual, Section 6.[34] Hazardous nonradioactive chemicals are limited to one half pint volumes of cleaning solvents out of approved storage cabinets.

Process Material Transfers

NA

On-Site Transportation

Fissile material contained in transport boxes or packages moved by a forklift within the NMIS Facility shall be a DOT or DOE approved container or have available documentation establishing the container as critically safe under accident conditions. The container must be shown to withstand a fall from a forklift without a criticality accident in a flooded condtion. The transport of fuel elements using the fuel element transport racks was analyzed and the results show a adequate safety margin. (See Reference 14, pages 64-67) An infinite flooded 2-D array of fuel elements in ATR transport racks, all eight storage positions occupied, has a k-effective of 0.905. This result was obtained with the transport racks modeled front-to-front and tipped so the fuel elements were vertical but with the spaces between fuel elements and fuel racks not containing water. This is the most reactive configuration, and results in largest k-effective value because interaction between fuel units is increased. Safety during transport is further enhanced by limiting the amount of U-235 in the buffer areas (fuel is only allowed to pass through buffer areas (no storage)) to less than 22.8 kg and the combined amount of U-235 in the Inspection, Assay and Staging Areas (out of approved storage) to less than 22.8 kg (the minimum amount of fully reflected unmoderated U-235 that can be made critical).[43] This limit recognizes that human bodies can be reflectors. However, to comply with security requirements for not exceeding Category II

TRA-621

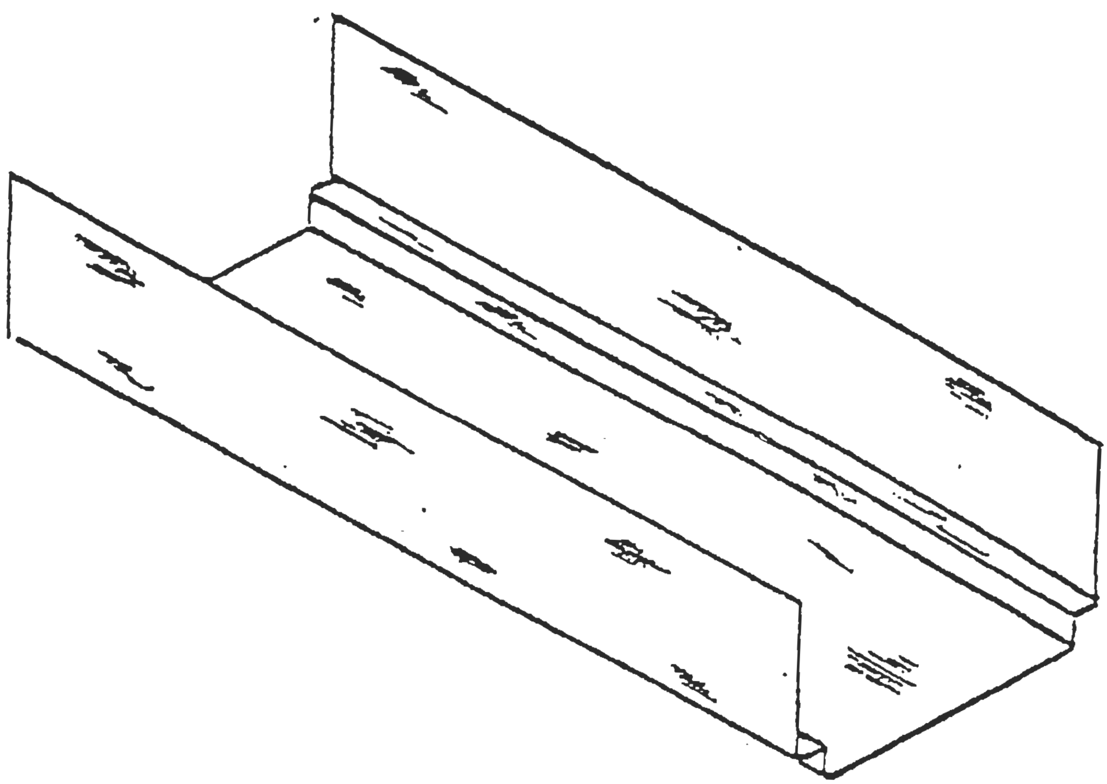


Figure TRA-621-4 Fuel storage rack fire shield.

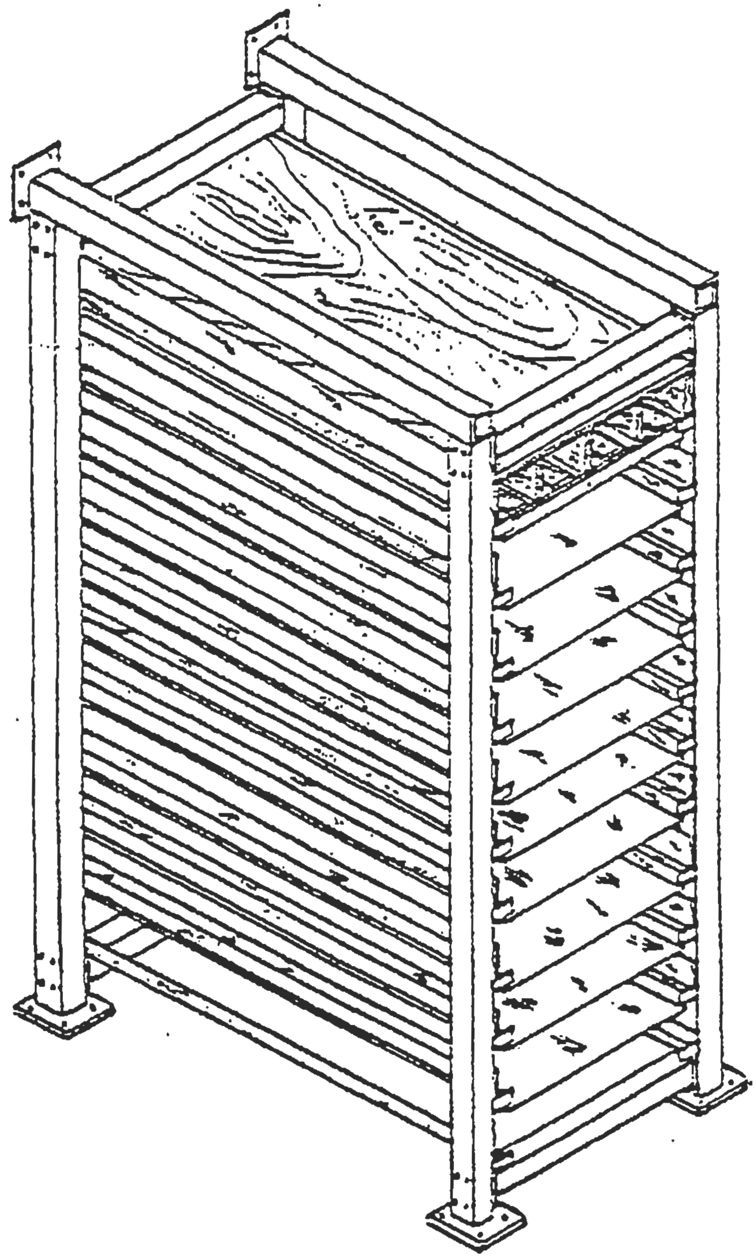


Figure TRA-621-5 Fuel storage rack with fire shie.u

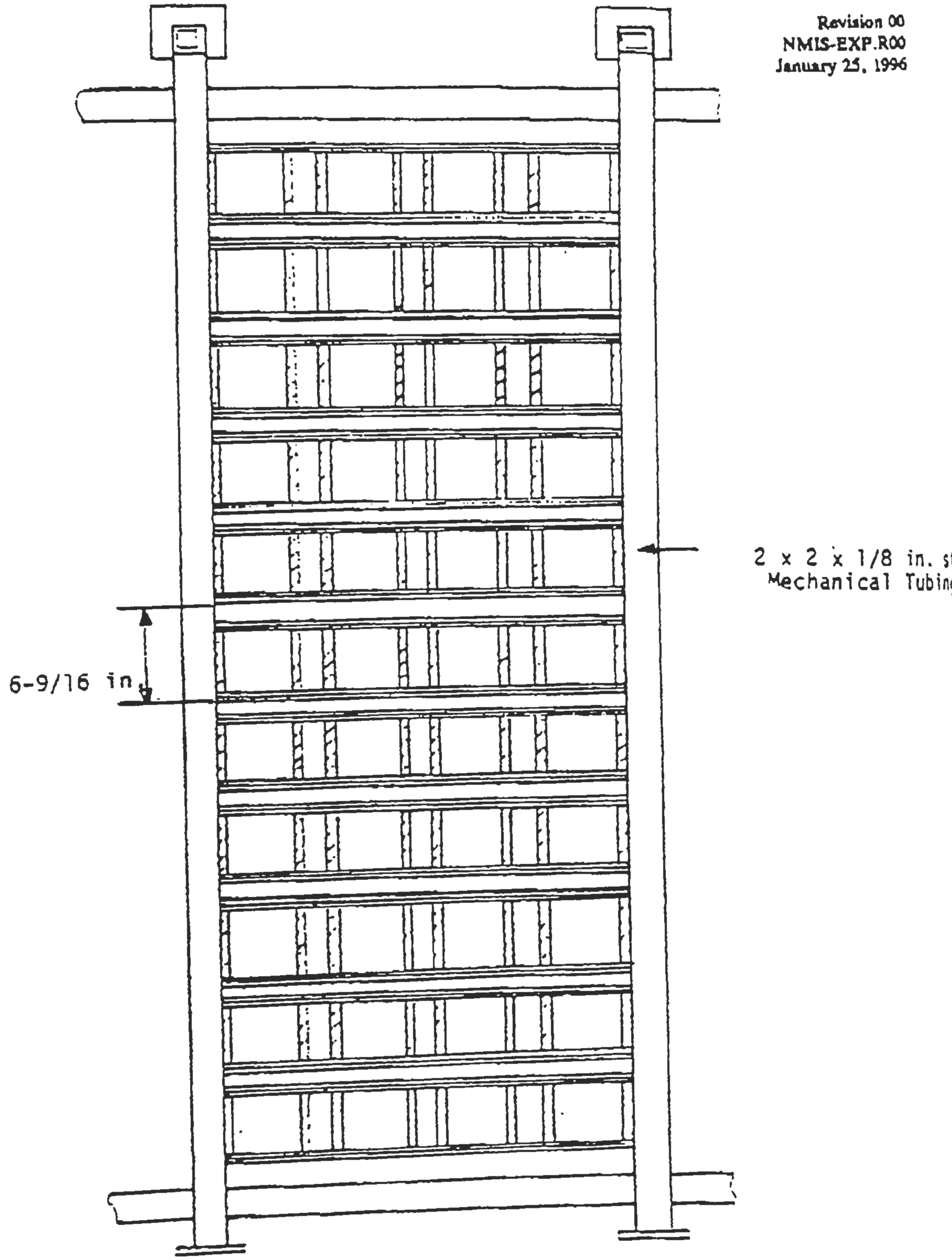
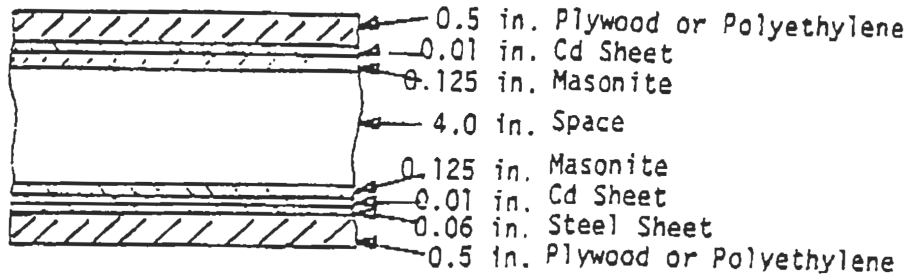


Figure TRA-621-6 Typical ETR Fuel Element Storage Rack



Horizontal Shelf Construction

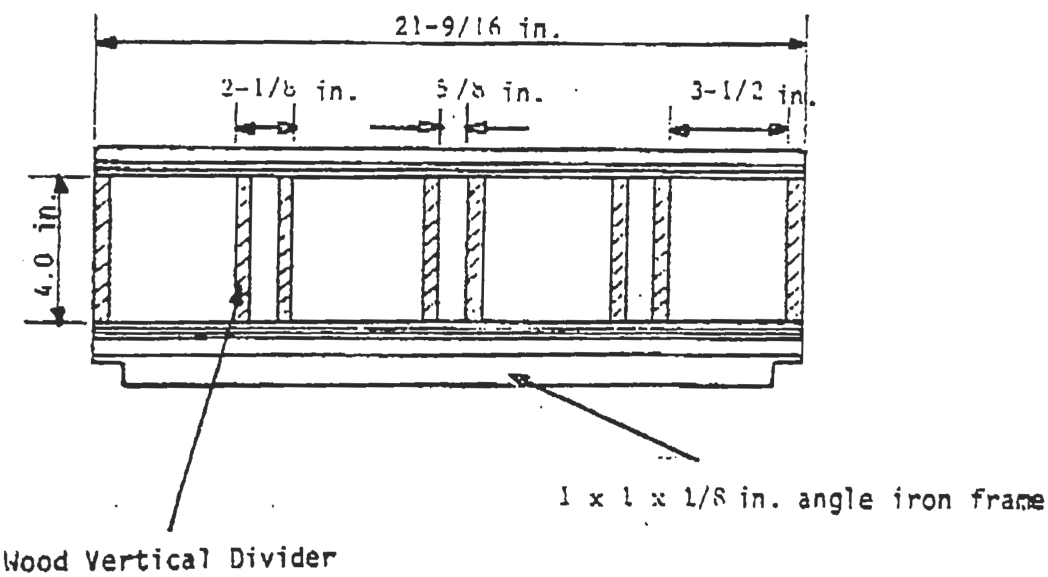


Figure TRA-621-7 Typical ETR Fuel Element Storage Rack Shelf Insert

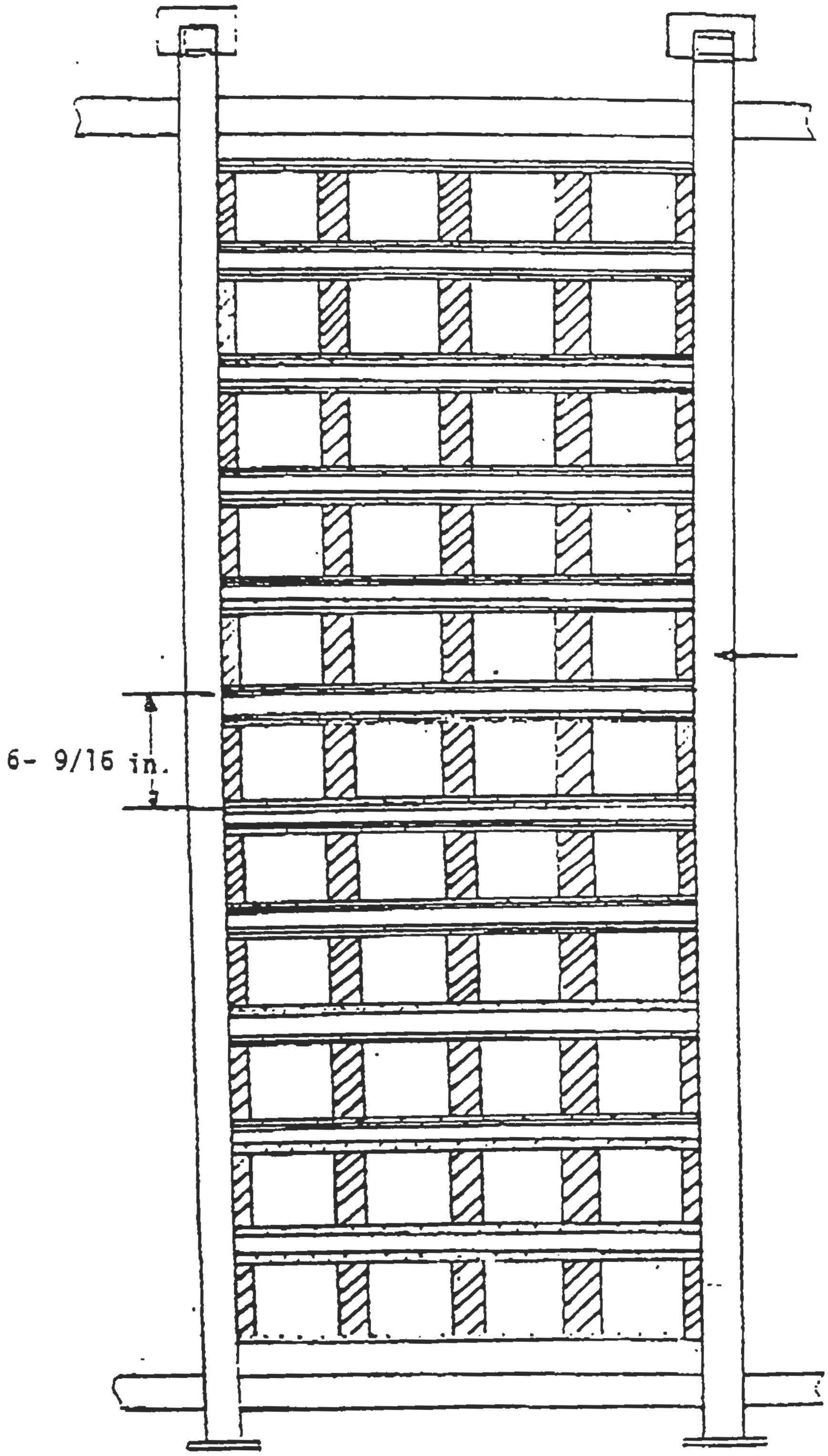
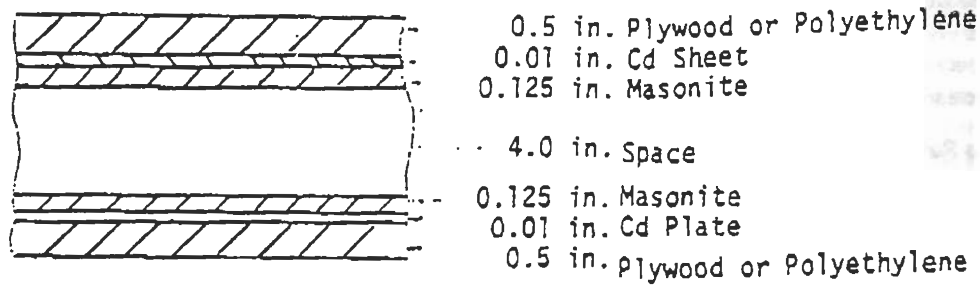


Figure TRA-621-8 Typical ATR Fuel Element Storage Rack



Horizontal Shelf Construction

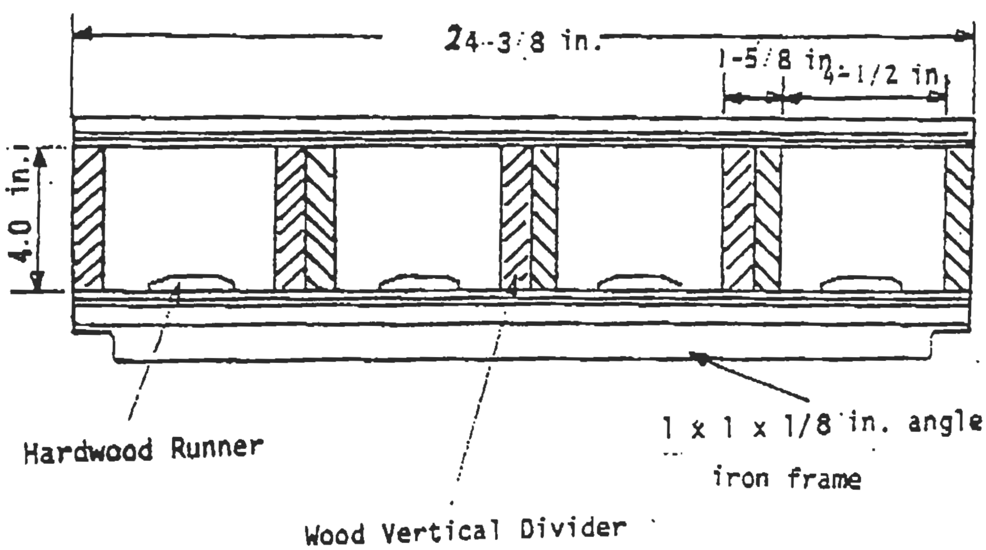


Figure TRA-621-9 Typical ATR Fuel Element Storage Rack Shelf Insert limits, the quantity of fissile material out of storage shall be limited to 20 kg.

Staff Levels & Experience

Operational responsibility for the NMIS Facility has been assigned to the Reactor Operations Department (Org. 5410). There is one Nuclear Material Custodian (9 months) from the Operations department, and two alternate custodians (15 years and 22 years) from the Quality department. There are two building tenants from the Safeguards and Security department (5 years and 8 years). The Custodian and one of the alternates are qualified as Fissile Material Handler Supervisors. The remaining people are qualified as Fissile Material Handlers. Safeguards and QC Fissile Material Handlers have the authority to enter the facility and conduct operations as needed. However, no fuel transfers are performed without the Nuclear Material Custodian or alternate, and a "Q" cleared NMIS Facility tenant present.

Applicable References

Authorization basis documents listed above.

SITE: INEL	FACILITY (Building or Location) TRA-621
	FUNCTION: Inspection and Storage

Question 1: SITE

DOE Headquarters Facility Landlord: EM
DOE Headquarters Program Sponsor: NE
Facility Age: 15 **Design Life:** 30

Location of Facility on Site and Distance to Site Boundary

Summary description of the facility:

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Description of processes, process/material flows, operations, and storage:

1) The primary function of the Assay area is to perform receiving assays on Advanced Test Reactor (ATR) and other fuel types as well as measurements in support of periodic physical inventory verifications. All nuclear material which enters, leaves, or is stored in the NMIS Facility is subject to measurements according to the requirements of DOE Order 5633.3, DOE-ID Operations interpretive orders, and Safeguards and Material Management procedures. The measurement instrumentation currently used by Safeguards is described as follows:

The Isotopic Source Assay System (ISAS) is used to interrogate ATR elements (and possibly other materials in the future) with neutrons from a Califomium source (8.24 x 107 neutrons per second) while detecting the emission of prompt gamma-rays and neutrons. This provides an integrated measurement of the nuclear material, poisons, and material geometry.

The Vertical Fuel Scanner (VFS) is used to measure the passive gamma-ray emission from nuclear materials with a low resolution NaI(T1) detector. This provides a background corrected integrated measurement and a fuel profile.

The high resolution Germanium detectors and low resolution portable NaI(T1) detectors are used to identify isotopic content and enrichment of nuclear material. It measures the passive gamma-ray emission of material.

The Active Well Coincidence Counter (AWCC) interrogates nuclear materials with neutrons from two Am-Li sources (range from 3.86 x 104 to 5.04 x 104 neutrons per second) while detecting the emission of coincidence neutrons. This provides an integrated measurement of the nuclear material and poisons while minimizing the effect of material geometry. The neutron sources identified above for instrumentation are registered and maintained in accordance with the Radiological Controls Manual.

2) The primary function of the QC Inspection Area is to receive, provide dimensional inspections of reactor fuel elements, and certify acceptance of fuel assemblies for reactor use. To accomplish those tasks, the QC Inspection Area is equipped with the following equipment:

Element Envelope Gage: Functional gage to determine whether or not a fuel element is properly sized for the reactor by physically inserting the element into the device.

Channel Probe Gage: Measures the dimensions of the coolant water gap between each fuel plate. The probe has an X-Y plotter that records the profile traces of the channel.

Surface Plates: Smooth horizontal granite surface for measuring the fuel elements and other items.

Vertical Gage: Device with self-contained vertical surface plate for measuring outside dimensions of fuel elements.

Transport Racks: Transports and stores fuel elements safely between the SNM Storage Vault, the Inspection Area or the Assay Area. ATR racks hold four ATR fuel elements.

3) The primary functions of the Staging Area include shipping, receiving and as an inventory area for fissile material.

4) The primary function of the vault is to receive, store, and ship ATR, ETR, GETR, and miscellaneous fuels in elements, rods, pellets, and other forms.

5) A small Clean Room is provided for handling material suspected of contamination and SNM in powder form. A HEPA filtered fume hood is provided in the Clean Room.

Location of the facility on the site and the distance to the site boundary: (Refer to Figure TRA-621 and 2)

NMIS is located within the TRA protected or perimeter security area located on the Idaho National Engineering Laboratory (INEL).

SITE: INEL	FACILITY (Building or Location) TRA-621
	FUNCTION: Inspection and Storage

Question 1: SITE

Design Mission, Interim Mission, Current Use

NMIS is a fuel storage, safeguards and security facility. The facility consolidates the storage of strategic quantities of special nu materials (SNM) located within the TRA. The NMIS Facility also consolidates the fuel inspection activities of Quality Control Engineering and the non-destructive assay activities of Safeguards. Both fuel inspection and non-destructive assay are perform within the NMIS Facility, thereby eliminating the need to move fuel from a protective area for these activities. The consolidation of fuel in the NMIS Facility significantly increases the safety and security of the fuel from (a) unauthorized access and (b) risk of da due to handling when transporting fuel from the SNM Storage Vault to a less secure measurement area.

Operational Status

Operating

Historical Information

During the service life of this facility, no adverse consequences to personnel and the public have occurred.

List Authorization Basis

The Safety Analysis Report for the NMIS Issue 2, December 8, 1992, provides an assessment of the environmental, safety and risks associated with the operation of the Test Reactor Area (TRA) Nuclear Materials Inspection and Storage (NMIS) Facility. Th objectives of the assessment are to (a) demonstrate that the NMIS Facility and safety related systems can be operated without risk to the health and safety of operating personnel and the public, (b) demonstrate that adequate provisions exist to protect the environment, (c) provide a basis for development of a Operations Safety Requirements Document (OSRD) and (d) establish the classification of the NMIS Facility and ensure that it conforms with the requirements of Section 2 of the EG&G Safety Manual and applicable chapters of DOE 5480.5 and DOE-ID Orders 5480.1A/5480.1 and 5481.1. DOE-ID approval of a Moderate Hazard classification for the NMIS Facility was received before the addition of the new SNM Storage Vault.[1] The addition of the new does not change this hazard classification. This document evaluates the receipt, handling, storage, and examination of fissile within the facility. The NMIS Facility has improved security measures, assay capabilities, and inspection capabilities in addition to consolidating the storage of SNM. The results of this safety analysis indicate that operation of the NMIS Facility is warranted.

SITE: INEL	FACILITY (Building or Location) TRA-621
	FUNCTION: Inspection and Storage
Question 1: SITE	

Describe Important or Unique Design Features

1) NMIS is a vault type structure with poured concrete exterior walls and a precast concrete beam roof with a poured concrete overlay.

2) The interior walls are metal stud and sheetrock construction.

3) The wall separating the Assay and QC Areas from the Staging Area has 0.25 in. lead radiation shield incorporated in the sheetrock.

4) The Staging Area includes a receiving Inspection Area with a fume hood in the Clean Room for inspecting, packaging, or consolidating powdered fuels. The fume hood in the Clean Room is a 6 ft bench with a 304 stainless steel interior, fluorescent lights and switch, and an exhaust blower rated at a minimum air velocity through the hood door of 125 ft/min and an average flow of 150-200 cfm. The blower is roof-mounted with duct work connecting to the fume hood to maintain negative pressure. Since there is a minute chance for contamination, the exhaust system is equipped with prefilters and high-efficiency HEPA filters installed upstream of the blower. Bag-out-type caisson filters were designed to allow changeout with minimum of contamination spread. A fire system sprinkler head has been added to the fume hood.

5) The facility has no windows and only three access points: one personnel access door and one cargo access door in the Staging Area and a emergency exit door is located in the QC Inspection Area.

6) Test fixtures are constructed to securely hold the fuel, positioned to maintain a minimum of 3-ft separation from fuel in adjacent fixtures, and limited to no more than one fuel unit in the test fixture.

7) The NMIS Facility was constructed to INEL Architectural Standards, which include provision for wind velocities of up to 80 mph at 33 ft elevation, "C" exposure factor and a fifty year recurrence frequency.

8) Protection from potential flooding of the Big Lost River has been provided by diversion works in the southwest corner of the INEL. This control consists of a dam and a channel leading to several impounding areas where the water seeps into the ground. Localized ponding and surface flow of water occur occasionally as a result of unusual situations involving extended periods of above-freezing temperatures, prolonged light rainfall, extensive areas of snow, and deeply frozen ground. However, the TRA is protected from flooding by separate dikes and impoundment areas.

9) The NMIS Facility has been designed and constructed to meet Uniform Building Code (UBC) Zone 3 requirements as required by the INEL Architectural Standards.

10) The fuel element racks and earthquake gates were designed by dynamic analysis using specific criteria as outlined in the INEL Architectural Standards.

11) The NMIS Facility is designed and constructed to withstand the Design Basis Tornado (DBT).[15, 16, and 17] The DBT is defined as 175 mph wind (150 mph rotational speed and 25 mph translational speed) with a pressure drop of 0.75 psi at a rate of 0.25 psi per second. The probability of a tornado at the INEL is 2 x 10-6 per year.[16] For purposes of analysis, missiles are defined as: a 2 in. by 12 in. by 12 ft wooden plank at 135 mph and a automobile at 65 mph.[18]

12) The nearest populated area to the INEL is Atomic City, located less than 1.5 miles from the southern INEL boundary, with about 35 residents. In 1980, the population residing within a 50 mile radius was approximately 147,000.

13) Combustible materials in the facility are low. The facility is primarily constructed of non-combustible materials and is equipped with fire suppression systems. Fire detection and suppression systems at the NMIS Facility are designed to meet the "Improved Risk" criteria defined by DOE Order 5480.1[19] as implemented in Section 11 of the EG&G Safety Manual.[34] Sprinkler systems are installed in accordance with the National Fire Protection Association (NFPA) Code No. 13 and the Ordinary Hazard Occupancy, Group I. The NMIS Facility fire detection and suppression is provided by two separate systems, a required[32] wet pipe sprinkler system covering the entire facility, and a halon system in the SNM Storage Vault. The sprinklers are activated by fusible heads in all areas and need no outside power supply for support. Alarms are activated by smoke detectors in the Staging Area and in the SNM Storage Vault. Any detector will initiate a local alarm and a remote alarm at CFA DOE-ID Fire Department. There are five smoke detectors in the SNM Storage Vault; three ionization types and two photoelectric types. The halon fire suppression system will be activated only when one of each of the above types of detector are activated (one ionization plus one photoelectric type). The SNM Storage Vault ventilation system will also be shut down if the halon system is activated. There are also five smoke detectors in the Staging Area, any one of which will provide an alarm upon activation. The sprinkler system is only activated by the fusible head detectors inherent in the system. The Assay/Inspection Areas are protected by the function of sprinkler system in the same way. Backup manual fire protection is provided by three hand-held fire extinguishers located in the NMIS Facility. An ABC type and a metal fire type are located in the Staging Area, and an ABC type is located in the Inspection Area. Routine operational tests and servicing of the fire system equipment is provided by periodic surveillance in accordance with Reference 51.

14) Explosive materials are not permitted in the NMIS Facility.

15) The SNM Storage Vault contains areas for storage of ATR, ETR, GETR, PBF fuel pins and rods, and miscellaneous fuels. Areas are also provided for storage of drums containing fissile material controlled through use of transport indices.

16) The storage configuration in the SNM Storage Vault is within metal racks with earthquake gates in front.

17) The storage racks have metal fire shields. (Refer to Figure TRA-621 4 and 5)

18) The storage rack design allows the storage of ATR/ARMF/ETR/GETR fuel assembles plus miscellaneous material.[13] (Refer to Figures TRA-621 6, 7, 8 and 9)

19) The seismic analysis determined the NMIS fuel storage racks adequate for a Safe Shutdown Earthquake.

20) Heating and ventilation for the NMIS Facility is provided by a single package electric unit for cooling and heating. A multi-speed fan motor and automatic thermostat provides temperature control. The integrated heating and cooling system automatically maintain a temperature of 70 F plus or minus 2 , mitigating any temperature extremes. Heating for the Staging Area and the SNM Storage Vault is provided by electrical space heaters with integrated fans. The SNM Storage Vault exhaust system has a manually operated damper and blower system equipped with roughing type filters. The exhaust blower is rated at 500 CFM and exhausts at an elevation of approximately 6 ft above ground level.

21) Two power sources provide power requirements for the NMIS Facility. Commercial power to the NMIS Facility is provided at 208/480 V, 3 phase, 60 Hz from an adjacent facility, MTR-605. Power for lighting through individual switches or lighting contactors is commercial.

Commercial/Diesel power is also provided at 120-208/480 V, 3 phase, 60 Hz from the adjacent facility, MTR-605. Commercial/Diesel power is provided for the criticality alarm system, halon fire suppression system, and the lights and outlet receptacles in the SNM Storage Vault. Emergency lighting is supplied from individual battery-backed fixtures to allow personnel to safely exit the facility in a loss-of-power emergency.

Describe Weaknesses in the Design Basis

None Identified.

Structural Design

Partitioned Areas of HEU within facility

Inspection/Staging/Assay Areas

SNM Storage Vault

Description of Partitioned Areas

(1) Vault

(2) Inspection/Staging/Assay Areas.

Amount & Location of Hazardous Material Collocated or Commingled with HEU

All hazardous nonradioactive chemicals will be stored in approved flammable liquid storage cabinets in compliance with EG&G Safety Manual, Section 6.[34] Hazardous nonradioactive chemicals are limited to one half pint volumes of cleaning solvents out of approved storage cabinets.

Process Material Transfers

NA

On-Site Transportation

Fissile material contained in transport boxes or packages moved by a forklift within the NMIS Facility shall be a DOT or DOE approved container or have available documentation establishing the container as critically safe under accident conditions. The container must be shown to withstand a fall from a forklift without a criticality accident in a flooded condtion. The transport of fuel elements using the fuel element transport racks was analyzed and the results show a adequate safety margin. (See Reference 14, pages 64-67) An infinite flooded 2-D array of fuel elements in ATR transport racks, all eight storage positions occupied, has a k-effective of 0.905. This result was obtained with the transport racks modeled front-to-front and tipped so the fuel elements were vertical but with the spaces between fuel elements and fuel racks not containing water. This is the most reactive configuration, and results in largest k-effective value because interaction between fuel units is increased. Safety during transport is further enhanced by limiting the amount of U-235 in the buffer areas (fuel is only allowed to pass through buffer areas (no storage)) to less than 22.8 kg and the combined amount of U-235 in the Inspection, Assay and Staging Areas (out of approved storage) to less than 22.8 kg (the minimum amount of fully reflected unmoderated U-235 that can be made critical).[43] This limit recognizes that human bodies can be reflectors. However, to comply with security requirements for not exceeding Category II limits, the quantity of fissile material out of storage shall be limited to 20 kg.

Staff Levels & Experience

Operational responsibility for the NMIS Facility has been assigned to the Reactor Operations Department (Org. 5410). There is one Nuclear Material Custodian (9 months) from the Operations department, and two alternate custodians (15 years and 22 years) from the Quality department. There are two building tenants from the Safeguards and Security department (5 years and 8 years). The Custodian and one of the alternates are qualified as Fissile Material Handler Supervisors. The remaining people are qualified as Fissile Material Handlers. Safeguards and QC Fissile Material Handlers have the authority to enter the facility and conduct operations as needed. However, no fuel transfers are performed without the Nuclear Material Custodian or alternate, and a "Q" cleared NMIS Facility tenant present.

Applicable References

Authorization basis documents listed above.

SITE: INEL	FACILITY (Building or Location): TRA-621
	PARTITIONED AREA: Inspection/Staging/Assay Areas

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality[1,2]	Administrative Barrier[3]
[ ] Gloveboxes	[Y] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[Y] HVAC/Confinement	[ ] Double Contingency Not Applied (specify)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike	(e.g., Mass	[ ] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines	Absorbers	[Y] Configuration Control
[Y] Vault	[ ] Canyons	Geometry	[ ] Quality Assurance
[ ] Room	[ ] Pads	Interaction	[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary	Concentration	[Y] Authorization Basis
[Y] Hood	[ ] Trenches	Moderation	[Y] Training
[ ] Piping	[ ] Storage Vault	Enrichment	[ ] Organization
[Y] Shielding	[Y] Fire Suppression	Reflection	[Y] Lessons-Leamed
[ ] Distance	[ ] Alarm System	Volume)	[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[ ] Protective Clothing			[ ] Records
[ ] Remote Handling			[ ] Standards
[ ] Confinement System			[ ] External Regulation
[ ] Burial Ground			[Y] Surveillance
[ ] Tanks			[Y] Personnel Reliability Assurance Program
[Y] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[ ] Emgergency Respc
[ ] Other-specify Container			[ ] Other-specify
[N] None			

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): TRA-621
	PARTITIONED AREA: Inspection/Staging/Assay Areas

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Vault: The Vault protects workers outside the vault from radiation originiating within the vault.

Hood: The Staging Area includes a receiving inspection Area with a fume hood in the Clean Room for inspecting, packaging, or consolidating powdered fuels. The fume hood in the Clean Room is a 6 ft bench with a 304 stainless steel interior, fluorescent lights and swithc, and an exhaust blower rated at a minimum air velocity through the hood door of 125 ft/min and an average flow of 150-200 cfm. The blower is roof-mounted with duct work connecting to the fume hood to maintain negative pressure. Since there is a minute chance for contamination, the exhaust system is equipped with prefilters and high-efficiency HEPA filters installed upstream of the blower. Bag-out-type caisson filters were designed to allow changeout with minimum of contamination spread. A fire system sprinkler head has been added to the fume hood.

Shielding: The wall separating the Assay and QC Areas from the Staging Area has 0.25 inch lead radiation shield incorporated in the sheetrock.

Alarm System: Workers are protected by criticality, fire, and Constant Air Monitor alarms

Public/Environment Barrier Narrative:

HVAC/Confinement: The Staging Area includes a receiving inspection Area with a fume hood in the Clean Room for inspecting, packaging, or consolidating powdered fuels. The fume hood in the Clean Room is a 6 ft bench with a 304 stainless steel interior, fluorescent lights and swithc, and an exhaust blower rated at a minimum air velocity through the hood door of 125 ft/min and an average flow of 150-200 cfm. The blower is roof-mounted with duct work connecting to the fume hood to maintain negative pressure. Since there is a minute chance for contamination, the exhaust system is equipped with prefilters and high-efficiency HEPA filters installed upstream of the blower. Bag-out-type caisson filters were designed to allow changeout with minimum of contamination spread. A fire system sprinkler head has been added to the fume hood.

Fire Suppression: Combustible materials in the facility are low. The facility is primarily constructed of non-combustible materials and is equipped with fire suppression systems. Fire detection and suppression systems at the NMIS Facility are designed to meet the "Improved Risk" criteria defined by DOE Order 5480.1[19] as implemented in Section 11 of the EG&G Safety Manual.[34] Sprinkler systems are installed in accordance with the National Fire Protection Association (NFPA) Code No. 13 and the Ordinary Hazard Occupancy, Group I. The NMIS Facility fire detection and suppression is provided by two separate systems, a required[32] wet pipe sprinkler system covering the entire facility, and a halon system in the SNM Storage Vault. The sprinklers are activated by fusible heads in all areas and need no outside power supply for support. Alarms are activated by smoke detectors in the Staging Area and in the SNM Storage Vault. Any detector will initiate a local alarm and a remote alarm at CFA DOE-ID Fire Department. There are five smoke detectors in the SNM Storage Vault; three ionization types and two photoelectric types. The halon fire suppression system will be activated only when one of each of the above types of detector are activated (one ionization plus one photoelectric type). The SNM Storage Vault ventilation system will also be shut down if the halon system is activated. There are also five smoke detectors in the Staging Area, any one of which will provide an alarm upon activation. The sprinkler system is only activated by the fusible head detectors inherent in the system. The Assay/Inspection Areas are protected by the function of sprinkler system in the same way. Backup manual fire protection is provided by three hand-held fire extinguishers located in the NMIS Facility. An ABC type and a metal fire type are located in the Staging Area, and an ABC type is located in the Inspection Area. Routine operational tests and servicing of the fire system equipment is provided by periodic surveillance in accordance with Reference 51.

Site Boundary: The NMIS facility is located approximately 10.5 km from the nearest site boundary.

Facility/Building: The facility is designed to minimize release of materials to the environment.

Criticality Barrier Narrative:

Properly stored fuel remains subcritical event under completely flooded conditions.

Moderating materials shall be excluded from the NMIS Facility, except for human bodies, small quantities of drinking water and sanitation supplies, fire suppression, hydrocarbons in the form of wood, plastic, or foam used in packaging, contamination control, test equipment, shipping container construction, physical protection and office supplies, including graphite in pencils and other small items.

Only shipping boxes, and transport racks are used for transporting ATR and ETR fuel element and plate bundles. Fuel units may be transported by hand carrying one element at a time.

Locking devices on loaded transport racks are latched except when fuel elements or plate bundles are being loaded or removed.

SITE: INEL	FACILITY (Building or Location): TRA-621
	PARTITIONED AREA: Inspection/Staging/Assay Areas

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Fuel units within any NMIS Facility area are returned to secure storage in a test fixture, transport rack, or approved storage prior to the NMIS Facility begin left unattended.

Ensure NMIS Operating Procedures meet the special handling requirements of DOE 5480.5 in the event of a loaded shipping container being received in a damaged or wet condition.

A maxium of 22.8 kg of fissile material may be out of storage at any time. However, security requirements limit the quantity to less than 20 kg. This limit shall be maintained by the following controls:

The ATR transport racks shall be physically limited to four ATR fuel elements, and ETR racks to five ETR or ARMF fuel elements.

The maximum number of fuel units out of a transport rack, storage container, or test fixture in the Assay Area shall not exceed three, and the total quantity of fissile material shall not exceed 7.0 kg.

The maximum number of fuel units out of a transport rack, storage container, or test fixture in the Inspection Area shall not exceed three, and the total quantity of fissile material shall not exceed 6.0 kg.

The Inspection, Assay, and Staging Areas shall be separated by a buffer zone at least 3 ft. wide.

Fissile material handling other than the transport of fuel between areas is prohibited in the buffer zones.

Fissile material transport through the buffer zones shall be in a transport rack of a properly secured shipping container, or by hand carrying single units one at a time.

A minimum of 3 ft of separation shall be maintained between fuel units out of storage, except for assembled fuel elements. Test fixtures are included in this separation requirement.

Fissile material in the form of rods, fuel plates, and odd lot items in excess of 365 grams U-235 in the aggregate (45% of minimum critical mass), when out of approved storage, shall be handled as follows:

In water tight enclosures or containers, or maintained within a geometric envelope as specified in the following table:

Enrichment	Flat Envelope Height	Cylindrical Envelope Diameter
<20%	2.0 in.	6.2 in.
>20%	0.5 in.	3.0 in.

(NOTE: These limits do not apply to fuel units being handled for immediate transport to or from the storage racks. Upon reaching the work station the fuel unit shall be immediately reconfigured to satisfy these limits.)

A minimum of 3 ft. separation shall be maintained between each enclosure, container, or handling envelope.

The enclosures, containers, and handling envelopes shall be constructed to prevent spilling or tipping of fissile material onto the floor[43].

Fuel rods must be in oxide form. The oxide may be contained in a matrix providing the matrix material does not contain the moderating elements hydrogen, lithium, carbon, or beryllium in greater than trace amounts (less than one percent).

Fissile material quantity in fuel elements or fuel plate bundles shall not exceed 1100 grams U-235 for ATR, 200 grams U-235 for ARMF and 520 grams U-235 for ETR and GETR.

Plates from different types of elements shall not be mixed in the same bundle.

Fissile material not stored in racks shall be stored in approved shipping containers, NMIS storage drums, transport racks, or in test fixtures. Shipping container storage shall further be limited to DOT/DOE approved containers for Class I or Class II shipments, and ATR and ETR shipping boxes.

Transport indices must be maintained for loaded storage limits, and limited to a total index of 50.

SITE: INEL	FACILITY (Building or Location): TRA-621
	PARTITIONED AREA: Inspection/Staging/Assay Areas

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Administrative Barrier Narrative:

Emergency Response: The NMIS utilizes an Emergency Procedure Network (EPN) and Abnormal Operating Procedures (AOP's) to guide action during emergency/abnormal conditions.

SITE: INEL	FACILITY (Building or Location): TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]

- [ ] Gloveboxes
- [ ] Transfer System
- [ ] Duct
- [ ] Filter
- [ ] Vault
- [ ] Room
- [ ] Hot Cell/Canyon
- [ ] Hood
- [ ] Piping
- [ ] Shielding
- [ ] Distance
- [ ] Respiratory Protection
- [ ] Protective Clothing
- [ ] Remote Handling
- [ ] Confinement System
- [ ] Burial Ground
- [ ] Tanks
- [Y] Alarm System
- [Y] Temporary Barriers
- [Y] Other-specify
  DOT-Approved Storage Container
- [N] None

Public/Environmental Barrier[2]

- [Y] Facility/Building Boundary
- [ ] HVAC/Confinement
- [ ] Liquid Containment/Dike
- [ ] Bay, Cells, Magazines
- [ ] Canyons
- [ ] Pads
- [Y] Site Boundary
- [ ] Trenches
- [Y] Storage Vault
- [Y] Fire Suppression
- [ ] Alarm System
- [ ] Other - Specify

Criticality[1,2]

- [Y] Double Contingency Applied
- [ ] Double Contingency Not Applied (specify)
  (e.g., Mass
  Absorbers
  Geometry
  Interaction
  Concentration
  Moderation
  Enrichment
  Reflection
  Volume)

Administrative Barrier[3]

- [Y] Procedure: Operation, Maint.
- [Y] Material Limits
- [ ] Monitoring
- [Y] Configuration Control
- [ ] Quality Assurance
- [Y] Conduct of Operations
- [Y] Authorization Basis
- [Y] Training
- [ ] Organization
- [Y] Lessons-Learned
- [ ] Testing
- [ ] Trending
- [ ] Records
- [ ] Standards
- [ ] External Regulation
- [Y] Surveillance
- [Y] Personnel Reliability Assurance Program
- [Y] Worker/Access Occupancy Limits
- [Y] Emergency Response
- [ ] Other-specify

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Alarm System: Workers are protected by criticality, CAM, and fire alarm systems.

Temporary Barriers: One area of the vault contains slightly irradiated fuel which had been in canal storage. There is a radiological ribbon roping off this contaminated material.

DOT-approved storage containers (e.g. 6-M Drums) are used to store some HEU materials in the vault.

Public/Environment Barrier Narrative:

Facility/Building Boundary: Prevents HEU from reaching the outside.

Site Boundary: Approximately 10 km to nearest site boundary.

Storage Vault: Halon and sprinkler systems.

Criticality Barrier Narrative:

Properly stored fuel remains subcritical event under completely flooded conditions. The fuel has been shown to be critically safe, even assuming the rack and contents are mashed by the collapse of the building and subsequent flooding.

The storage configuration in the SNM Storage Vault is within metal racks with earthquake gates in front. Earthquake gates are installed to keep the fuel elements in the racks during a postulated seismic event. The racks and gates meet Safe Shutdown Earthquake design requirements.

Design of fuel storage racks, (which includes cadmium sheets between storage rack grills.

Moderating materials shall be excluded from the NMIS Facility, except for human bodies, small quantities of drinking water and sanitation supplies, fire suppression, hydrocarbons in the form of wood, plastic, or foam used in packaging, contamination control, test equipment, shipping container construction, physical protection and office supplies, including graphite in pencils and other small items.

Only shipping boxes, and transport racks are used for transporting ATR and ETR fuel element and plate bundles. Fuel units may be transported by hand carrying one element at a time.

Locking devices on loaded transport racks are latched except when fuel elements or plate bundles are being loaded or removed.

Fuel units within any NMIS Facility area are returned to secure storage in a test fixture, transport rack, or approved storage prior to the NMIS Facility begin left unattended.

Ensure NMIS Operating Procedures meet the special handling requirements of DOE 5480.5 in the event of a loaded shipping container being received in a damaged or wet condition.

A maxium of 22.8 kg of fissile material may be out of storage at any time. However, security requirements limit the quantity to less than 20 kg. This limit shall be maintained by the following controls:

The ATR transport racks shall be physically limited to four ATR fuel elements, and ETR racks to five ETR or ARMF fuel elements.

The maximum number of fuel units out of a transport rack, storage container, or test fixture in the Staging Area or the SNM Storage Vault shall not exceed three, and the total quantity of fissile material shall not exceed 6.0 kg. For this control, the SNM Storage Vault and the Staging Area are considered as a single area.

Fuel storage racks in the SNM Storage Vault shall have a 3-ft buffer zone around them.

A minimum of 3 ft of separation shall be maintained between fuel units out of storage, except for assembled fuel elements. Test fixtures are included in this separation requirement.

Fissile material in the form of rods, fuel plates, and odd lot items in excess of 365 grams U-235 in the aggregate (45% of minimum critical mass), when out of approved storage, shall be handled as follows:

In water tight enclosures or containers, or maintained within a geometric envelope as specified in the following table:

	FACILITY (Building or Location): TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 2: BARRIER TYPES

ntified above and its intended protective functions.

/elope Height	Cylindrical Envelope Diameter
2.0 in.	6.2 in.
0.5 in.	3.0 in.

do not apply to fuel units being handled for immediate transport to or from the storage racks. Upon reaching nit shall be immediately reconfigured to satisfy these limits.)
. separation shall be maintained between each enclosure, container, or handling envelope.
;ontainers, and handling envelopes shall be constructed to prevent spilling or tipping of fissile material onto the

-235) for stationary rack cells used for fuel rod storage shall not exceed the values listed below, based on the ɜter (D, in.) in each cell: [14]

Linear Fuel Density
750 grams/ft
[(1200 D) + 150] = grams/ft

ıargin, these limits were one-half for purposes of operational controls rendering the table values to the following
ms/ft
D) + 100 = Grams/FT

ɔred under the fuel rod limits provided they are physically constrained in a device that maintains end-to-end

J-235) shall not exceed one-half the normal fuel rod limit stated above when the constraining device is made of

ide form. The oxide may be contained in a matrix providing the matrix material does not contain the moderating ium, carbon, or beryllium in greater than trace amounts (less than one percent).

ETR and ATR racks shall be physically confined to a 3 x 3 in. cross-sectional area within the rack cell. All odd ored in a 3 x 3 in. cross-sectional area.

ɟing loose or non-rigid shall be physically constrained to limit linear fuel density to a safe maximum of 200 grams ·ease the safety margin for storing the odd lot materials within the storage racks, this margin will be reduced by operational control.

ɔe stored in rack containers (trays) which are divided into compartments to maintain the 100 grams/ft limit.

or fuel rod storage shall be provided with drain holes that prevent the retention of water. Each tray shall have a with a minimum diameter of 3/8 in. and located at the bottom of the tray, with at least one drain hole for each tray

is limited to ATR fuel elements, ARMF fuel elements, ETR and GETR fuel elements, and ETR and GETR control

ity in fuel elements or fuel plate bundles shall not exceed 1100 grams U-235 for ATR, 200 grams U-235 for ARMF ; for ETR and GETR.

types of elements shall not be mixed in the same bundle.

; shall not be permitted in storage rack cells with the exception of plastic wrap used for contamination control or to constrain fuel pellets.

ᴧTR, ARMF or ETR fuel element or plate bundle shall be stored in a single storage rack cell.

vill be stored in ATR racks only. Fuel plate bundles may be stored in either ATR or ETR racks.

SITE: INEL	FACILITY (Building or Location): TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

ATR plates shall be bundled in descending order, per width size, from Plate 1 through Plate 19, and no more than one of each ATR plate type shall be included into a single bundle.

Fissile material not stored in racks shall be stored in approved shipping containers, NMIS storage drums, transport racks, or in test fixtures. Shipping container storage shall further be limited to DOE/DOE approved containers for Class I and Class II shipments, and ATR and ETR shipping boxes.

Transport indices must be maintained for loaded storage limits, and limited to a total index of 50.

Administrative Barrier Narrative:

The NMIS Facility utilizes an Emergency Procedure Network (EPN) and Abnormal Operating Procedures (AOP's) to guide action during emergency/abnormal conditions.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: Inspection/Staging/Assay

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
	Depleted	MI	D1	Other-specify Staging Area	Unknown	1	0.003

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped collimator in 6M drum.

Describe material at risk, which constitutes a source term.
None

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: Inspection/Staging/Assay			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Metal	Weapons		D1	Other-specify Staging Area	Unknown	1	0.01

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Two (2) Red Plates in two bare plates in a 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-62		
				PARTITIONED AREA: SNM Storage Vault		
Question 3: HEU Holdings and Packaging						
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages
Reactor Fuel	Weapons	Unirradiated	None	Vault	NA	271

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped ATR Fuel Element in storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Reactor Fuel	Weapons	Unirradiated	None	Vault	NA	11	10.645

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped ATR Fuel Element in a rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Reactor Fuel	Weapons	Unirradiated	None	Vault	NA	2	2.094

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped instrumented ATR Fuel Element in a rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor Fuel	Weapons	Unirradiated	None	Vault	NA	26	0.026

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped depleted ATR Fuel Element in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621 PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Ma (kg
Reactor Fuel	Weapons	Unirradiated	None	Vault	NA	1	1.0

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped ATRC Fuel Element in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Reactor Fuel	Weapons	Unirradiated	None	Vault	NA	246	117.13

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped ETR Fuel Element in storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	[illegible]
Reactor Fuel	Weapons	Unirradiated	None	Vault	NA	129	[illegible]

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped GETR Fuel Element in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Reactor Fuel	Weapons	Unirradiated	None	Vault	NA	15	2.828

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped ARMF Fuel Elements in a storage rack.

Describe material at risk, which constitutes a source term.
None.

ITE: INEL	FACILITY (Building or Location) TRA-621 PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

laterial Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
₹eactor Fuel	Enriched	Unirradiated	None	Vault	NA	8	1.393

umulative Inventory Differences
.0000

escribe packaging and its intended protective function(s).
Inwrapped TRIGA Fuel Elements in a storage rack.

escribe material at risk, which constitutes a source term.
Ione.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor Fuel	LEU	Unirradiated	None	Vault	NA	595	137.12

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped PBF Fuel Rod in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor Fuel	Weapons	Unirradiated	X1	Vault	Unknown	1	1.215

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped 43 PBPC Rods in a 110 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Reactor Fuel		Unirradiated	None	Vault	NA	1	0.559

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped PWR instrument rod in storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor Fuel	Weapons	Unirradiated	None	Vault	NA	89	4.683

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped ATR Fuel Element Plate in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Reactor Fuel	Depleted	Unirradiated	None	Vault	NA	2	0.002

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped depleted ATR Fuel Element Plates in a storage rack.

Describe material at risk, which constitutes a source term.
None.

	FACILITY (Building or Location) TRA-621				
	PARTITIONED AREA: SNM Storage Vault				

Question 3: HEU Holdings and Packaging

Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Other Reactor Fuel -Other RO	None	Vault	NA	2	0.001

rences

s intended protective function(s).
el Element Plates in a storage rack.

which constitutes a source term.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Reactor Fuel	Weapons	Unirradiated	None	Vault	NA	28	0.364

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped ARMF Fuel Element Plates in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor Fuel	Weapons	Unirradiated	None	Vault	NA	2	0.7

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped MIT Fuel Element Plates in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				**FACILITY (Building or Location)** TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Metal	Weapons	Alloys	None	Vault	NA	148	0.730

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped Red Plates in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Metal	Weapons	Alloys	None	Vault	NA	11	0.023

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped Blue Plate in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Metal	Weapons	Alloys	None	Vault	NA	57	0.058

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped Fuel Pieces in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Metal	Weapons	NA	None	Vault	NA	265	0.690

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped Fuel Strips in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				**FACILITY (Building or Location)** TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Metal	Enriched	Alloys	None	Vault	NA	1	0.008

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped Leaf Plates in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Metal	Very Highly	Pure Metal	C1/X1	Vault	Unknown	1	0.055

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Foils (FO) in a sealed stainless steel food can in a 110 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	Weapons	Other	None	Vault	NA	2	1.095

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped PBF PWR Rod Standard in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	Enriched	Other	None	Vault	NA	2	1.101

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped PBF PWR Rod Standard in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				**FACILITY (Building or Location)** TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Sample	Enriched	Other	None	Vault	NA	2	1.103

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped PBF PWR Rod Standard in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA6 PARTITIONED AREA: SNM Storage Vst			
Question 3: HEU Holdings and Packaging							
Material Form	*Grade of HEU*	*Material Form Description*	*Packaging Types*	Location	Range of Age	No. of Packages	[illegible]
Sources and Samples	*None LEU*	*Other*	*None*	Vault	NA	2	[illegible]

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped PBF Rod Standard in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	LEU	Other	None	Vault	NA	1	0.443

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped Saxton Rod Standard in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	LEU	Other	None	Vault	NA	1	0.598

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped SPR Rod Standard in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	Weapons	Other	None	Vault	NA	38	2.198

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped ATR Fuel Plate Standards in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621 PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	Weapons	Other	None	Vault	NA	1	0.008

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Unwrapped UTS Plate Standard in a storage rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	LEU	Other	C1	Vault	Unknown	4	0.088

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
NBS UO^2 Powder Standard in (packaging not listed - probably poly bottle) in sealed stainless steel can.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	LEU	Other	P0/C1	Vault	Unknown	1	0.283

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Bulk UO^2 Powder in poly bottles in a sealed stainless steel can in tray/rack..

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				**FACILITY (Building or Location)** TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	LEU	Other	P0/C1	Vault	Unknown	1	0.204

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Bulk U^3O^8 Powder Standard in poly bottles in a sealed stainless steel can in tray/rack..

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location): TRA[illegible]			
				PARTITIONED AREA: [illegible] Storage [illegible]			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	[illegible]
Sources and Samples	LEU	Other	CVOM	Vault	Unknown	8	1[illegible]

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
$U^{3}O^{8}$ Powder Standard in sealed stainless steel can in a [illegible].

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				**FACILITY (Building or Location)** TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	LEU	Other	C1/D1	Vault	Unknown	2	5.035

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
UO² Powder Standard in a sealed stainless steel can in 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	Enriched	Other	C1/D1	Vault	Unknown	1	0.025

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
U3O8 Powder Standard in a sealed stainless steel can in 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples		Other	C1/D1	Vault	Unknown	1	0.025

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
U^3O^8 Powder Standard in sealed stainless steel can in a drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	Very Highly Enriched		C1/D1	Vault	Unknown	1	.025

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
U^3O^8 Powder Standard in a sealed stainless steel can in a drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	LEU	Other	C1/X1	Vault	Unknown	1	0.169

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
U^3O^8 NBS Powder in sealed stainless steel can in a 110 gallon, 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	LEU	Other	G1	Vault	Unknown	2	0.072

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
NBL Pellets Standards in glass screw lid.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	LEU	Other	C1	Vault	Unknown	1	0.008

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
PBF Pellets Standards in glass jar in a tray.

Describe material at risk, which constitutes a source term.
None.

	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
	Other	G1	Vault	Unknown	1	0.009

ences

intended protective function(s).
s jar.

ich constitutes a source term.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	Weapons	Other	G1	Vault	Unknown	1	0.009

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
PBF Pellets Standard in glass jar.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	LEU	Other	C1/D1	Vault	Unknown	4	4.03

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
PBF Ternary Pellet Standards used its stainless steel can in 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	LEU	Other	C1/D1	Vault	Unknown	1	0.058

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
LOFT Ternary Pellet Standards in sealed stainless steel can in 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL			FACILITY (Building or Location) TRA-621				
			PARTITIONED AREA: SNM Storage Vault				
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	LEU	Other	C1/X1	Vault	Unknown	1	1.03

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
LOFT UO^2 Pellet Standard in sealed stainless steel can in 110 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	LEU	Other	C1/D1	Vault	Unknown	4	14.125

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Loft UO^2 Pellet Standard in sealed stainless steel can in 55 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	LEU	Other	C1/X1	Vault	Unknown	1	0.549

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
PWR Pellet Standard sealed in a stainless steel can in 110 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	LEU	Other	C1/X1	Vault	Unknown	1	2.425

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
PNL UO^2 Pellet Standard in sealed stainless steel can in 110 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	LEU	Other	C1/D1	Vault	Unknown	1	0.049

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
PNL UO^2 Pellet in sealed stainless steel can in 55 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	Enriched	Other	C1/D1	Vault	Unknown	1	0.056

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
PBF Pellet Standard sealed in a stainless steel can in 55 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	Enriched	Other	C1/D1	Vault	Unknown	1	0.0[illegible]

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
PBF Pellet Standard in 55 gallon 6m drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	LEU	Other	C1/D1	Vault	Unknown	2	0.936

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
BWR Pellet Standard in 55 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	LEU	Other	D1	Vault	Unknown	4	12.57

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Sintered Pellet Standards(inner package unknown) in stainless steel can in 55 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Sources and Samples	LEU	Other		Vault	Unknown	4	5.289

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
UO^2 Pellet Standards (inner package unknown - glass bottle?) in stainless steel can in 55 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-6[illegible]
	PARTITIONED AREA: SNM Storage Vau[illegible]

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Ma[illegible] (k[illegible]
Sources and Samples	LEU	Other	None	Vault	Unknown	2	0.0[illegible]

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
U-metal Brick Standard in tray/rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Process Residues	LEU	Other	C1/X1	Vault	Unknown	1	1.680

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
UO^2 Sludge and Met Mounts in sealed stainless steel can in 110 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621 PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mas (kg
Process Residues	LEU	Sludge	C1/D1	Vault	Unknown	1	0.41

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
UO^3 Sludge in stainless steel can in 55 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Oxide	LEU	Pure Oxides	C1/X1	Vault	Unknown	1	0.127

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
PBF UO^2 Ternary Pellets in stainless steel can in 55 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Oxide	LEU	Pure Oxides	C1/D1	Vault	Unknown	1	0.046

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
PWR Pellets in stainless steel can in 55 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

ITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
laterial Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
)xide	LEU	Pure Oxides	C1/D1	Vault	Unknown	1	0.284

umulative Inventory Differences
0000

escribe packaging and its intended protective function(s).
intered Pellets in stainless steel can in 55 gallon 6M drum

escribe material at risk, which constitutes a source term.
one.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Oxide	LEU	Other (specify)	C1/X1	Vault	Unknown	1	0.044

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
PBF Scrap (Pellets) in stainless steel can in 55 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Oxide	LEU	Other (Specify)	C1/D1	Vault	Unknown	1	0.003

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Scrap (depleted pellets) in stainless steel can in 55 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Oxide	Enriched	Pure Oxides	V5/D2	Vault	Unknown	1	0.078

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
PBF Ternary Powder in "pink" 6" PIPE nipple (cupped) in 30 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

ITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
laterial Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
›xide	Enriched	Pure Oxides	V5/D2	Vault	Unknown	1	0.076

umulative Inventory Differences
0000

escribe packaging and its intended protective function(s).
3F Ternary Powder in "pink" 6" PIPE nipple (cupped) in 30 gallon 6M drum.

escribe material at risk, which constitutes a source term.
one.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mas (kg
Oxide	Enriched	Pure Oxides	V5	Vault	Unknown	1	0.22

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Ternary Powder in pipe nipple in tray/rack.

Describe material at risk, which constitutes a source term.
None.

TE: INEL				FACILITY (Building or Location) TRA-621			
				PARTIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
aterial Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
(ide	LEU	Pure Oxide	C1/X1	Vault	Unknown	1	0.065

mulative Inventory Differences
000

scribe packaging and its intended protective function(s).
)[8] Powder in sealed stainless steel can in 110 gallon 6M drum.

scribe material at risk, which constitutes a source term.
ne.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SMW Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Ma (k
Oxide	Depleted	Pure oxide	C1/D1	Vault	Unknown	1	0.

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Depleted U^3O^8 in stainless steel can in 55 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Oxide	LEU	Other (specify)	C1/D1	Vault	Unknown	1	0.022

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
UO[2] LOFT H Scrap in 55 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

EL

Question 3: HEL

Form	Grade of HEU	Material Form Description
	Depleted	Pure oxide

ive Inventory Differences

e packaging and its intended prot

U^3O^8 in stainless steel can in 55 ga

e material at risk, which constitu

;ITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

laterial Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Jnknown	Weapons	Metal Alloys	C1/X1	Vault	Unknown	3	0.089

:umulative Inventory Differences
.0000

)escribe packaging and its intended protective function(s).
'lux Wires in sealed stainless steel can in 110 gallon 6M drum.

)escribe material at risk, which constitutes a source term.
lone.

:: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

terial Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
de	LEU	Other (specify)	X1	Vault	Unknown	2	0.574

mulative Inventory Differences
000

scribe packaging and its intended protective function(s).
3F Scrap in "Bottles" (type not listed, most likely glass [pellets]) in stainless steel 55 gallon 6M drum.

escribe material at risk, which constitutes a source term.
one.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Unknown	Weapons	Metal Alloys	C1/X1	Vault	Unknown	3	0.089

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Flux Wires in sealed stainless steel can in 110 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

ITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Metal	Weapons	Metal Alloys	None	Vault	NA	1	0.00[illegible]

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
UALX Lead Wire in tray/rack.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Unknown	Depleted	Unknown	None	Vault	NA	1	0.001

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Wires in tray/storage rack.

Describe material at risk, which constitutes a source term.
None.

	FACILITY (Building or Location) TRA-621				
	PARTITIONED AREA: SNM Storage Vault				
tion 3: HEU Holdings and Packaging					
ial n ption	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Alloys	None	Vault	NA	8	0.012

d protective function(s).

istitutes a source term.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Unknown	Depleted	Unknown	None	Vault	NA	1	0.003

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Collimator (depleted) in a tray.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location) TRA-621
	PARTITIONED AREA: SNM Storage Vault

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Unknown	Weapons	Unknown	Unknown	Vault	Unknown	1	0.00[illegible]

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
Brass Capsule in a tray.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL				FACILITY (Building or Location) TRA-621			
				PARTITIONED AREA: SNM Storage Vault			
Question 3: HEU Holdings and Packaging							
Material Form	**Grade of HEU**	**Material Form Description**	**Packaging Types**	**Location**	**Range of Age**	**No. of Packages**	**Mass (kg)**
Unknown	Weapons	Unknown	D2	Vault	Unknown	4	0.351

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).
ARMF Capsule in a 30 gallon 6M drum.

Describe material at risk, which constitutes a source term.
None.

SITE: INEL	FACILITY (Building or Location): TRA-621
	PARTITIONED AREA: Inspection/Staging/Assay Areas

Question 4: POTENTIAL CAUSES

Facility	Material	External
[ ] Process Material Transfer	[ ] Aging	[ ] Fire
[ ] Inadvertent Transfers	[ ] Container Seal Degradation	[ ] Explosion
[ ] Aging/Degradation	[ ] Pressurization	[Y] Earthquakes
[ ] Equipment Failure	[Y] Pyrophoricity	[ ] Subsidence
[ ] Change in Mission	[ ] Radioactivity	[ ] Winds
[ ] Other Collocated Hazards	[ ] Chemical Reactivity	[ ] Floods
[ ] Corrosion/Embrittlement	[ ] Radiolysis	[ ] Extreme Temperature
[ ] Inadequate Configuration Knowledge	[ ] Volumetric Expansion	[ ] Snow
[ ] Combustible Loading	[ ] Oxidation	[ ] Ash Loading
[ ] Inadequate Seals	[ ] Flammability	[ ] Aircraft Crash
[ ] Water Sources	[ ] Toxicity	[ ] Vehicle Accident
[ ] Inadequate Drains	[ ] Hydroloysis	[ ] Onsite Transporation
[ ] Preventive Maintenance Failure	[ ] Crystallization	[ ] Adjacent Facility Accident
[ ] Administrative Control	[ ] Other - Specify	[ ] Other-specify
[Y] Human Error		
[ ] Chemical Reactions		
[ ] Contamination		
[ ] Inadequacy of Design Basis		
[ ] Design Deficiency		
[Y] Flooding		
[Y] Fire		
[ ] Other SAR Accidents		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): TRA-621
	PARTITIONED AREA: Inspection/Staging/Assay Areas

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

FACILITY

Human Error: A fuel handler's error could lead to the inadvertant stacking of a critical mass of fuel in the vault area.

Consequences - None: Due to training, administrative controls, experience. Event would require a double contingency before it could happen.

Flooding: (1) The firewater system either actuates spuriously, or a pipe rupture leads to firewater system flow in the vault area.
(2) A failure of the Mackay Dam, at the time of failure there is sufficient amount of fuel in the lab/assay area to attain criticality under the right conditions. The flood provdies both a source of moderation, and a motive force for rearranging the fuel into a critical geometry.

Consequences - None: Considered extremely unlikely because the only water supply to the NMIS is the automatic sprinklers and the restroom. External flooding is unlikely due to terrain, flood dikes, flooding zones which have constructed, and building design. Event would require a violation of a double contingency before it could happen.

Fire: Failure of electrical system components.

Consequences - None: Considered extremely unlikely because structure is primarily steel and concrete, materials handled are essentially nonflammable. Volume of combustible materials is administratively controlled. Event would require a double contingency before it could happen.

MATERIAL

Phrophoricity: Powders stored in the facility are capable of spontaneous combustion.

EXTERNAL

Earthquakes: (1) With fuel stacked on the floor, flooding caused by an earthquake could provide the moderation needed for criticality.
(2) CAM is not seismically mounted, could lose power and fail.
(3) CAM, Storage Boxes, etc., could become moving objects.

SITE: INEL

FACILITY (Building or Location): TRA-[illegible]

PARTITIONED AREA: Inspection Staging/Storage Area

Question 15: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[ ] Criticality	[ ] Loss of [illegible]
[ ] Explosion	[ ] Material Release	[ ] Loss of [illegible]
[ ] Contamination	[ ] Breach of Packaging	[ ] Release of [illegible]
[ ] Criticality	[Y] Fire	[ ] Radiation and Release [illegible]
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[ ] Structural Failure		
[Y] Equipment Failure		
[ ] Material Release		
[ ] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): TRA-621
	PARTITIONED AREA: Inspection/Staging/Assay Areas

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

FACILITY

CAM is not seismically mounted. Could lose power and fail.

Moving objects (CAM, Storage Boxes, etc.) could damage Fire Suppression Control System.

MATERIAL

Pyrophoricity: When powders are being handled in the fume hood spontaneous combustion may occur.

SITE: INEL	FACILITY (Building or Location):TRA-621
	PARTITIONED AREA: Inspection/Staging/Assay Areas

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Other - specify (Facility)									

Explanation

CAM Failure: In the event of an earthquake, all fuel is adminstratively required to be placed in approved storage.

Pyrophoricity: None, handling requirements, administrative controls, and packaging prevent this event from occurring.

EXTERNAL

None, considered extremely unlikely because building and vault adequately designed. Building conforms to the applicable Uniform Building Code.

Applicable References

NMIS SAR-002.

SITE: INEL	FACILITY (Building or Location):TRA-621
	PARTITIONED AREA: Inspection/Staging/Assay Areas

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Other - specify (Facility)									

Explanation

Fire Suppression Control System: The fusible heads will activate without outside power or controls.

Applicable References

NMIS SAR-002.

SITE: INEL	FACILITY (Building or Location):TRA-621 PARTITIONED AREA: SRM Storage Vault

Question 6: POTENTIAL CONSEQUENCES

Effect	Worker			Environment			Public		
	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury

Explanation

Applicable References

SITE: INEL	FACILITY (Building or Location)	Advanced Test Reactor
	FUNCTION:	ATR Core Research

Question 1: SITE

DOE Headquarters Facility Landlord: EM
DOE Headquarters Program Sponsor: EM
Design Life: 0
Facility Age: 32

Location of Facility on Site and Distance to Site Boundary

The ATRC is located in Building 670 of the Test Reactor Area (TRA), which is located within the INEL. The ATRC is located in the west side of the ATR Building, TRA-670. The walls of the ATRC bay are either pumice block, concrete, or aluminum. The north and east walls are pumice block, the south wall is either concrete or pumice block, and the west wall is rubbed aluminum insulation sandwich. The distance to the nearest site boundary is 10.53 km.

Design Mission, Interim Mission, Current Use

The ATRC is used to obtain accurate and timely data on nuclear characteristics of the ATR core, such as rods, worths and calibrations, excess reactivities, neutron flux distributions, gamma-heat generation rates, fuel loading requirements, and effects of insertions and removal of experiments. The ATRC is operational as necessary to support the ATR Test Plan.

Operational Status

Operating

Historical Information

The ATRC has had no Occurrence Reports (OR) caused by the HEU it contains. There have been some caused by equipment failures in the past. Reference ORs ID-EG-TRACF-1990-0002; ID-EG-TRACF-1990-0003; ID-EG-TRACF-1990-0004; ID-EG-TRACF-1990-0006; ID-EG-TRACF-1992-0002; ID-EG-TRACF-1992-0003; ID-EG-TRACF-1994-0001; ED-EG-TRACF-1995-0001. The USQ process is used in the facility, and no USQ Screens or Determinations have resulted in identification of USQ. There are no Defense Nuclear Facility Safety Board (DNFSB) concerns with the facility.

SITE: INEL	FACILITY (Building or Location)	Advanced Test Reactor
	FUNCTION:	ATR Core Research
Question 1: SITE		

List Authorization Basis

The authorization basis for the ATRC is the "ATRC Safety Analysis Report and Technical Specifications" and its references. The current issue is number 007, issued 9/8/93. This document is reviewed and updated every five years. An implementation plan requesting exemption from DOE Orders 5480.22 and 5480.23 has been prepared and submitted to the contractor Safety Analysis Committee for review and submission to the DOE for approval. The Basis for Interim Operaton provides the basis for exemption.

Describe Important or Unique Design Features

The ATRC is located in the west side of the ATR Building, TRA-670. The walls of the ATRC bay are either pumice block, concrete, or aluminum. The north and east walls are pumice block, the south wall is either concrete or pumice block, and the west wall is ribbed aluminum insulation sandwich. The ATRC bay floor is built of reinforced concrete and will withstand a floor loading of 1000 pounds per square foot. The ATRC reactor is a very low power, pool type reactor, located in a section of the ATR canal. An aluminum bulkhead separates the ATRC from the main ATR canal. The ATRC canal is 10 feet wide, 28 feet long, and 21 feet deep. A nine foot section where the reactor is located is 24 feet deep. The bottom and walls of the canal in the vicinity of the reactor are five and six feet thick, respectively, and the canal parapet extends three feet above the main floor. The canal walls and floor are reinforced concrete with a welded stainless steel lining. Additionally, polyvinyl chloride water stops are provided in the concrete construction joints. A system of seepage drains is provided in the concrete behind the lining to locate leaks and prevent any pressure buildup behind the liner plates. Normal water level is approximately fourteen feet above the ATRC core, and reactor operation is administratively prohibited if level is less than twleve feet above the core.

The ATRC has an automatic fire alarm system comprised of a wet pipe sprinkler system and manual pull alarms. Automatic fire system are backed by the TRA Incident Response Team (IRT) and the INEL Fire Department at the Central Facilities Area (CFA). All criticality limits are purposely made conservative enough to provide protection from criticality in the event of fire fighting activities which could introduce sprays or flooding. Fuels at the ATRC are either metallic or they are clad or canned, and contamination spread from fire fighting activities would be minimal.

Air and heat to the ATRC are provided by a system (HVS-2) separate from other systems in the ATR building. The equipment, located in the heating and ventilating room on the first mezzanine level in the southwest corner of the building consists of a filtering system, a waste heat recovery hot water coil, electric heaters, and a supply fan. Design and construction of the hot water coil and the electric heaters was controlled by codes and standards such as American National Standards Institute Power Piping Code (ANSI B31.1), the National Electrical Manufacturers Association Standards (NEMA), the National Electric Code (NEC), and American Society of Heating, Refrigeration, and Air Conditioning Engineering Standards. The ventilation system allows for four air changes per hour. In the summe 100 percent outside air is fumished. A roof ventilator exhausts the air supplied to the ATRC bay. In the winter, the roof ventilator is closed and the air is recirculated. Because the ATRC system is outside the ATR confinement volume, no special dampers are require The roof ventilator and exhause fans are controlled by operation of the supply fan. When the supply fan is off, the ventilator and exha fans are also off. An interlock with the ATRC constant air monitor (CAM) will shut down the system in the event of high airborne activit However, the radiation monitoring interlock may be bypassed at the Health Physics monitoring panel to allow an operator to ventilate t building, conditions permitting.

Written procedures for criticality control are in effect as required by DOE-ID 5480.5. The control methods are use of neutron absorber spacing, and mass limits. Cadmium sheets are used to neutronically isolate storage positions in the storage and transport cabinets. Cadmium is also used in the underwater storage grid. Spacing limits are applied to the ATR fuel elements. The analytical basis for th spacing limits is that one element per storage rack position is subcritical and any array of less than 6 elements or one-layer array of le than 20 elements is subcritical. No other fissile material is allowed in close proximity to fuel elements in the hanging baskets or trans racks (linear one-layer array). Mass limits are applied to fissile material in unspecified configuration. These limits follow the accepted practice of being no more than 45 percent of the minimum critical mass, the limits being 365 g U-235 or 180 g for other fissile isotopes out of approved storage. All personnel working with fissile material are required to be formally trained and qualified as a fissile materi handler. The fissile material handling area has a criticality alarm as required by the above cited DOE order. The double contingency requirement for DOE-ID 5480.5A for the canal criticality controls is met by control of mass and spacing. The triple contingency requirement for the dry storage and mockup assembly area is met by control of mass, spacing and moderation.

The safe shutdown earthquake (SSE) defined for the TRA is one with Modified Mercalli Intensity VIII. As determined for the ATR, earthquakes are composed of a number of disturbances or shocks following in quick succession. The damaging shocks are usually preceded by foreshocks that are initially non-damaging but build to damaging levels of acceleration. Studies show that in general, shocks of 0.15 g to 0.21 g (Modified Mercalli VIII) occurred in the average time of one to six seconds after the foreshock. The seismic subsystem will drop the safety rods within 200 ms after sensing a non-damaging shock of 0.015 g. The safety rods will be fully inserted within 800 ms. To a very high probability, the expected result is that the reactor will be placed in a stable subcritical configuration before a damaging shock could occur.

There are no engineered safety features at the ATRC identified in the authorization basis documentation.

Describe Weaknesses in the Design Basis

There are no currently identified weaknesses in the ATRC.

Structural Design

Reinforced concrete

Partitioned Areas of HEU within facility

Canal

Fuel Storage Cabinet

Description of Partitioned Areas

Canal: The ATRC Canal is 10 feet wide, 28 feet long, and 21 feet deep. A nine foot section where the reactor is located is 24 feet deep. The bottom and walls of the canal in the vicinity of the reactor are five and six feet thick, respectively, and the canal parapet extends three feet above the main floor. The canal walls and floor are reinforced concrete with a welded stainless steel lining. Additionally, polyvinyl chloride water stops are provided in the concrete construction joints. A system of seepage drains is provided in the concrete behind the lining to locate leaks and prevent any pressure buildup behind the liner plates. (See Photo ATRC-1.)

Fuel Storage Cabinet: The storage cabinet allows storage of ATRC fuel, fuel assembly mockups, and miscellaneous material. (See Photo ATRC-2.)

Amount & Location of Hazardous Material Collocated or Commingled with HEU

The ATRC has two 80 gram, 5 curie plutonium/beryllium neutron sources used during reactor startups. The sources are in seal-welded canisters located near the reactor on a drive system which allows the sources to be moved near and from the reactor core as needed. Approximately 100 pounds of cadmium are used as a neutron absorber in the reactor's safety rods, which are used for quick shutdown of the reactor. The reactor is surrounded by a neutron reflector, which consists of approximately 10,000 pounds of beryllium. The ATRC fuel storage cabinet has cadmium sandwiched between polyethylene and masonite.

Process Material Transfers

Material transfers to and from the ATRC are very infrequent, mostly consisting of transferring the core fuel loading to the TRA NMIS for storage when it is necessary to load the ATRC with ATR fuel. This normally only occurs during an ATR core internals changeout, which occurs every six to seven years. The transfer is accomplished by removing the fuel elements from the reactor core, placing them in a criticality safe rack for drying, then placing in an approved, criticality safe, ATR fuel element shipping box. A forklift is used to transport the shipping boxes to and from the NMIS. The number of fuel elements out of storage is limited to two (a shipping box is considered approved storage), and the number of shipping boxes in the facility limited to a maximum transport index of 50. After the entire ATRC fuel loading is in storage at the NMIS, the fuel to be loaded in the ATRC is shipped from the NMIS to ATRC by reversing the above procedure. Transfer of ATR fuel from ATRC to ATR is accomplished by hand carrying fuel elements from ATRC to ATR (maximum of two fuel elements at a time).

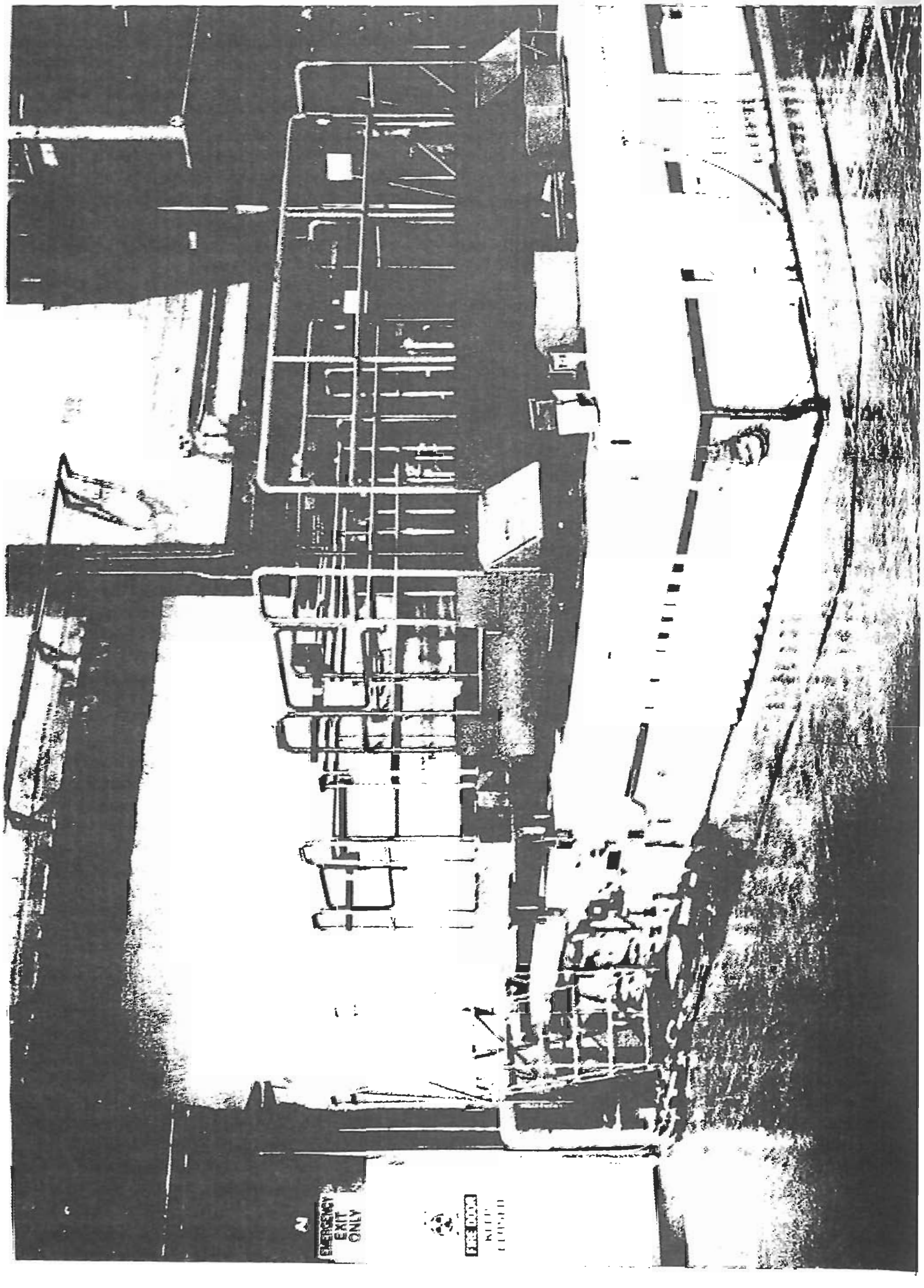


Photo ATRC-1: Canal

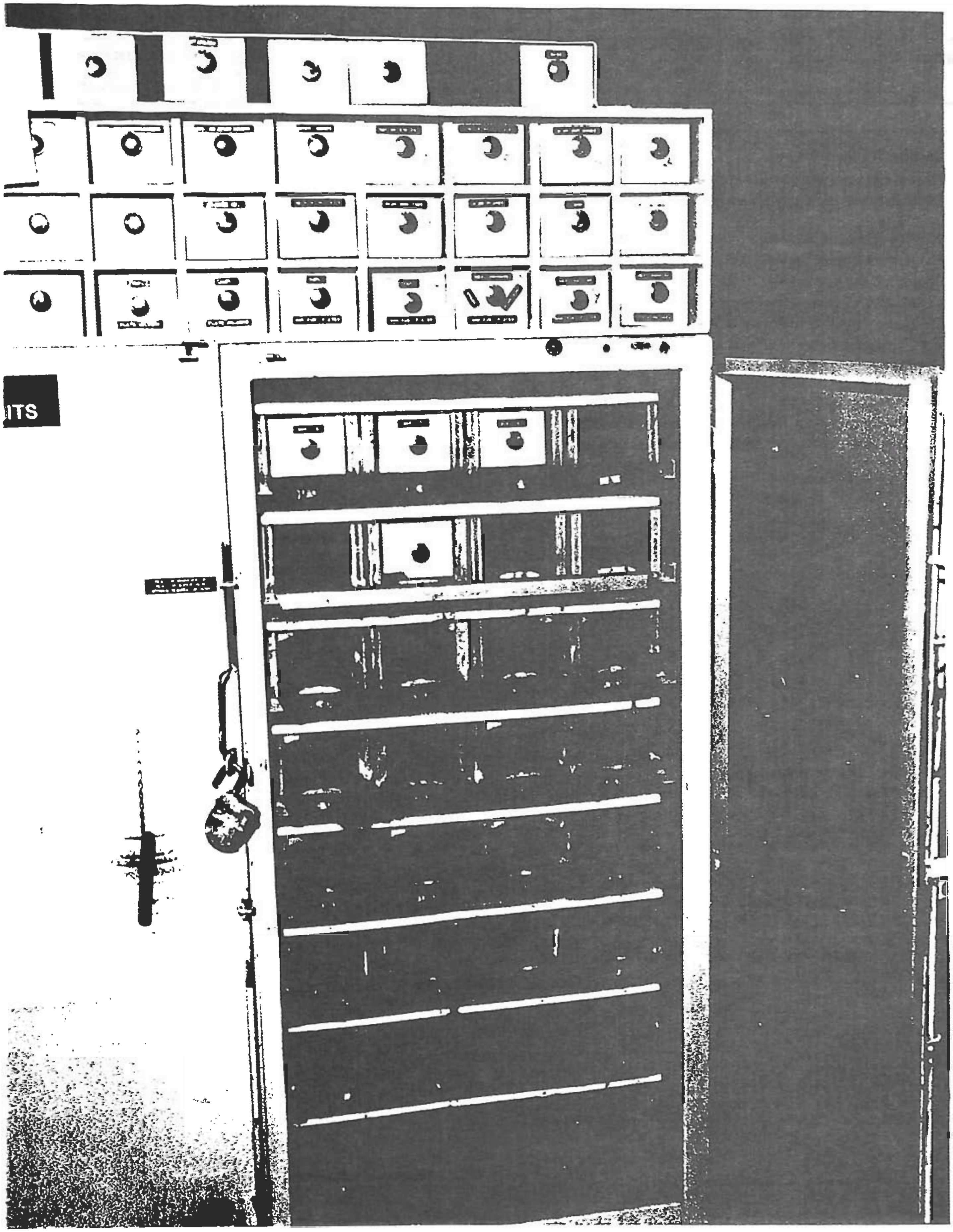


Photo ATRC-2: Fuel Storage Cabinet

SITE: INEL	FACILITY (Building or Location) Advanced Test Reactor
	FUNCTION: ATR Core Research
Question 1: SITE	

On-Site Transportation

The on-site transfers of HEU from the ATRC to the NMIS is performed by ATRC operations and NMIS operations, with assistance from Security, maintenance organization, and Safeguards personnel.

Staff Levels & Experience

The current staff at the ATRC consists of the Reactor Manager, two Reactor Supervisors (equivalent to Senior Reactor Operator), and one trainee. The Reactor Manager is a certified Shift Supervisor on the ATR (and Reactor Operator on the ATRC) with 15 years experience in reactor operations. One Reactor Supervisor has 16 years experience in the operation of ATRC and the other criticality facilities. The other Reactor Supervisor is a certified Senior Reactor Operator on the ATR, and has 13 years experience in reactor operations. The trainee is a certified reactor operator on the ATR and has nine years experience in reactor operations.

Applicable References

ATRC Safety Analysis Report and Technical Specifications, Issue 007, dated 9/9/93.

Hazards Assessments for Facilities located at the Test Reactor Area, Revision 4, published August 1995

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor
	PARTITIONED AREA: Canal

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality [1,2]	Administrative Barrier[3]
[ ] Gloveboxes	[ ] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[Y] HVAC/Confinement	[ ] Double Contingency Not Applied (specify)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike	(e.g., Mass	[Y] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines	Absorbers	[Y] Configuration Control
[ ] Vault	[ ] Canyons	Geometry	[ ] Quality Assurance
[ ] Room	[ ] Pads	Interaction	[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary	Concentration	[Y] Authorization Basis
[ ] Hood	[ ] Trenches	Moderation	[Y] Training
[ ] Piping	[ ] Storage Vault	Enrichment	[Y] Organization
[Y] Shielding	[Y] Fire Suppression	Reflection	[Y] Lessons-Learned
[Y] Distance	[Y] Alarm System	Volume)	[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[Y] Protective Clothing			[Y] Records
[ ] Remote Handling			[Y] Standards
[ ] Confinement System			[ ] External Regulation
[ ] Burial Ground			[Y] Surveillance
[ ] Tanks			[Y] Personnel Reliability Assurance Program
[Y] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[Y] Emgergency Response
[ ] Other-specify			[ ] Other-specify
[ ] None			

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor
	PARTITIONED AREA: Canal
Question 2: BARRIER TYPES	

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Alarm System: Two gamma radiation monitors and a constant air monitor are required for fuel handling in the reactor core. The criticality alarm system is required whenever there are more than 700 g of U-235 or 450 g of any combination of U-235, U-233, or plutonium stored at the facility (reactor core not included)

Shielding/Distance: The ATRC reactor is located on the bottom of the ATRC canal, under at least 12 feet (normally 14 feet) of water. The reactor is not operated with less than 12 feet of water above the core.

Protective Clothing: Anti-C clothing is required by the ATRC radiological work permit when working with fuel elements. Anti-C clothing consists of Anti-Cs, cotton liner gloves, two sets of gloves (one surgical and one latex or two latex), three sets of booties, hood, and a fast track dosimeter. All openings are taped shut.

Public/Environment Barrier Narrative:

HVAC: The ATRC ventilation interlock with the ATRC constant air monitor will shut down the ventilation system in the event of high airborne activity, limiting release from ATRC to the environment.

Fire Suppression: The ATRC has an automatic fire alarm system comprised of a wet pipe sprinkler system and manual pull alarms. Automatic fire systems are backed by the TRA IRT and the INEL Fire Department at CFA. All criticality limits are purposely made conservative enough to provide protection from criticality in the event of fire fighting activities which could introduce sprays or flooding. Fuels at the ATRC are either metallic or they are clad or canned, and contamination spread from fire fighting activities would be minimal

Site Boundary: The distance to the nearest site boundary is 10.53 km.

Alarm System: Two gamma radiation monitors and a constant air monitor are required for fuel handling in the reactor core. The criticality alarm system is required whenever there are more than 700 g of U-235 or 450 g of any combination of U-235, U-233, or plutonium stored at the facility. (Reactor core not included.)

Criticality Barrier Narrative:

All fissile material handling in the ATRC shall be by or under the direct supervision of certified (for fuel handling) ATRC personnel. The amount of fuel units outside of the fuel storage area or transfer equipment and reactor shall be as follows: (a) the maximum number of ATR fuel elements out of approved storage shall be two; in the ATRC canal, fuel elements shall be separated by at least 30.5 cm (12 in.) from other fuel, except as required for placement in approved storage; in the air, the fuel elements shall be separated by at least 12 feet from other fuel that is outside of the ATRC fuel storage cabinet, except as required for placement in approved storage; in the handling area, except the canal, during handling there shall be no immersion in water of a fuel element, except as required for loading or unloading an approved shipping container.

Alarm systems are in place and while they are not criticality barriers, they do not help mitigate the potential consequences of an accident. Two gamma radiation monitors and a constant air monitor are required for fuel handling in the reactor core. The criticality alarm system is required whenever there are more than 700 g of U-235 or 450 g of any combination of U-235, U-233, or plutonium stored at the facility. (Reactor core not included.)

Criticality in the underwater storage grid is prevented by design of the grid and limiting the number of fuel elements to 24 by covers installed over alternate rows of the grid.

Administrative Barrier Narrative:

Procedures: All fuel handling is performed by operating procedures.

Material Limits: Limits of material out of storage in the facility are detailed in the ATRC TSs, and incorporated in the operating procedures.

Monitoring: Permanently installed radiation monitoring is utilized, and RCT monitoring used when required by the radiological work permit.

Configuration Control: Configuration of material in the ATRC is limited by the design of the core and storage grid.

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor
	PARTITIONED AREA: Canal

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Conduct of Operations: The LITCO Conduct of Operations manual is implemented in ATRC.

Authorization Basis: The ATRC authorization basis is current and approved. A Basis for Interim Operation has been submitted and is pending approval.

Training: ATRC training is required and completed IAW 5480.20A.

Organization: ATRC organization is specified in the ATRC Technical Specifications (TS).

Lessons Learned: The ATR operations required reading program includes lessons learned. Also there is a site Lessons Learned program.

Records: Log keeping and procedure use and storage is delinated by the Conduct of Operations Manual and ATRC Standing Directives.

Standards: Systems are designed and maintained to applicable standards, e.g., ASME, ANSI, NEC, etc.

Surveillance: Facility surveillances are described by the ATRC TSs and implemented by and documented by log keeping and operating/maintenance procedures.

PRAP: ATRC personnel are HRP/PSAP participants.

Worker/Access: Access to the ATRC is limited by the requirements of the ATRC Security Plan.

Emergency Response: The ATRC utilizes an Emergency Procedure Network and Abnormal Operating Procedures to guide actions during emergency/abnormal conditions.

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor
	PARTITIONED AREA: Fuel Storage Cabinet

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality[1,2]	Administrative Barrier[3]
[ ] Gloveboxes	[ ] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[Y] HVAC/Confinement	[ ] Double Contingency Not Applied (specify)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike	(e.g., Mass	[Y] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines	Absorbers	[Y] Configuration Control
[ ] Vault	[ ] Canyons	Geometry	[ ] Quality Assurance
[ ] Room	[ ] Pads	Interaction	[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary	Concentration	[Y] Authorization Basis
[ ] Hood	[ ] Trenches	Moderation	[Y] Training
[ ] Piping	[ ] Storage Vault	Enrichment	[Y] Organization
[ ] Shielding	[Y] Fire Suppression	Reflection	[Y] Lessons-Learned
[ ] Distance	[Y] Alarm System	Volume)	[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[ ] Protective Clothing			[Y] Records
[ ] Remote Handling			[Y] Standards
[ ] Confinement System			[ ] External Regulation
[ ] Burial Ground			[Y] Surveillance
[ ] Tanks			[Y] Personnel Reliability Assurance Program
[Y] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[Y] Emgergency Response
[ ] Other-specify			[ ] Other-specify
[ ] None			

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor
	PARTITIONED AREA: Fuel Storage Cabinet

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Alarm System: The criticality alarm system is required whenever there is more than 700 g of U-235 or 450 g of any combination of U-235, U-233 or plutonium stored at the facility (reactor core not included). Constant air monitor is operating with its ventilation interlock operational.

Public/Environment Barrier Narrative:

HVAC: The ventilation interlock constant air monitor will shut down the ventilation system in the event of high airbome activity, limiting release to the environment.

Fire Suppression: There is an automatic fire alarm system comprised of a wet pipe sprinkler system and manual pull alarms. Automatic fire systems are backed by the TRA IRT and the INEL Fire Department at CFA. All criticality limits are purposely made conservative enough to provide protection from criticality in the event of fire fighting activities which could introduce sprays or flooding. Fuels are either metallic or they are clad or canned, and contamination spread from fire fighting activities would be minimal.

Site Boundary: The distance to the nearest site boundary is 10.53 km.

Alarm System: Two gamma radiation monitors and a constant air monitor are required for fuel handlingin the reactor core. The criticality alarm system is required whenever there are more than 700 g of U-235 or 450 g of any combination of U-235, U-233 or plutonium stored at the facility. (Reactor core not included.)

Criticality Barrier Narrative:

All fissile material handling shall be by or under the direct supervision of certified (for fuel handling) ATRC personnel. The amount of fuel units outside of the fuel storage area or transfer equipment and reactor shall be as follows: (a) the maximum number of ATR fuel elements out of approved storage shall be two; in the ATRC canal, fuel elements shall be separated by at least 30.5 cm (12 in) from other fuel, except as required for placement in approved storage; in air, the fuel elements shall be separated by at least 12 feet from other fuel that is outside of the ATRC fuel storage cabinet, except as required for placement in approved storage; in the handling area, except the canal, during handling there shall be no immersion in water of a fuel element, except as required for loading or unloading an approved shipping container. Transfer of fissile material to or from the ATRC when the amount exceeds 180 g (365 g if only U-235) shall be coordinated through the ATR shift supervisor. The limit of fuel components, test samples and experiments out of approved storage shall not exceed 180 g of fissile material (365 g if only U-235 is present). Storage of DOT approved shipping containers is permitted in the ATRC provided: (a) these shipping containers are located at least three feet from the fuel storage cabinet; (b) the transport index of all shipping containers does not exceed 50 (49 CFR parts 100 to 177); (c) the containers are covered to prevent water intake in the event of sprinkler system actuation. The staff for fuel handling shall consist of at least two people, one of whom shall be a reactor supervisor and the other shall be either another reactor supervisor or a reactor operator. All fuel handling shall be performed by approved operating procedures.

The storage cabinet contains 64 storage positions, with .01 inch of cadmium sandwiched on the top and bottom of each shelf. Analysis shows the cabinet to be subcritical for all degrees of moderation.

Administrative Barrier Narrative:

Procedure: All fuel handling is performed by operating procedures.

Material Limits: Limits of material out of storage in the facility are detailed in the ATRC TSs, and incorporated in the operating procedures.

Monitoring: Permanently installed radiation monitoring is utilized, and RCT monitoring used when required by the radiological work permit.

Configuration Control: Configuration of material in the ATRC is limited by the design of the core and storage grid.

Conduct of Operations: The LITCO Conduct of Operations Manual is implemented in ATRC.

Authorization Basis: The ATRC authorization basis is current and approved. A Basis for Interim Operation (BIO) has been submitted and is pending approval.

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor
	PARTITIONED AREA: Fuel Storage Cabinet

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Training: ATRC training is required and completed IAW 5480.20A.

Organization: ATRC organization is specified in the ATRC Technical Specifications (TS).

Lessons Learned: The ATR operations required reading program includes lessons learned. Also there is a site Lessons Learned Program.

Records: Log keeping and procedure use and storage is delineated by the Conduct of Operations Manual and ATRC Standing Directives.

Standards: Systems are designed and maintained to applicable standards, e.g., ASME, ANSI, NEC, etc.

Surveillance: Facility surveillances are described by the ATRC TSs and implemented by and documented by log keeping and operating/maintenance procedures.

PRAP: ATRC personnel are HRP/PSAP participants.

Worker/Access: Access to the ATRC is limited by the requirements of the ATRC Security Plan.

Emergency Response: The ATRC utilizes an Emergency Procedure Network (EPN) and Abnormal Operating Procedures (AOPs) to guide actions during emergency/abnormal conditions.

SITE: INEL	FACILITY (Building or Location) Advanced Test Reactor
	PARTITIONED AREA: Canal

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor fuel	Weapons	Slightly irradiated		Other-specify Reactor Core	34 years	40	41.810

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

The ATRC HEU inventory consists of 40 assembled fuel elements.

A fuel element consists of 19 parallel, curved, aluminum fuel plates mechanically attached to two side plates, forming a 45-degree sector of a right circular cylinder.

Describe material at risk, which constitutes a source term.

Highly enriched ATRC Fuel.

SITE: INEL	FACILITY (Building or Location) Advanced Test Reactor PARTITIONED AREA: Fuel Storage Cabinet

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mas (kg)
Reactor fuel	Weapons	Targets	W2	Other-specify Storage Cabinet	34 years	126	0.5

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

The small amounts of HEU in the fuel storage cabinet are in wooden cells, with cadmium between all cells. Within the cells, the material is in wood drawers.

Describe material at risk, which constitutes a source term.

Highly enriched ATRC fuel

SITE: INEL	FACILITY (Building or Location) Advanced Test Reactor
	PARTITIONED AREA: Fuel Storage Cabinet

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Metal	Weapons	Alloys	G1	Other-specify Storage Cabinet	>2 years	3	0.0100

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

The small amounts of HEU in the fuel storage cabinet are in wooden cells, with cadmium between all cells. Within the cells, the material is in wood drawers, with the smaller components packaged in glass. (The metal, flux wires, are stored in the cabinet in three 35 ml glass bottles with plastic screw on caps.)

Describe material at risk, which constitutes a source term.

Highly enriched ATRC fuel.

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor PARTITIONED AREA: Canal

Question 4: POTENTIAL CAUSES

Facility	Material	External
[ ] Process Material Transfer	[ ] Aging	[ ] Fire
[ ] Inadvertent Transfers	[ ] Container Seal Degradation	[ ] Explosion
[ ] Aging/Degradation	[ ] Pressurization	[Y] Earthquakes
[ ] Equipment Failure	[ ] Pyrophoricity	[ ] Subsidence
[ ] Change in Mission	[ ] Radioactivity	[ ] Winds
[ ] Other Collocated Hazards	[ ] Chemical Reactivity	[ ] Floods
[ ] Corrosion/Embrittlement	[ ] Radiolysis	[ ] Extreme Temperature
[ ] Inadequate Configuration Knowledge	[ ] Volumetric Expansion	[ ] Snow
[ ] Combustible Loading	[ ] Oxidation	[ ] Ash Loading
[ ] Inadequate Seals	[ ] Flammability	[ ] Aircraft Crash
[ ] Water Sources	[ ] Toxicity	[ ] Vehicle Accident
[ ] Inadequate Drains	[ ] Hydroloysis	[ ] Onsite Transporation
[ ] Preventive Maintenance Failure	[ ] Crystallization	[ ] Adjacent Facility Acci
[ ] Administrative Control	[ ] Other - Specify	[ ] Other-specify
[Y] Human Error		
[ ] Chemical Reactions		
[ ] Contamination		
[ ] Inadequacy of Design Basis		
[ ] Design Deficiency		
[ ] Flooding		
[Y] Fire		
[ ] Other SAR Accidents		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor
	PARTITIONED AREA: Canal

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Human Error: Fuel handler errors could result in accumulation of a critical mass or damage to a fuel element/barrier, but this is not credible due to administrative and physical contingencies which would have to be violated.

Fire: Combustibles are at a minimum, and criticality limits are conservative enough to provide protection from criticality in the event of fire fighting activities.

Earthquake: The seismic subsystem will shutdown the reactor within one second of a nondamaging shock of 0.015 g.

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor
	PARTITIONED AREA: Fuel Storage Cabinet

Question 4: POTENTIAL CAUSES

Facility	Material	External
[ ] Process Material Transfer	[ ] Aging	[ ] Fire
[ ] Inadvertent Transfers	[ ] Container Seal Degradation	[ ] Explosion
[ ] Aging/Degradation	[ ] Pressurization	[Y] Earthquakes
[ ] Equipment Failure	[ ] Pyrophoricity	[ ] Subsidence
[ ] Change in Mission	[ ] Radioactivity	[ ] Winds
[ ] Other Collocated Hazards	[ ] Chemical Reactivity	[ ] Floods
[ ] Corrosion/Embrittlement	[ ] Radiolysis	[ ] Extreme Temperature
[ ] Inadequate Configuration Knowledge	[ ] Volumetric Expansion	[ ] Snow
[ ] Combustible Loading	[ ] Oxidation	[ ] Ash Loading
[ ] Inadequate Seals	[ ] Flammability	[ ] Aircraft Crash
[ ] Water Sources	[ ] Toxicity	[ ] Vehicle Accident
[ ] Inadequate Drains	[ ] Hydroloysis	[ ] Onsite Transporation
[ ] Preventive Maintenance Failure	[ ] Crystallization	[ ] Adjacent Facility Accid
[ ] Administrative Control	[ ] Other - Specify	[ ] Other-specify
[Y] Human Error		
[ ] Chemical Reactions		
[ ] Contamination		
[ ] Inadequacy of Design Basis		
[ ] Design Deficiency		
[ ] Flooding		
[Y] Fire		
[ ] Other SAR Accidents		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor
	PARTITIONED AREA: Fuel Storage Cabinet

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

Human Error: Fuel handler errors could result in accumulation of a critical mass or damage to a fuel element/barrier, but this is not credible due to administrative and physical contingencies which would have to be violated.

Fire: Combustibles are at a minimum and criticality limits are conservative enough to provide protection from criticality in the event of fire fighting activities.

Earthquake: The doors on the fuel storage cabinet are shut except during access. The quantity of HEU in the cabinet is below that required for criticality.

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor PARTITIONED AREA: Canal

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integrity
[ ] Contamination	[ ] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Criticality
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[Y] Structural Failure		
[Y] Equipment Failure		
[ ] Material Release		
[Y] Increased Radioactivity Level		
[ ] Other-specify		

06/04?

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor
	PARTITIONED AREA: Canal

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Structural Failure, Equipment Failure, Increased Radioactivity Level: In the event of a canal draining, the loss of moderator will result in a reactor shutdown (if operating). Worst case radiation levels could be 20 R/hr on the main floor immediately after the draining.

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor PARTITIONED AREA: Fuel Storage Cabinet

Question 5: POTENTIAL EFFECTS

Facility	Material	External
☐ Fire ☐ Explosion ☐ Contamination ☐ Criticality ☐ Leakage/Spills ☐ Other Accidents-specify ☐ Structural Failure ☐ Equipment Failure ☐ Material Release ☐ Increased Radioactivity Level ☐ Other-specify	☐ Criticality ☐ Material Release ☐ Breach of Packaging ☐ Fire ☐ Other-specify	☐ Loss of Site Integrity ☐ Loss of Building Integ ☐ Release of Materials ☐ Radiation and Releases from Critica

06

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor
	PARTITIONED AREA: Fuel Storage Cabinet

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

No potential effects were identified.

SITE: INEL	FACILITY (Building or Location): Advanced Test Reactor
	PARTITIONED AREA: Fuel Storage Cabinet

Question 6: POTENTIAL CONSEQUENCES

Effect	Worker			Environment			Public		
	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury

Explanation

No consequences were identified.

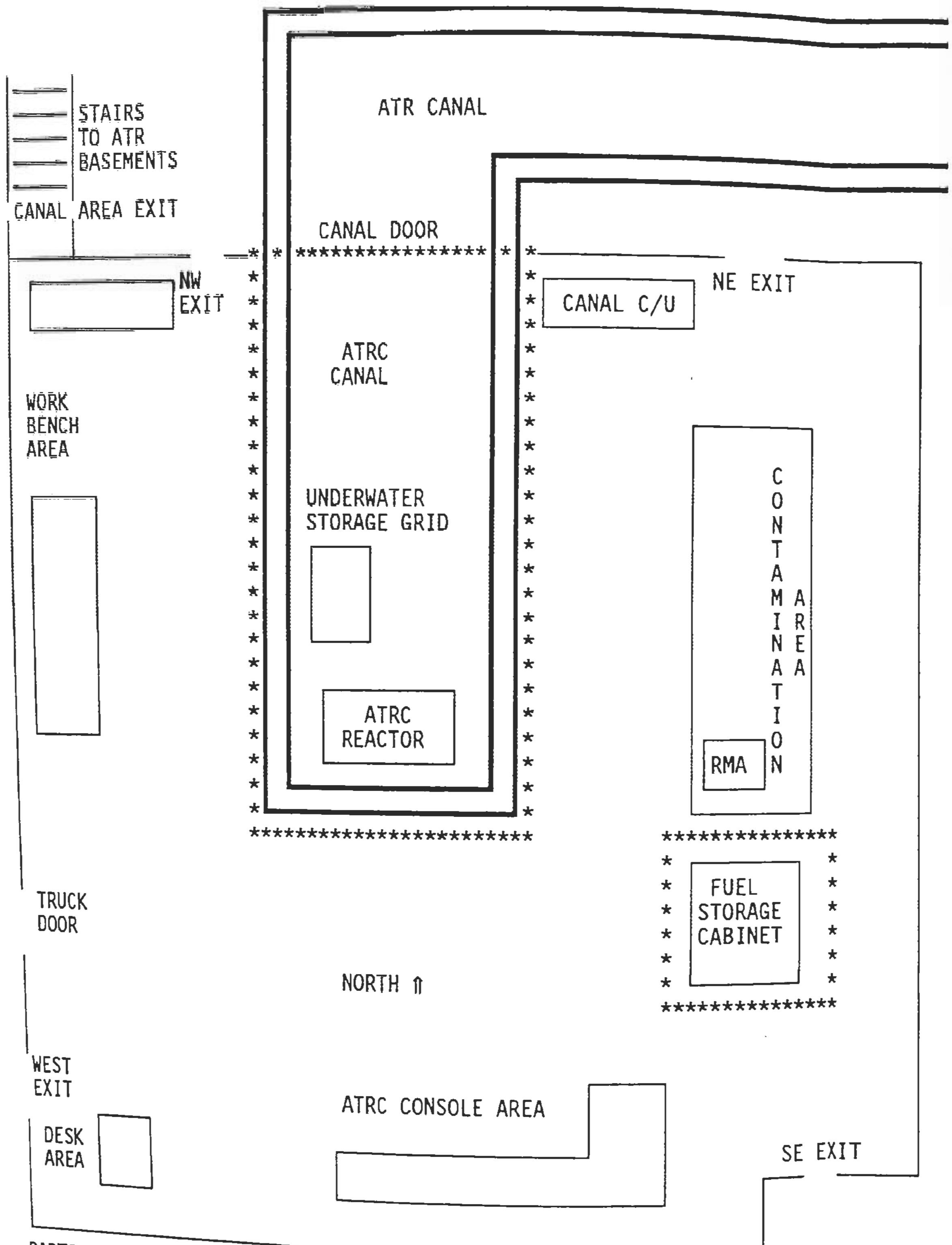
EXPLANATION FOR THE CANAL PARTITIONED AREA (Database would not generate a separate Question 6):

No consequences which are above the levels of concern exist.

SITE: INEL	FACILITY (Building or Location):Advanced Test Reactor PARTITIONED AREA: Fuel Storage Cabinet

Question 6: POTENTIAL CONSEQUENCES

Applicable References



PARTIONED AREAS MARKED WITH ******************

SITE: INEL	FACILITY (Building or Location) RWMC - ASB II #711
	FUNCTION: Waste Storage
Question 1: SITE	

Operational Status

Operating waste storage

Historical Information

There are no historical occurrence reports, or USQs, etc., involving the U-233 materials. In the original placement of other waste containers, a few incidents of container dropping during handling have occurred. However, the storage condition of the U-233 containers has been static since original placement. A "white paper" has been issued discussing the historical origin, potential safety issues, and proposed disposition of the material. This was issued under a cover letter L. C. VanDeusen letter to J. A. VanVliet, LCV-123-94, "U-233 Waste Stored at the Radioactive Waste Management Complex (RWMC)," December 1, 1994.

List Authorization Basis

The RWMC is operated under a DOE-approved safety analysis report, "Safety Analysis Report for the Radioactive Waste Management complex at the Idaho National Engineering Laboratory," INEL-94/0226, February 1995. This document was prepared to conform to the requirements of DOE Order 5480.23. An updated version, "Radioactive Waste Management Complex Safety Analysis Report (DRAFT)," INEL-94/0226 Rev.1, February 1996, is currently in DOE-ID review.

Describe Important or Unique Design Features

None.

Describe Weaknesses in the Design Basis

ASB II was originally only intended to be a temporary weather shield, until the container stack could be covered with soil. With the air support cover, the container stack is protected from wind, rain and snow, and from extreme temperature fluctuations. However, neither the stack nor the structure are seismically qualified, and severe high winds (tornadoes are extremely unlikely on the INEL) could deflate and collapse the air support building. Some unknown quantities of hazardous materials may exist in other waste containers in the stack.

Materials transfer operations are not a threat to the container stack until transfer of the containers is imminent, probably not for several years. At that time, transportation accidents (forklift operations, container dropping) may become an issue.

Structural Design

Other- specify air support structure

Partitioned Areas of HEU within facility

No partitioning applies

Description of Partitioned Areas

No partitioning applies.

Amount & Location of Hazardous Material Collocated or Commingled with HEU

The U-233 drums are in large stacks of transuranic (TRU) waste containers. There are presently approximately 6,200 waste containers in ASB II in 8 distinct stacks. The stacks containing the U-233 6M drums consist of a total of 1,629 waste containers. All of them contain TRU contaminated waste and some may contain other hazardous materials.

SITE: INEL	FACILITY (Building or Location) RWMC - ASB II #711
	FUNCTION: Waste Storage

Question 1: SITE

DOE Headquarters Facility Landlord: EM-36
DOE Headquarters Program Sponsor: EM-36
Facility Age: 6 Design Life:

Location of Facility on Site and Distance to Site Boundary

The Idaho National Engineering Laboratory (INEL) is about 70 km (45 miles) west of Idaho Falls, Idaho. The Radioactive Waste Management Complex (RWMC) is in the southwest part of the INEL, 5.6 km (3.5 miles) north of the INEL southern boundary, and km south of U.S. Highway 20.

The eastern half of the RWMC comprises the Transuranic Storage Area (TSA), where transuranic (TRU) contaminated waste is stored in large container stacks on asphalt pads. The waste on two of these pads has been covered with a layer of soil. The pads are divided into cells. Cell three of pad 2 was not covered with soil but has an air-support structure over it for protection of the waste container stacks. This structure is called ASB II.

Design Mission, Interim Mission, Current Use

Twelve DOT 6M drums containing U-233 in the form of fuel pellets and fuel rods are located in ASB II at the TSA (in a stack surrounded by hundreds of other TRU waste containers). The storage pad is composed of a 5- to 8-cm (2- to 3-in) thick asphalt surface on a compacted gravel base. It slopes across the width and has an approximately 1% slope along the length for liquid runoff. The pad is segmented into cells, with each cell containing a waste container stack. Upon completion of a cell, the container stack was covered with earth. The container stack in cell 3 on pad 2 was left uncovered and is now covered by ASB II.

The U-233 stored at the TSA at the RWMC originated from the Light Water Breeder Reactor program at Bettis Atomic Power Laboratory. The material has been declared transuranic waste by DOE, and handled and stored by RWMC this way since its receipt.

ASB II is currently in use as a waste storage facility. To comply with the RCRA Part B permit for the TSA, waste containers in ASB II will be transferred to newly erected, RCRA permitted, metal Butler-type buildings. The U-233 drums may not be transferred to this facility because of increased radiation levels. If so, a shielded storage location may have to be identified.

RWMC ASB II Photograph 1 shows the container stack in ASB II.
RWMC ASB II Photograph 2 shows a close-up of a U-233 6M drum.

SITE: INEL	FACILITY (Building or Location) RWMC - ASB II #711
	FUNCTION: Waste Storage

Question 1: SITE

Process Material Transfers
The facility is only used for waste storage. No process material transfers take place.

On-Site Transportation
Barrel handlers (forklifts with special barrel-handling adapters).

Staff Levels & Experience
Staffing levels and experience:
- 14 Fissile Material Handlers
- Average Experience - 22.8 Months
- Experience Range - 15 month to 24 months

Applicable References
Safety Analysis Report for the Radioactive Waste Management Complex at the Idaho National Engineering Laboratory" INEL-94/0226, February 1995.

"Radioactive Waste Management Complex Safety Analysis Report (DRAFT)," INEL-94/0226 Rev. 1, February 1996.

L. C. VanDeusen letter to J. A. VanVliet, LCV-123-94, "U-233 Waste Stored at the Radioactive Waste Management Complex (RWMC)," December 1, 1994.

"Hazard Assessment for Radioactive Waste Management Complex," INEL-94/0140, February 1996.

SITE: INEL	FACILITY (Building or Location): RWMC - ASB II #711
	PARTITIONED AREA: No partitioning applies

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]

- [ ] Gloveboxes
- [ ] Transfer System
- [ ] Duct
- [ ] Filter
- [ ] Vault
- [ ] Room
- [ ] Hot Cell/Canyon
- [ ] Hood
- [ ] Piping
- [ ] Shielding
- [ ] Distance
- [ ] Respiratory Protection
- [ ] Protective Clothing
- [ ] Remote Handling
- [Y] Confinement System
- [ ] Burial Ground
- [ ] Tanks
- [Y] Alarm System
- [ ] Temporary Barriers
- [Y] Other-specify material form
- [ ] None

Public/Environmental Barrier[2]

- [Y] Facility/Building Boundary
- [ ] HVAC/Confinement
- [ ] Liquid Containment/Dike
- [ ] Bay, Cells, Magazines
- [ ] Canyons
- [Y] Pads
- [Y] Site Boundary
- [ ] Trenches
- [ ] Storage Vault
- [Y] Fire Suppression
- [ ] Alarm System
- [ ] Other - Specify

Criticality[1,2]

- [ ] Double Contingency Applied
- [Y] Double Contingency Not Applied (specify)
  (e.g., Mass
  Absorbers
  Geometry
  Interaction
  Concentration
  Moderation
  Enrichment
  Reflection
  Volume)

Administrative Barrier[3]

- [Y] Procedure: Operation, Maint.
- [Y] Material Limits
- [Y] Monitoring
- [Y] Configuration Control
- [Y] Quality Assurance
- [Y] Conduct of Operations
- [Y] Authorization Basis
- [Y] Training
- [Y] Organization
- [Y] Lessons-Learned
- [ ] Testing
- [Y] Trending
- [Y] Records
- [ ] Standards
- [Y] External Regulation
- [Y] Surveillance
- [Y] Personnel Reliability Assurance Program
- [Y] Worker/Access Occupancy Limits
- [Y] Emergency Response
- [ ] Other-specify

1. Barriers between HEU and worker.
2. Barriers between HEU and public/environment.
3. Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.

SITE: INEL	FACILITY (Building or Location): RWMC - ASB II #711
	PARTITIONED AREA: No partitioning applies
Question 2: BARRIER TYPES	

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Confinement System:
The material is contained in U.S. Department of Transportation (DOT) specification 6M drums. The 6M drums consist of an outer stainless steel 55 gallon or 110 gallon drum, with the material stored in an inner DOT 2R inner container. The 2R container is an approximately 5-inch diameter carbon steel pipe with threaded pipe closure. It is centered in the outer container with the fiber board discs. The U-233 drums are surrounded by other waste containers and are not accessible without moving many other containers.

Other - the material is in the form of fuel pellets and fuel rods and is thus essentially non-dispersible.

Alarm System:
The atmosphere inside ASB II is monitored by alpha and beta/gamma CAMs.

Public/Environment Barrier Narrative:

Facility/Building Boundary:
The RWMC is an access-controlled facility; within the RWMC, further access control is in place for the TSA. Unescorted access is allowed only for trained radiation workers and fissile material handlers.

Pads:
The asphalt pad will prevent spilled solid material from entering the subsoil.

Site Boundary:
There are no residents inside the INEL site boundary. The public is kept from the RWMC a distance of at least 5.6 km (distance nearest site boundary south of RWMC and to U.S. Highway 20 north of RWMC), except for escorted tours. EBR-I is a national historic land mark that is accessible to the public. It is located 3.6 km from RWMC. In case of an emergency, RWMC management can prohibit access to EBR-I or evacuate members of the public from there.

Fire Suppression:
RWMC emergency response team members are trained in initial firefighting response. In case of a fire, the INEL Fire Department located at the Central Facilities Area will be able to respond within 15 minutes of notification. Flammable material loading of ASB II is very low.

Criticality Barrier Narrative:

Double contingency - applied in the form of mass limits per container (developed on the basis of optimally moderate inner containers), and geometry of the inner containers. In addition, the actual fissile mass loadings per drum (approximately 280 g average) are well below allowed loadings (500 g), which in turn are well below loading analyzed as safe (800 g) for the DOT 6M containers under very conservative container array modeling.

Administrative Barrier Narrative:

Procedures:
All monitoring and surveillance activities are performed according to written procedures. No waste containers are moved without written plans and procedures.

Material Limits:
The DOT 6M drums containing U-233 were received under acceptance criteria that specified a maximum content of 500 g of fissile material.

Monitoring:
The air in the Air Support Building II (WMF-711) is monitored for radioactive contamination with alpha and beta/gamma CAMs.

Configuration Control:
The storage containers (6M drums) are constructed according to the DOT regulations. Placement or removal of stored containers is under configuration control.

Quality Assurance:
Operations at the RWMC are subject to the provisions of the Lockheed Idaho Technologies Company Quality Assurance Program as outlined in Program Description Document-1 and Program Requirements Document-101. These documents, and the "Implementation

SITE: INEL	FACILITY (Building or Location): RWMC - ASB II #711
	PARTITIONED AREA: No partitioning applies

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Plan for 10 CFR 830.120" implement the requirements and regulations of DOE Order 5700.6C, "Quality Assurance," and of title 10 of the Code of Federal Regulations Part 830.120, "Quality Assurance Requirements."

Conduct of Operations:
Operations at the RWMC are subject to the provisions of the Lockheed Idaho Technologies Company Conduct of Operations Manual, which implements the reqirements of DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities."

Authorization Basis:
The authorization basis for the RWMC is contained in INEL-94/0226 Rev. 0, "Safety Analysis Report for the Radioactive Waste Management Complex at the Idaho National Engineering Laboratory," February 1995; and its references.

Training:
All personnel working with fissile material at the Transuranic Storage Area of the RWMC are trained as radiation workers and Fissile Material Handlers. This training includes initial qualification and annual retraining.

Organization:
The organizational structure for the RWMC is outlined in Chapter 12 of the SAR.

Lessons-Learned:
Lockheed Idaho Technologies Company participates in the DOE-wide lessons-learned program, as well as maintaining an internal lessons-learned program.

Trending:
Trending is performed for reportable incidents or abnormal occurrences. Also, trending of the radiation readings taken in the vicinity of the waste container stack on the ASB II is performed, to check on the validity of theoretical predictions of the development of radiation fields of U-233 containers.

Records:
Records of the U-233 and U-232 content of the containers in the ASB II are maintained. The results of radiation surveys are also maintained for trending purposes.

External Regulations:
RCRA Part B permit.
The Governor's Settlement Agreement

Surveillance:
Radiation surveys are taken weekly of the container stacks in ASB II.

Personnel Reliability Assurance Program:
The LITCO personnel reliability program is detailed in Section 6 and in (MCP-306, "Personnel Reliability Program") of the Safeguards and Security Manual. This implements the requirements of DOE Order 472.1, "Personnel Security Activities."

SITE: INEL	FACILITY (Building or Location): RWMC - ASB II #711
	PARTITIONED AREA: No partitioning applies

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker/Access Occupancy Limits:
Unescorted access to the ASB II is strictly controlled, and limited to trained personnel.

Emergency Response:
The RWMC and INEL emergency response organizations and plans are detailed in Chapter 15 of the SAR.

SITE: INEL	FACILITY (Building or Location) RWMC - ASB II #711 PARTITIONED AREA: No partitioning applies

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages
Reactor fuel	U-233>10 ppm	Other RO-short rod and pellets	D1	Other-specify storage	16	12

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

DOT 6M drums consist of inner containers (DOT Spec 2R) centered in a 55-gallon drum.

Describe material at risk, which constitutes a source term.

Form of material is in fuel pellets and rods. The material is contained in fuel rod cladding, pellet cans, 2R inner container, 55-gallon stainless steel drum outer container. This ensures there is no dispersable source term from this material.

SITE: INEL	FACILITY (Building or Location): RWMC - ASB II #711
	PARTITIONED AREA: No partitioning applies

Question 4: POTENTIAL CAUSES

Facility	Material	External
[ ] Process Material Transfer	[Y] Aging	[ ] Fire
[ ] Inadvertent Transfers	[ ] Container Seal Degradation	[ ] Explosion
[Y] Aging/Degradation	[ ] Pressurization	[Y] Earthquakes
[ ] Equipment Failure	[ ] Pyrophoricity	[ ] Subsidence
[ ] Change in Mission	[Y] Radioactivity	[Y] Winds
[ ] Other Collocated Hazards	[ ] Chemical Reactivity	[ ] Floods
[ ] Corrosion/Embrittlement	[ ] Radiolysis	[ ] Extreme Temperature
[ ] Inadequate Configuration Knowledge	[ ] Volumetric Expansion	[ ] Snow
[ ] Combustible Loading	[ ] Oxidation	[ ] Ash Loading
[ ] Inadequate Seals	[ ] Flammability	[ ] Aircraft Crash
[ ] Water Sources	[ ] Toxicity	[ ] Vehicle Accident
[ ] Inadequate Drains	[ ] Hydroloysis	[Y] Onsite Transporation
[ ] Preventive Maintenance Failure	[ ] Crystallization	[ ] Adjacent Facility Accident
[ ] Administrative Control	[ ] Other - Specify	[ ] Other-specify
[Y] Human Error		
[ ] Chemical Reactions		
[ ] Contamination		
[ ] Inadequacy of Design Basis		
[ ] Design Deficiency		
[ ] Flooding		
[Y] Fire		
[ ] Other SAR Accidents		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): RWMC - ASB II #711
	PARTITIONED AREA: No partitioning applies

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

FACILITY

Aging/Degradation:
Although the facility is currently within its design life, there is a plan to empty the facility to comply with the RCRA Part B Permit. This may not be completed before the design life is expired.

Human Error:
Any of the administrative controls listed under Question 2 are subject to human error.

Fire:
Other waste containers (wooden boxes) stored in the ASB II and their contents are flammable. A very large facility fire could eventually breach the outer 6M drum and destroy the fiberboard spacers between the outer and inner container.

MATERIAL

Radioactivity/Aging:
The containers were initially received as "Contact Handled" waste (no more than 200 mr/h at the container surface); radioactive decay ta lead to an increase in radiation fields, which may have moved the containers to the "Remote Handled" category. A study has been made in a LITCO Internal Report, "Radiation Level Evaluation for the LWBR Fuel Stored at Intermediate Level Transuranic Storage Facility (ILTSF)" which indicates at the time of this assessment radioactive decay of the contents will not lead to further increases in the radiation levels of the containers beyond that experienced presently.

EXTERNAL

Earthquakes/Winds/On-site Transportation:
Any of these could topple the container stacks, damaging the outer containers.

SITE: INEL	FACILITY (Building or Location): RWMC - ASB II #711
	PARTITIONED AREA: No partitioning applies

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

FACILITY

Fire:
Fire may be caused by human error or from other stored materials. Only a very large scale fire has the potential to breach the outer 6M container and destroy the spacer material.

Structural Failure:
Structural failure caused by aging/degradation of the facility has no significant consequences for the stored U-233.

Increased Radioactivity Level:
Destruction of the outer container and spacer material (by fire) can cause increased radioactivity levels in the facility due to elimination of shielding material. This is extremely unlikely.

MATERIAL

Breach of Packaging:
The outer container of the 6M drum may be breached by fire or dropping of the drum due to earthquake/wind/on-site transportation accident. It is not credible that any of these causes would also breach the inner 2R container. Therefore, material release is not a credible consequence.

SITE: INEL	FACILITY (Building or Location): RWMC - ASB II #711
	PARTITIONED AREA: No partitioning applies

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[Y] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integri
[ ] Contamination	[Y] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Critica
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[Y] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[Y] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location):RWMC - ASB II #711
	PARTITIONED AREA: No partitioning applies

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Breach of Packaging (Material)									

Explanation

Breach of Packaging:
Release of material from breach of packaging is not a credible consequence for any postulated effect due to the double containment provided by the 6M containers and the material form in rods and pellets.

Applicable References

SITE: INEL	FACILITY (Building or Location): RWMC - ASB II #711
	PARTITIONED AREA: No partitioning applies

Question 6: POTENTIAL CONSEQUENCES

Effect	Worker			Environment			Public		
	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Fire (Facility)									

Explanation

Fire:
Only a very large scale facility fire has the potential to breach the outer container. Even then, breaching of the inner container and release of the stored material is not a credible consequence.

Applicable References

SITE: INEL	FACILITY (Building or Location) RWMC - TSA Pad
	FUNCTION: Storage

Question 1: SITE

DOE Headquarters Facility Landlord: EM-36
DOE Headquarters Program Sponsor: EM-36
Facility Age: 16

Design Life: 50

Location of Facility on Site and Distance to Site Boundary

The Idaho National Engineering Laboratory (INEL) is about 70 km (45 miles) west of Idaho Falls, Idaho. The Radioactive Waste Management Complex (RWMC) is in the southwest part of the INEL, 5.6 km (3.5 miles) north of the INEL southern boundary, and 5.6 km south of U.S. Highway 20.

The Transuranic Storage Area (TSA) occupies the eastern portion of the RWMC. Transuranic contaminated waste is stored on asphalt pads at the TSA.

Design Mission, Interim Mission, Current Use

The U-233 stored at the Transuranic Storage Area (TSA) at the RWMC originated from the Light Water Breeder Reactor (LWBR) program at Bettis Atomic Power Laboratory. The material has been declared transuranic waste by DOE, and handled and stored by RWMC this way since its receipt.

Approximately 150 drums containing U-233 materials are located on the earth-covered TSA pads in stacks along with thousands of other TRU waste containers. Eighty (80) of these drums contain U-233 in the form of fuel rods or pellets, and documentaiton on the mass content is available. The contents of the remaining drums are not as well characterized. They are described as "solidified grinding sludge, metallography mounts, fuel assembly endplates, and scrap." U-233 mass content is not presently available, but they were received under an acceptance criterion of no greater than 500 g per drum.

The storage pads are composed of a 5- to 8-cm (2- to 3-in) thick asphalt surface on a compacted gravel base. They slope across the width and have an approximately 1% slope along the length for liquid runoff. The pads were segmented into cells, with each cell containing a waste container stack. Upon completion of a cell, the container stack was covered with earth.

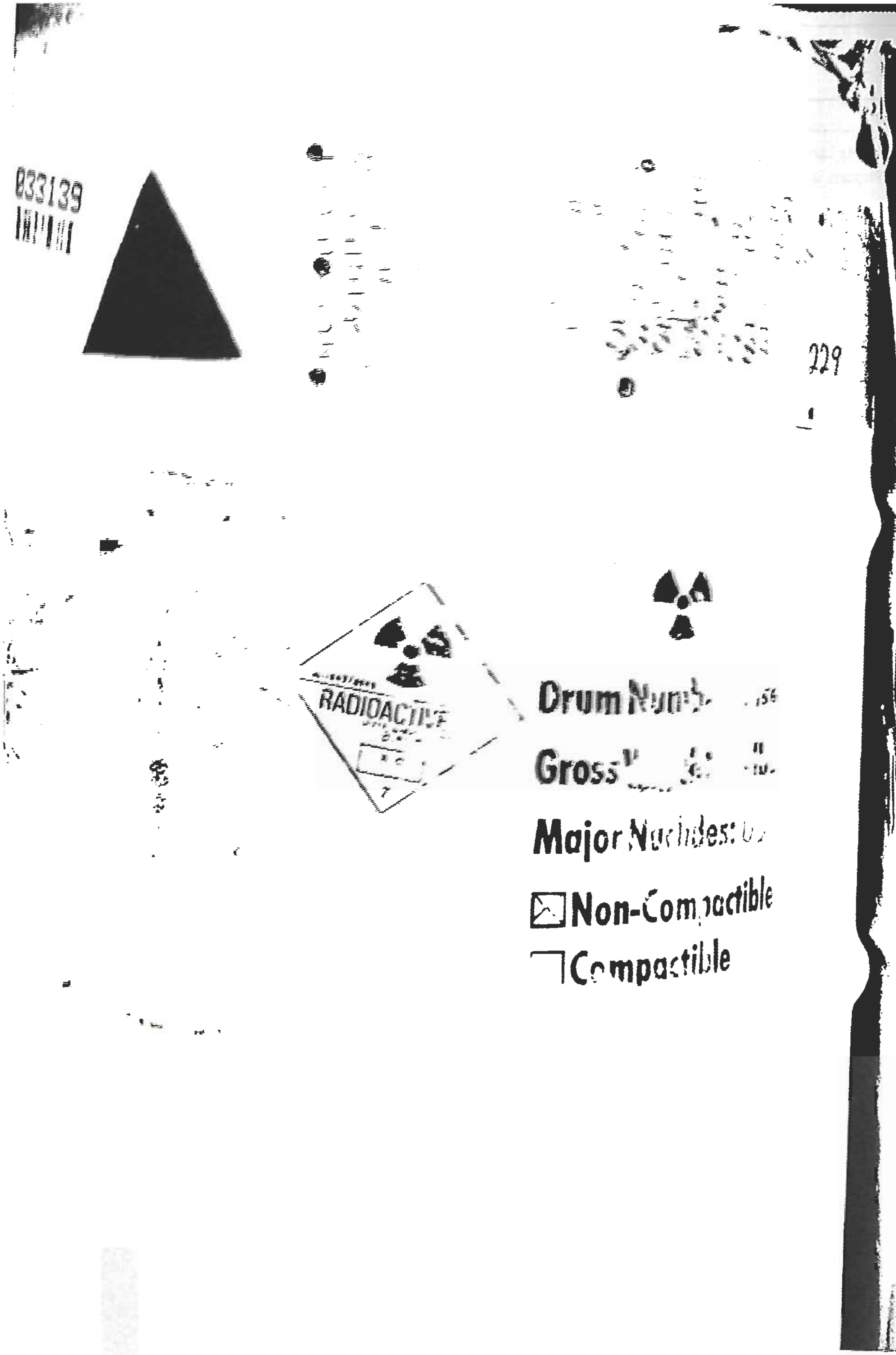


Photo RWMC ASB II-1: Container Stack in ASB II

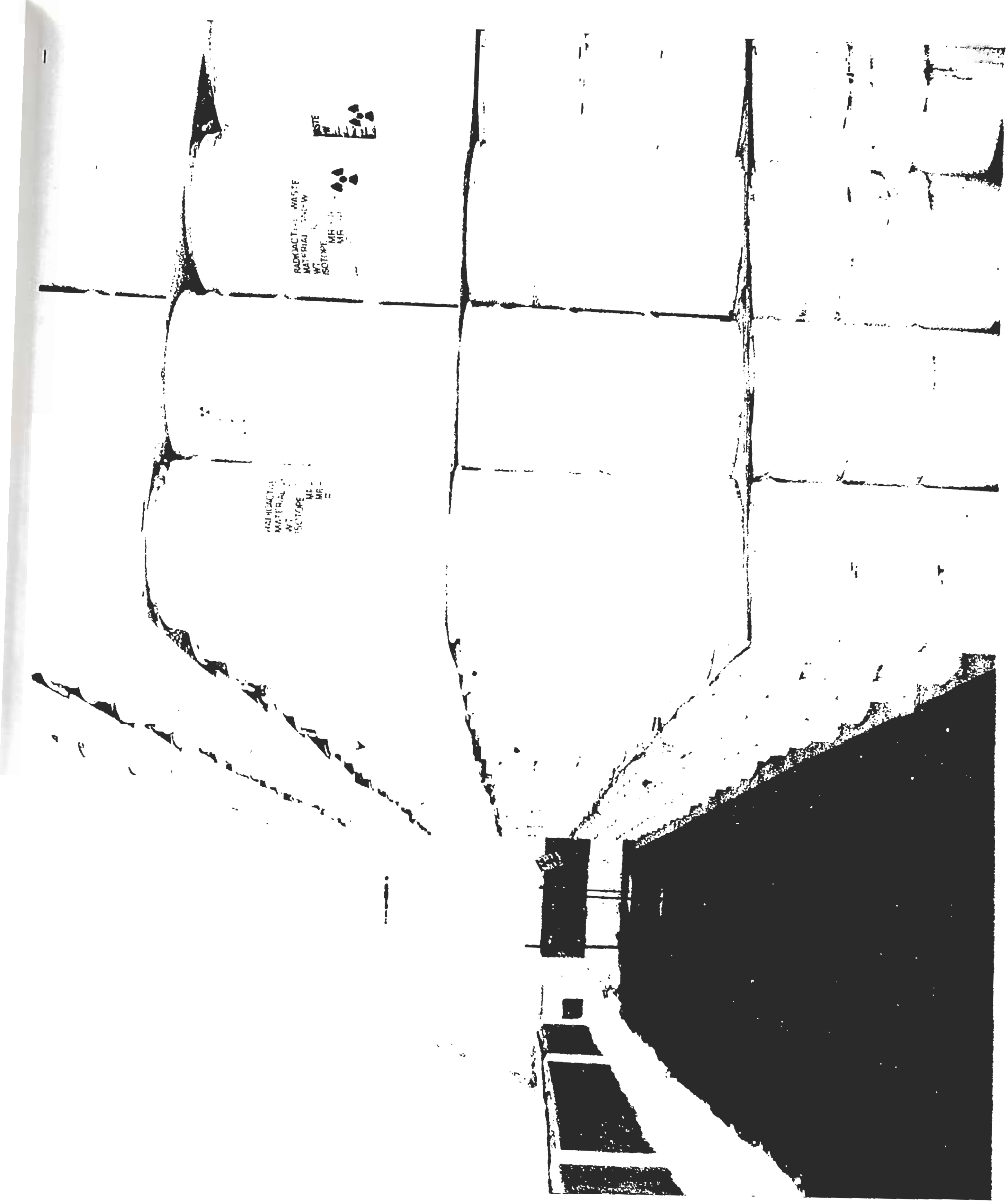


Photo RWMC ASB II-2: Close-up of a U-233 6M drum

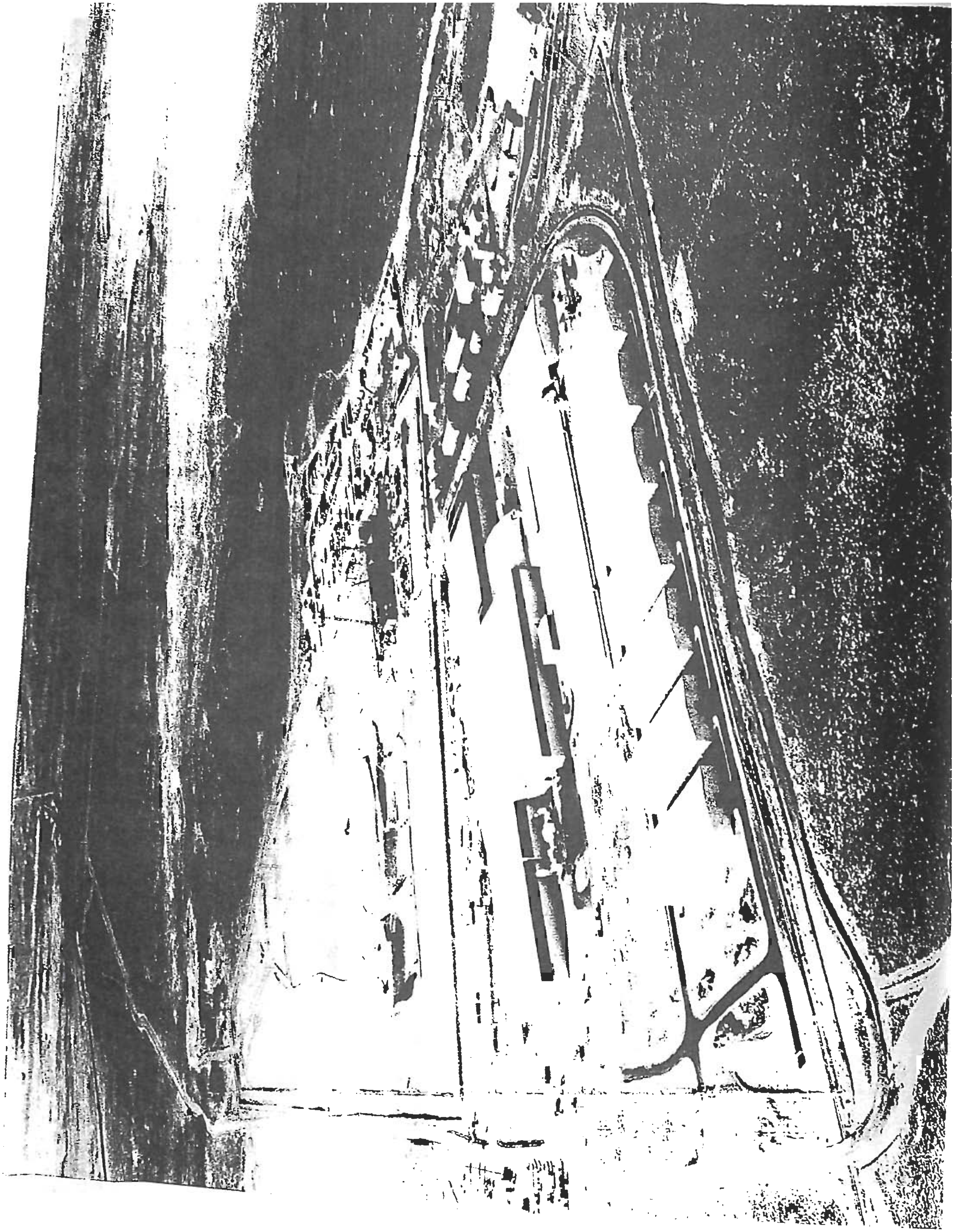


Photo RWMC TSA Pad-1: TSA Pads with completed Retrieval Enclosures

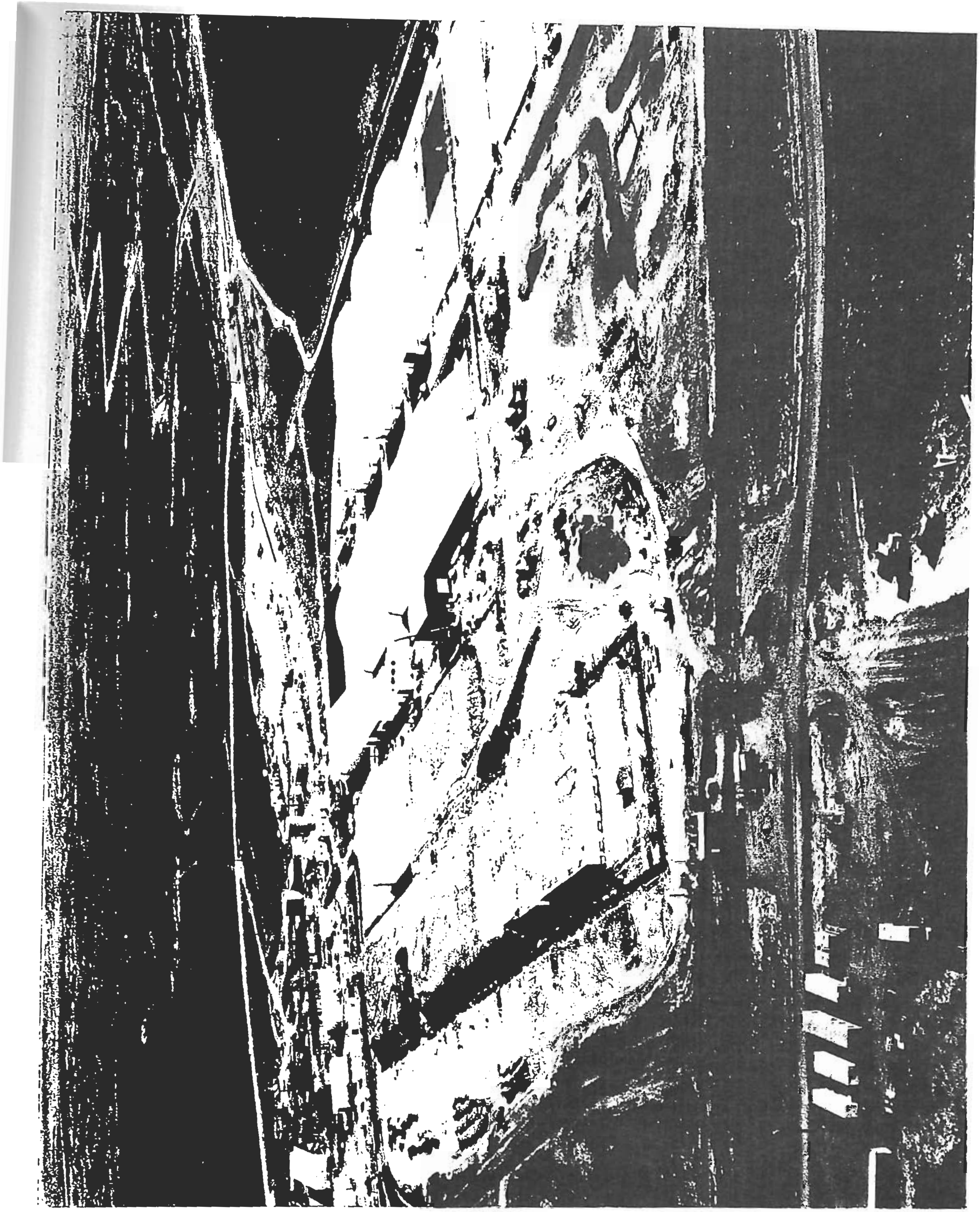
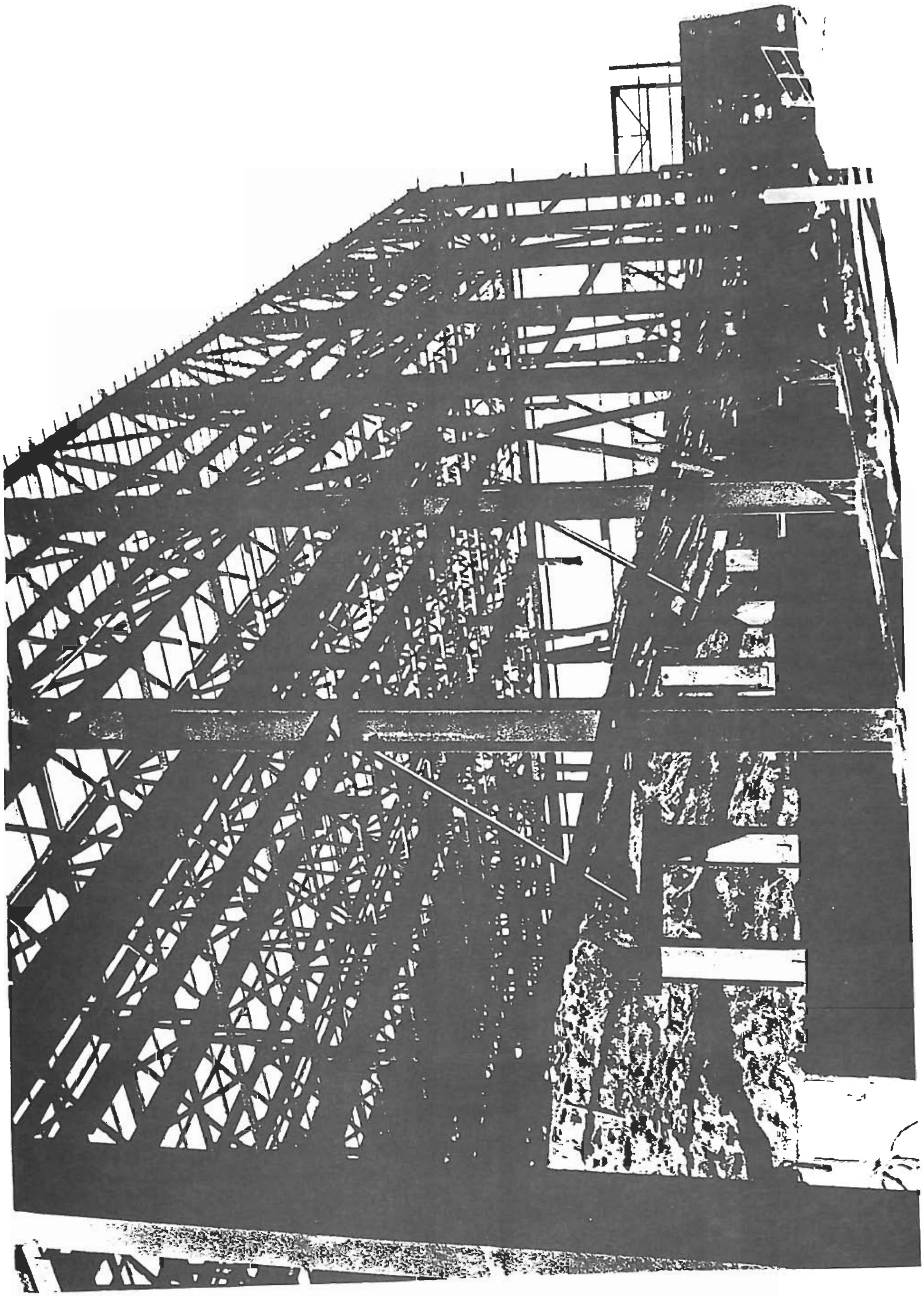


Photo RWMC TSA Pad-2: TSA Pads without Retrieval Enclosures (pre-1995)

Photo RWMC TSA Pad-3: TSA Pads with Retrieval Enclosures (since 1995)



TSA pad prior to completion of enclosure

SITE: INEL	FACILITY (Building or Location)	RWMC - TSA Pad
	FUNCTION:	Storage

Question 1: SITE

DOE Headquarters Facility Landlord: EM-36

DOE Headquarters Program Sponsor: EM-36

Facility Age: 16 Design Life:

Location of Facility on Site and Distance to Site Boundary

The Idaho National Engineering Laboratory (INEL) is about 70 km (45 miles) west of Idaho Falls, Idaho. The Radioactive Waste Management Complex (RWMC) is in the southwest part of the INEL, 5.6 km (3.5 miles) north of the INEL southern boundary, and km south of U.S. Highway 20.

The Transuranic Storage Area (TSA) occupies the eastern portion of the RWMC. Transuranic contaminated waste is stored on pads at the TSA.

Design Mission, Interim Mission, Current Use

The U-233 stored at the Transuranic Storage Area (TSA) at the RWMC originated from the Light Water Breeder Reactor (LWBR) program at Bettis Atomic Power Laboratory. The material has been declared transuranic waste by DOE, and has been handled stored by RWMC this way since its receipt.

Approximately 150 drums containing U-233 materials are located on the earth-covered TSA pads in stacks along with thousands other TRU waste containers. Eighty (80) of these drums contain U-233 in the form of fuel rods or pellets, and documentation mass content is available. The contents of the remaining drums are not as well characterized. They are described as "solidified grinding sludge, metallography mounts, fuel assembly endplates, and scrap." U-233 mass content is not presently available, but were received under an acceptance criterion of no greater than 500 g per drum.

The storage pads are composed of a 5- to 8-cm (2- to 3-in) thick asphalt surface on a compacted gravel base. They slope across width and have an approximate slope of 1% along the length for liquid runoff. The pads were segmented into cells, with each cell containing a waste container stack. Upon completion of a cell, the container stack was covered with earth.

SITE: INEL	FACILITY (Building or Location) RWMC - TSA Pad
	FUNCTION: Storage
Question 1: SITE	

Operational Status
Operating

Historical Information
There are no historical occurrence reports, or USQs, etc., involving the U-233 materials. In the original placement of other waste containers, a few incidents of container dropping during handling have occurred. However, the storage condition of the U-233 containers has been static since original placement. A "white paper" has been issued discussing the historical origin, potential safety issues, and proposed disposition of the material. This was issued under a cover letter L. C. VanDeusen latter to J.A. VanVliet, LCV-123-94, "U-233 Waste Stored at the Radioactive Waste Management complex (RWMC)," December 1, 1994.

List Authorization Basis
The RWMC is operated under a DOE-approved safety analysis report, "Safety Analysis Report for the Radioactive Waste Management Complex at the Idaho National Engineering Laboratory," INEL-94/0226, February 1995. This document was prepared to conform to the requirements of DOE Order 5480.23. An updated version, "Radioactive Waste Management Complex Safety Analysis Report (DRAFT)," INEL-94/0226, Revision 1, February 1996, is currently in DOE-ID review.

Describe Important or Unique Design Features
None.

Describe Weaknesses in the Design Basis
As noted above, the contents of about 45 of these drums are not well known. The authorization basis (SAR) may not fully address criticality safety of U-233 in 6M drums intermingled with other fissile material waste containers. Some unknown quantities of hazardous materials may exist in other waste containers in the stack. The earth cover does not totally exclude moisture from the container stack; this, makes it likely that corrosion damage to the outer containers has occurred. The inability to inspect the containers compounds the problem.

Other than corrosion, there are no external threats to the container stack until retrieval operations commence in a few years. At that time, operations or transporation accidents (lifting operations, container dropping) may become an issue.

Structural Design
Earth covered

Partitioned Areas of HEU within facility
No partitioned areas

Description of Partitioned Areas
No partitioning applies.

Amount & Location of Hazardous Material Collocated or Commingled with HEU
No partitioning applies.

Process Material Transfers
The facility is only used for waste storage. No process material transfers take place.

On-Site Transportation
Not applicable.

Staff Levels & Experience
Staffing Levels and Experience
- 14 Fissile Material Handlers
- Average Experience - 22.8 months
- Experience Range - 15 months to 24 months

SITE: INEL	FACILITY (Building or Location)	RWMC - TSA Pad
	FUNCTION:	Storage

Question 1: SITE

DOE Headquarters Facility Landlord: EM-36

DOE Headquarters Program Sponsor: EM-36 Design Life: 5

Facility Age: 16

Location of Facility on Site and Distance to Site Boundary

The Idaho National Engineering Laboratory (INEL) is about 70 km (45 miles) west of Idaho Falls, Idaho. The Radioactive Waste Management Complex (RWMC) is in the southwest part of the INEL, 5.6 km (3.5 miles) north of the INEL southern boundary, and 5.6 km south of U.S. Highway 20.

The Transuranic Storage Area (TSA) occupies the eastern portion of the RWMC. Transuranic contaminated waste is stored on asphalt pads at the TSA.

Design Mission, Interim Mission, Current Use

The U-233 stored at the Transuranic Storage Area (TSA) at the RWMC originated from the Light Water Breeder Reactor (LWBR) program at Bettis Atomic Power Laboratory. The material has been declared transuranic waste by DOE, and has been handled and stored by RWMC this way since its receipt.

Approximately 150 drums containing U-233 materials are located on the earth-covered TSA pads in stacks along with thousands of other TRU waste containers. Eighty (80) of these drums contain U-233 in the form of fuel rods or pellets, and documentation the mass content is available. The contents of the remaining drums are not as well characterized. They are described as "solidified grinding sludge, metallography mounts, fuel assembly endplates, and scrap." U-233 mass content is not presently available, but they were received under an acceptance criterion of no greater than 500 g per drum.

The storage pads are composed of a 5- to 8-cm (2- to 3-in) thick asphalt surface on a compacted gravel base. They slope across the width and have an approximate slope of 1% along the length for liquid runoff. The pads were segmented into cells, with each cell containing a waste container stack. Upon completion of a cell, the container stack was covered with earth.

SITE: INEL	FACILITY (Building or Location) RWMC - TSA Pad
	FUNCTION: Storage

Question 1: SITE

Operational Status
Operating

Historical Information
There are no historical occurrence reports, or USQs, etc., involving the U-233 materials. In the original placement of other waste containers, a few incidents of container dropping during handling have occurred. However, the storage condition of the U-233 containers has been static since original placement. A "white paper" has been issued discussing the historical origin, potential safety issues, and proposed disposition of the material. This was issued under a cover letter L. C. VanDeusen latter to J.A. VanVliet, LCV-123-94, "U-233 Waste Stored at the Radioactive Waste Management complex (RWMC)," December 1, 1994.

List Authorization Basis
The RWMC is operated under a DOE-approved safety analysis report, "Safety Analysis Report for the Radioactive Waste Management Complex at the Idaho National Engineering Laboratory," INEL-94/0226, February 1995. This document was prepared to conform to the requirements of DOE Order 5480.23. An updated version, "Radioactive Waste Management Complex Safety Analysis Report (DRAFT)," INEL-94/0226, Revision 1, February 1996, is currently in DOE-ID review.

Describe Important or Unique Design Features
None.

Describe Weaknesses in the Design Basis
As noted above, the contents of about 45 of these drums are not well known. The authorization basis (SAR) may not fully address criticality safety of U-233 in 6M drums intermingled with other fissile material waste containers. Some unknown quantities of hazardous materials may exist in other waste containers in the stack. The earth cover does not totally exclude moisture from the container stack; this, makes it likely that corrosion damage to the outer containers has occurred. The inability to inspect the containers compounds the problem.

Other than corrosion, there are no external threats to the container stack until retrieval operations commence in a few years. At that time, operations or transporation accidents (lifting operations, container dropping) may become an issue.

Structural Design
Earth covered

Partitioned Areas of HEU within facility

No partitioned areas

Description of Partitioned Areas
No partitioning applies.

Amount & Location of Hazardous Material Collocated or Commingled with HEU
No partitioning applies.

Process Material Transfers
The facility is only used for waste storage. No process material transfers take place.

On-Site Transportation
Not applicable.

Staff Levels & Experience
Staffing Levels and Experience
- 14 Fissile Material Handlers
- Average Experience - 22.8 months
- Experience Range - 15 months to 24 months

SITE: INEL	FACILITY (Building or Location) RWMC - TSA Pad
	FUNCTION: Storage
Question 1: SITE	

Applicable References

"Radioactive Waste Management Complex Safety Analysis Report (DRAFT)," INEL-94/0026, Revision 1, February 1996.

"Hazard Assessment for Radioactive Waste Management Complex," INEL-94/0140, February 1996.

"Safety Analysis Report for the Radioactive Waste Management Complex at the Idaho National Engineering Laboratory," INEL-94/0226, February 1995.

L. C. VanDeusen letter to J. A. VanVliet, LCV-123-94, "U-233 Waste Stored at the Radioactive Waste Management Complex (RWMC)," December 1, 1994.

SITE: INEL	FACILITY (Building or Location): RWMC - TSA Pad
	PARTITIONED AREA: No partitioned areas

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality [1,2]	Administrative Barrier[3]
[ ] Gloveboxes	[Y] Facility/Building Boundary	[Y] Double Contingency Applied	[ ] Procedure: Operation, Maint.
[ ] Transfer System	[ ] HVAC/Confinement	[ ] Double Contingency Not Applied (specify) (e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike		[ ] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines		[ ] Configuration Control
[ ] Vault	[ ] Canyons		[Y] Quality Assurance
[ ] Room	[Y] Pads		[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary		[Y] Authorization Basis
[ ] Hood	[ ] Trenches		[Y] Training
[ ] Piping	[ ] Storage Vault		[Y] Organization
[Y] Shielding	[ ] Fire Suppression		[Y] Lessons-Learned
[Y] Distance	[ ] Alarm System		[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[ ] Protective Clothing			[ ] Records
[ ] Remote Handling			[ ] Standards
[Y] Confinement System			[Y] External Regulation
[ ] Burial Ground			[ ] Surveillance
[ ] Tanks			[Y] Personnel Reliability Assurance Program
[ ] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[Y] Emgergency Response
[ ] Other-specify			[ ] Other-specify
[ ] None			

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): RWMC - TSA Pad
	PARTITIONED AREA: No partitioned areas
Question 2: BARRIER TYPES	

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Distance:
The U-233 drums are not accessible without a major retrieval effort that includes earth removal and unstacking of surrounding containers.

Shielding:
Drums stacks are under several feet of soil cover.

Confinement System:
A release could only happen if both the DOT 2R inner container and the 6M outer drum were breached.

A DOT specification 6M drum consists of a 55-gallon steel drum outer container in which a DOT specification 2R inner container is centered by stacked discs and rings of industrial core fiberboard or hardwood or plywood. The outer drum is made of 16-gauge low carbon steel. The inner container is a stainless steel pipe with maximum inside diameter of 13.3 cm (5.25 in.). The space between inner and outer container is completely filled with the centering discs and rings, which may have a gap between them and the inner or outer container wall of not more than 6 mm (1/4 in.).

Public/Environment Barrier Narrative:

Facility/Building Boundary:
All access to operational and storage areas at the RWMC requires approval by the shift manager. Within the RWMC, further access control is in place for the TSA, allowing only trained personnel unescorted access. Finally, the earth cover over the container stacks precludes access to the containers without digging equipment.

Pads:
The asphalt pad will prevent spilled solid material from entering the subsoil.

Site boundary:
There are no residents inside the INEL site boundary. The public is kept from the RWMC a distance of at least 5.6 km (distance to nearest site boundary south of RWMC and to U.S. Highway 20 north of RWMC), except for escorted tours. EBR-I is a national historic land mark that is accessible to the public. It is located 3.6 km from RWMC. In case of an emergency, RWMC management can prohibit access to EBR-I or evacuate members of the public from there.

Criticality Barrier Narrative:

Double Contingency:
Applied in the form of mass limits per container (developed on the basis of optimally moderated inner containers), and geometry of the inner containers. In addition, the actual fissile mass loadings per drum (approximately 280 g average) are well below allowed loadings (500 g), which in turn are well below loading analyzed as safe (800 g) under very conservative container array modeling.

Administrative Barrier Narrative:

Material Limits:
The DOT 6M drums containing U-233 were received under acceptance criteria that specified a maximum content of 500 g of fissile material.

Quality Assurance:
Operations at the RWMC are subject to the provisions of the Lockheed Idaho Technologies Company Quality Assurance Program as outlined in Program Description Document-1 and Program Requirements Document-101. These documents, and the "Implementation Plan for 10 CFR 830.120" implement the requirements and regulations of DOE Order 5700.6C, "Quality Assurance," and of title 10 of the Code of Federal Regulations Part 830.120, "Quality Assurance Requirements."

Conduct of Operations:
Operations at the RWMC are subject to the provisions of the Lockheed Idaho Technologies Company Conduct of Operations Manual, which implements the reqirements of DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities."

Authorization Basis:
The authorization basis for the RWMC is contained in INEL-94/0226 Rev. 0, "Safety Analysis Report for the Radioactive Waste Management Complex at the Idaho National Engineering Laboratory," February 1995; and its references.

SITE: INEL	FACILITY (Building or Location): RWMC - TSA Pad
	PARTITIONED AREA: No partitioned areas
Question 2: BARRIER TYPES	

Describe each barrier identified above and its intended protective functions.

Training:
All personnel working with fissile material at the Transuranic Storage Area of the RWMC are trained as radiation workers and Fissile Material Handlers. This training includes initial qualification and annual retraining.

Lessons Learned:
Lockheed Idaho Technologies Company participates in the DOE-wide lessons-learned program, as well as maintaining an internal lessons-learned program.

External Regulations:
RCRA Part B permit.
The Governor's Settlement Agreement

Personnel Reliability Assurance Program:
The LITCO personnel reliability program is detailed in Section 6 and in (MCP-306, "Personnel Reliability Program") of the Safeguards and Security Manual. This implements the requirements of DOE Order 472.1, "Personnel Security Activities."

Worker Access Occupancy Limits:
Unescorted access to the earth-covered TSA pad is limited to trained personnel.

SITE: INEL	FACILITY (Building or Location) RWMC - TSA Pad PARTITIONED AREA: No partitioned areas

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Process residues	U-233>10 ppm	Other solidified grinding sludge	D1	Other-specify waste storage	20	45	0.000

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Mixture of DOT 17C and 6M 55-gallon drums were used. DOT 6M drums consist of inner containers (DOT Spec 2R) centered in a 55-gallon drum.

Describe material at risk, which constitutes a source term.

The quantity is unknown but it is less than 22.5 kg based on acceptance criteria.

17C drums were received at the RWMC under an acceptace criteria of no more than 200 g fissile material per drum. 6M drums were received under an acceptace criterion of no more than 500 g fissile material per drum. These mass limits are the only U-233 mass information available for these drums. The material is described as "solidified grinding sludge, metallography mounts, fuel element end caps, etc."

SITE: INEL				FACILITY (Building or Location)		RWMC - TSA Pad	
				PARTITIONED AREA:		No partitioned areas	
Question 3: HEU Holdings and Packaging							
Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor fuel	U-233>10 ppm	Other RU	D1, X1, W1	Other-specify waste storage	16	24	6.6960

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).

DOT 6M drums consist of inner containers (DOT Spec 2R) centered in a 110-gallon drum. 110 gal. drums were used to fit intact fuel rods in the inner container.

Describe material at risk, which constitutes a source term.

Form of material is in fuel rods. The material is contained in fuel rod cladding, 2R inner container, 110-gallon drum outer container. This ensures there is no dispersable source term from this material.

SITE: INEL	FACILITY (Building or Location) RWMC - TSA Pad
	PARTITIONED AREA: No partitioned areas

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Oxides	U-233>10 ppm	Other DO U-233 Pellets	D1	Other-specify waste storage	16	83	0.0[illegible]

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

DOT 6M drums consist of an inner (DOT Spec. 2R) container centered in a 55-gal. drum.

Describe material at risk, which constitutes a source term.

The quantity is unknown but is less than 23.5 kg based on acceptance criteria.

Total mass contained in these 83 drums is not known.

6M drums were received at the RWMC under an acceptace criteria of no more than 500 g fissile material per drum. These mass lim'ts are the only U-233 mass information available for these drums. The form of the material, sintered UO2 pellets, and the double containment provided by the 6M packaging make the material practically non-dispersible.

SITE: INEL	FACILITY (Building or Location): RWMC - TSA Pad
	PARTITIONED AREA: No partitioned areas

Question 4: POTENTIAL CAUSES

Facility	Material	External
[ ] Process Material Transfer	[Y] Aging	[ ] Fire
[ ] Inadvertent Transfers	[ ] Container Seal Degradation	[ ] Explosion
[ ] Aging/Degradation	[ ] Pressurization	[Y] Earthquakes
[ ] Equipment Failure	[ ] Pyrophoricity	[Y] Subsidence
[ ] Change in Mission	[Y] Radioactivity	[Y] Winds
[ ] Other Collocated Hazards	[ ] Chemical Reactivity	[ ] Floods
[ ] Corrosion/Embrittlement	[ ] Radiolysis	[ ] Extreme Temperature
[Y] Inadequate Configuration Knowledge	[ ] Volumetric Expansion	[ ] Snow
[ ] Combustible Loading	[ ] Oxidation	[ ] Ash Loading
[ ] Inadequate Seals	[ ] Flammability	[ ] Aircraft Crash
[ ] Water Sources	[ ] Toxicity	[ ] Vehicle Accident
[ ] Inadequate Drains	[ ] Hydroloysis	[ ] Onsite Transporation
[ ] Preventive Maintenance Failure	[ ] Crystallization	[ ] Adjacent Facility Accident
[ ] Administrative Control	[Y] Other - Specify container corrosion	[ ] Other-specify
[ ] Human Error		
[ ] Chemical Reactions		
[ ] Contamination		
[ ] Inadequacy of Design Basis		
[ ] Design Deficiency		
[ ] Flooding		
[ ] Fire		
[ ] Other SAR Accidents		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): RWMC - TSA Pad
	PARTITIONED AREA: No partitioned areas

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

FACILITY

Inadequate Configuration Knowledge:
Original shipping documents for the U-233 were not maintained at the INEL. An attempt to recover the documents has been unsuccessful for many of the drums. The form and exact mass of their content is insufficiently known. This does not allow a complete evaluation of potential release of this material.

MATERIAL

Aging/Radioactivity:
The containers were initially received as "Contact Handled" waste (no more than 200 mr/h at the container surface); radioactive decay has lead to an increase in radiation fields, which may have moved the containers to the "Remote Handled" category. A recent evaluation concluded that radiation increases have reached a peak and will not increase any further.

Other - Container Corrosion:
Corrosion is essentially undetectable under the earth cover. The waste container stack includes moisture barriers, such as plastic sheets, and Styrofoam padding between the stacks and the dirt cover. Moisture is not completely excluded, so some corrosion of the outer container is possible. In order for a release to occur, corrosion of both outer and inner container must occur.

EXTERNAL

Earthquakes/Subsidence/Winds:
These natural causes could topple the container stacks, damaging the outer containers. Removal of the earth cover could expose drums

SITE: INEL	FACILITY (Building or Location): RWMC - TSA Pad
	PARTITIONED AREA: No partitioned areas

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[Y] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[Y] Material Release	[Y] Loss of Building Integrity
[ ] Contamination	[Y] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Criiticality
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[ ] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[Y] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): RWMC - TSA Pad
	PARTITIONED AREA: No partitioned areas

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

FACILITY

Increased Radioactivity Level:
The aging/radioactive decay process discussed above will lead to a higher radiation level at the container surface; this has already been observed in similar containers, and is suspected (from facility radiation surveys) for these containers; damage to or destruction of the outer container and spacer material of the 6M drums could also lead to increases in radiation levels.

MATERIAL

Material Release/Breach of Packaging:
Corrosion of the outer container is possible. Lack of configuration knowledge causes lack of confidence that the corrosion of the inner container will not also occur.

Release of material from the 6M drums will only be an issue if there is a concurrent loss of integrity of dirt cover and/or asphalt pad, (due to earthquake, subsidence, and wind). These are not creditable effects.

Criticality:
The criticality analysis in the evalution basis assume into integral container stacks of maximally loaded containers. Container integrity cannot be guaranteed in the long run. Although the probability of a criticality is very small it cannot be totally discounted.

EXTERNAL

Loss of Building Integrity:
Increased radioactivity levels are also only a concern when they occur concurrent with loss of integrity of dirt cover and/or asphalt pad (due to earthquake, subsidence, and wind). SAR indicates that a maximum probable earthquake would not cause soil fissuring to the extent of splitting asphalt pad.

SITE: INEL	FACILITY (Building or Location):RWMC - TSA Pad
	PARTITIONED AREA: No partitioned areas

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Increased Radioactivity Level									

Explanation

Increased Radiation Levels:
Increased radiation levels are not expected to subject workers to exposure above guidelines during retrieval operations. Provisions for monitoring and remote operations are included in retrieval plans. No contamination, injury, environmental effects, or effects to the public would result from this. All effects would be local and, in fact restricted to personnel actually handling drums. Workers are trained to handle highly radioactive packages.

Applicable References

SITE: INEL	FACILITY (Building or Location):RWMC - TSA Pad
	PARTITIONED AREA: No partitioned areas

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Material Release (Material)									

Explanation

Material Release:

There is a very small probability that both outer and inner container could corrode to a degree such that the contents could be released. Migration away from earth covered pad would additionally require disruption of the earth cover and/or the asphalt pad. These are not credible consequences.

Applicable References

SITE: INEL	FACILITY (Building or Location):RWMC - TSA Pad
	PARTITIONED AREA: No partitioned areas

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Criticality (Material)		Y							

Explanation

Criticality:
The probability of a criticality is very small but it cannot be totally discounted.

Applicable References

SITE: INEL	FACILITY (Building or Location)	RWMC - ILTSF Pad 2
	FUNCTION:	Waste Storage

Question 1: SITE

DOE Headquarters Facility Landlord: EM-36
DOE Headquarters Program Sponsor: EM-36 **Design Life:** 20
Facility Age: 11

Location of Facility on Site and Distance to Site Boundary

The Idaho National Engineering Laboratory (INEL) is about 70 km (45 miles) west of Idaho Falls, Idaho. The Radioactive Waste Management Complex (RWMC) is in the southwest part of the INEL, 5.6 km (3.5 miles) north of the INEL southern boundary, and 5.6 km south of U.S. Highway 20.

The Intermediate Level Transuranic Storage Facility (ILTSF) consists of two asphalt pads in the Transuranic Storage Area (TSA) of the RWMC.

Design Mission, Interim Mission, Current Use

The U-233 stored at the ILTSF originated from the Light Water Breeder Reactor (LWBR) program at Bettis Atomic Power Laboratory.

Fifty-three (53) DOT 6M drums containing U-233 in the form of fuel pellets and fuel rods are located in a shielded storage arrangement on the ILTSF Pad. These containers were initially received as "contact handled" waste (no greater than 200 mr/h at the container surface. Radioactive decay of the contents has led to an increase in surface radiation readings, which has moved these containers to the "remote handled" waste (greater than 200mr/h at the container surface) category. They were removed from their original storage on one of the TSA pads, and placed six-at-a-time in metal bins. Three metal bins were placed into a cargo container and three of the cargo containers were placed on the ILTSF pad. The cargo containers are completely surrounded by stacked concrete blocks for shielding.

RWMC ILTSF Pad Photograph 3 shows the concrete shielded enclosure that surrounds the cargo containers.

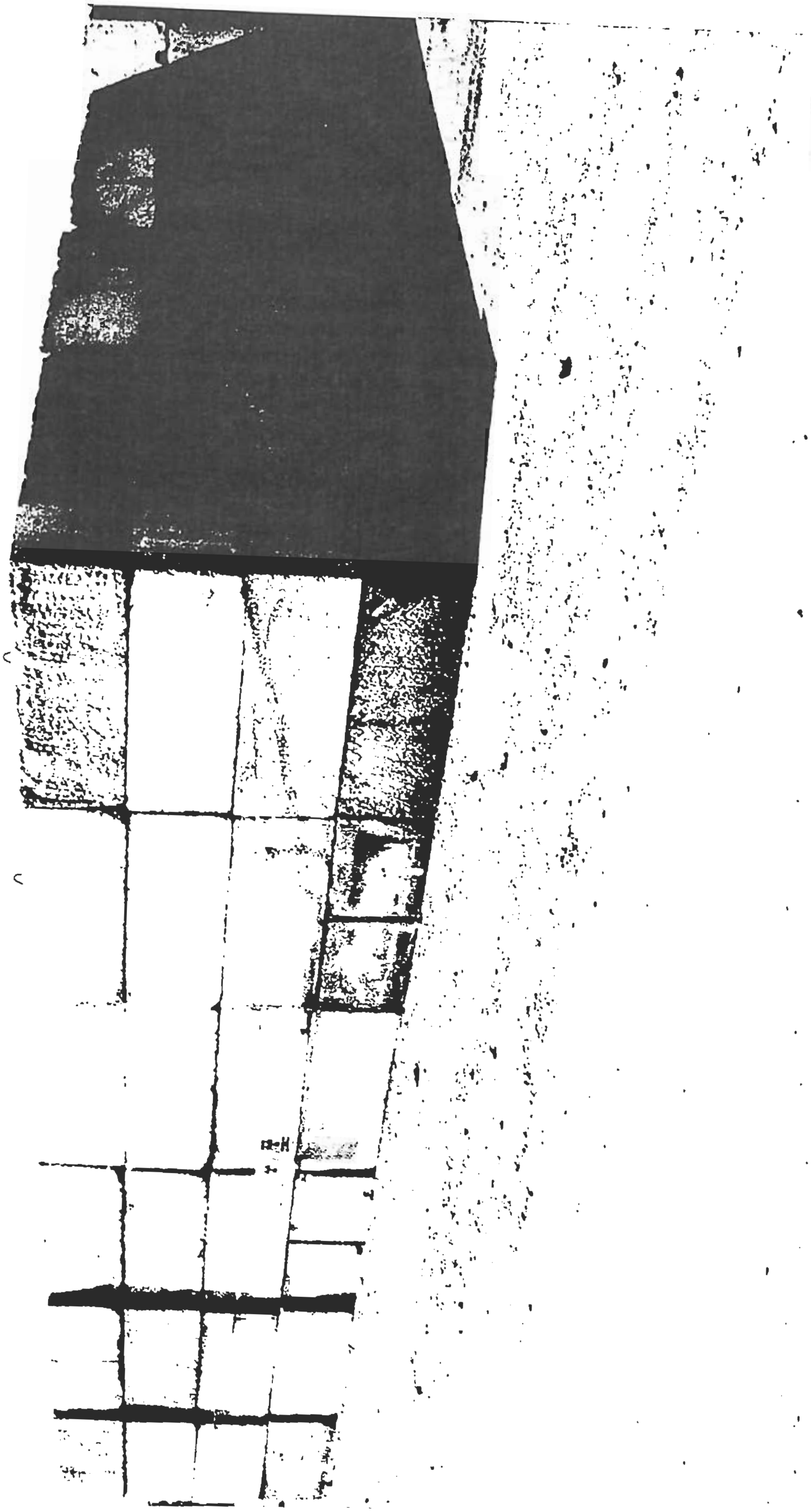


Photo RWMC ILTSF Pad-1: Concrete shielded enclosure that surrounds the cargo containers

SITE: INEL	FACILITY (Building or Location) RWMC - [illegible]
	FUNCTION: Waste Storage
Question 1: SITE	

Operational Status
Operating

Historical Information
There are no historical occurrence reports, or USQs, etc., involving the U-233 materials. In the original placement of other waste containers, a few incidents of container dropping during handling have occurred. However, the storage condition of the U-233 containers has been static since original placement. A "white paper" has been issued discussing the historical origin, potential [illegible] issues, and proposed disposition of the material. This was issued under a cover letter L. C. VanDeusen letter to J. A. Yarbro, LCV-123-94, "U-233 Waste Stored at the Radioactive Waste Management Complex (RWMC)," December 1, 1994.

List Authorization Basis
The RWMC is operated under a DOE-approved safety analysis report, "Safety Analysis Report for the Radioactive Waste Management Complex at the Idaho National Engineering Laboratory," INEL-94/0226, February 1995. This document was prepared to conform to requirements of DOE Order 5480.23. An updated version, "Radioactive Waste Management Complex Safety Analysis Report (DRAFT)," INEL-94/0226 Rev.1, February 1995, is currently in DOE-ID review.

Describe Important or Unique Design Features
None.

Describe Weaknesses in the Design Basis
Neither the cargo containers nor the concrete block stacks are seismically qualified. A severe earthquake could topple the concrete shield blocks into the cargo container and damage the outer containers of the SM drums.

Materials transfer operations are not a threat to the containers until transfer of the containers is imminent, probably not for several [illegible] At that time, transportation accidents (forklift operations, container dropping) may become an issue. Could be part of [illegible] vulnerability.

Structural Design
Other- specify cargo containers

Partitioned Areas of HEU within facility
No partitioning applies

Description of Partitioned Areas
No partitioned areas.

Amount & Location of Hazardous Material Collocated or Commingled with HEU
None.

Process Material Transfers
No process material transfers.

On-Site Transportation
Not relevant for current storage.

Staff Levels & Experience
Staffing Levels and Experience
- 14 Fissile Material Handlers
- Average Experience - 22.8 months
- Experience Range - 15 months to 24 months

SITE: INEL	FACILITY (Building or Location)	RWMC - ILTSF Pad 2
	FUNCTION:	Waste Storage
Question 1: SITE		

Applicable References

"Safety Analysis Report for the Radioactive Waste Management Complex at the Idaho National Engineering Laboratory," INEL-94/0226, February 1995.

"Radioactive Waste Management Complex Safety Analysis Report (DRAFT)," INEL-94/0226, Revision 1, February 1996.

L. C. VanDeusen letter to J. A. VanVliet, LCV-123-94, "U-233 Waste Stored at the Radioactive Waste Management Complex (RWMC)," December 1, 1994.

"Hazard Assessment for Radioactive Waste Management Complex," INEL-94/0140, February 1996.

S. S. Kim, P. Kuan, "Radiation Level Evaluation for the LWBR Fuel Stored at ILTSF, INEL-96/052, February 1996.

SITE: INEL	FACILITY (Building or Location): RWMC - ILTSF Pad 2
	PARTITIONED AREA: No partitioning applies

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality[1,2]	Administrative Barrier[3]
[ ] Gloveboxes	[Y] Facility/Building Boundary	[Y] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[ ] HVAC/Confinement	[ ] Double Contingency Not Applied (specify)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike	(e.g., Mass	[Y] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines	Absorbers	[ ] Configuration Control
[ ] Vault	[ ] Canyons	Geometry	[Y] Quality Assurance
[ ] Room	[Y] Pads	Interaction	[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary	Concentration	[Y] Authorization Basis
[ ] Hood	[ ] Trenches	Moderation	[Y] Training
[ ] Piping	[ ] Storage Vault	Enrichment	[Y] Organization
[Y] Shielding	[ ] Fire Suppression	Reflection	[Y] Lessons-Learned
[Y] Distance	[ ] Alarm System	Volume)	[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[Y] Trending
[ ] Protective Clothing			[Y] Records
[ ] Remote Handling			[ ] Standards
[ ] Confinement System			[Y] External Regulation
[ ] Burial Ground			[ ] Surveillance
[ ] Tanks			[Y] Personnel Reliability Assurance Program
[ ] Alarm System			[Y] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[ ] Emergency Response
[ ] Other-specify material form			[ ] Other-specify
[N] None			

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): RWMC - ILTSF Pad 2
	PARTITIONED AREA: No partitioning applies
Question 2: BARRIER TYPES	

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

Shielding/Confinement System:
The cargo containers are surrounded by a minimum of 18-inches of concrete.

Distance:
The U-233 drums in the cargo containers are surrounded by the concrete blocks and are not accessible without moving the blocks.

Other - the material form of fuel pellets and fuel rods make it non-dispersible; a release could only happen if the DOT 2R inner container, the 6M outer drum, and the cargo container were breached.

Public/Environment Barrier Narrative:

Facility/Building Boundary:
The RWMC is an access-controlled facility; within the RWMC, further access control is in place for the TSA; the material form, and inner and outer container, as mentioned above.

Pads:
The ILTSF pad will prevent spilled solid material from entering the subsoil.

Site Boundary:
There are no residents inside the INEL site boundary. The public is kept from the RWMC a distance of at least 5.6 km (distance nearest site boundary south of RWMC and to U.S. Highway 20 north of RWMC), except for escorted tours. EBR-1 is a national historic land mark that is accessible to the public. It is located 3.6 km from RWMC. In case of an emergency, RWMC management can prohibit access to EBR-1 or evacuate members of the public from there.

Criticality Barrier Narrative:

Double contingency - applied in the form of mass limits per container (developed on the basis of optimally moderated inner containers), and geometry of the inner containers. In addition, the actual fissile mass loadings per drum (approximately 280 g average) are well below allowed loadings (500 g), which in turn are well below loading analyzed as safe (800 g) under very conservative container array modeling.

Administrative Barrier Narrative:

Procedures:
All monitoring and surveillance activities are performed according to written procedures. No waste containers are moved without written plans and procedures.

Material Limits:
The DOT 6M drums containing U-233 were received under acceptance criteria that specified a maximum content of 500 g of fissile material.

Monitoring:
The air in the vicinity of the concrete shielding enclosure on ILTSF Pad 2 is monitored for radioactive contamination with alpha and beta/gamma CAMs.

Quality Assurance:
Operations at the RWMC are subject to the provisions of the Lockheed Idaho Technologies Company Quality Assurance Program as outlined in Program Description Document-1 and Program Requirements Document-101. These documents, and the "Implementation Plan for 10 CFR 830.120" implement the requirements and regulations of DOE Order 5700.6C, "Quality Assurance," and of Title 10 of the Code of Federal Regulations Part 830.120, "Quality Assurance Requirements."

Conduct of Operations:
Operations at the RWMC are subject to the provisions of the Lockheed Idaho Technologies Company Conduct of Operations Manual, which implements the reqirements of DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities."

Authorization Basis:
The authorization basis for the RWMC is contained in INEL-94/0226 Rev. 0, "Safety Analysis Report for the Radioactive Waste Management Complex at the Idaho National Engineering Laboratory," February 1995; and its references.

SITE: INEL	FACILITY (Building or Location): RWMC - ILTSF Pad 2
	PARTITIONED AREA: No partitioning applies

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Training:
All personnel working with fissile material at the Transuranic Storage Area of the RWMC are trained as radiation workers and Fissile Material Handlers. This training includes initial qualification and annual retraining.

Lessons-Learned:
Lockheed Idaho Technologies Company participates in the DOE-wide lessons-learned program, as well as maintaining an internal lessons-learned program.

Trending:
Trending is performed for reportable incidents or abnormal occurrences. Also, trending of the shielded storage configuration on the ILTSF pad is performed to check on the validity of theoretical predictions of the development of radiation fields of U-233 containers.

Records:
Records of the U-233 and U-232 content of the containers in the shielded storage configuration on the ILTSF pad are maintained. The results of radiation surveys are also maintained for trending purposes.

External Regulations:
RCRA Part B permit.
The Governor's Settlement Agreement

Personnel Reliability Assurance Program:
The LITCO personnel reliability program is detailed in Section 6 and in (MCP-306, "Personnel Reliability Program") of the Safeguards and Security Manual. This implements the requirements of DOE Order 472.1, "Personnel Security Activities."

Worker/Access Occupancy Limits:
Unescorted access to the earth-covered ILTSF pad is strictly limited to trained personnel.

Emergency Response: The RWMC and INEL emergency response organizations and plans are detailed in Chapter 15 of the SAR.

SITE: INEL	FACILITY (Building or Location) RWMC - ILTSF Pad 2 PARTITIONED AREA: No partitioning applies

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Reactor fuel	U-233>10 ppm	Other RU	D1, W1	Other-specify storage	16	53	14.731

Cumulative Inventory Differences
0.0000

Describe packaging and its intended protective function(s).

DOT 6M drums consist of inner containers (DOT Spec 2R) centered in a stainless steel 110-gallon drum.

Describe material at risk, which constitutes a source term.

Form of material is in fuel rods. The material is contained in fuel rod cladding, 2R inner container, 110-gallon drum outer container. This ensures there is no dispersable source term from this material.

SITE: INEL

FACILITY (Building or Location): [illegible]

PARTITIONED AREA: [illegible]

Question 4: POTENTIAL CAUSES

Facility	Material	External
☐ Process Material Transfer	☐ Aging	☐ Fire
☐ Inadvertent Transfers	☐ Container/Seal Degradation	☐ Explosion
☐ Aging/Degradation	☐ Pressurization	☐ Earthquakes
☐ Equipment Failure	☐ Pyrophoricity	☐ Tornadoes
☐ Change in Mission	☐ Radioactivity	☐ Winds
☐ Other Collocated Hazards	☐ Chemical Reactivity	☐ Floods
☐ Corrosion/Embrittlement	☐ Radiolysis	☐ Extreme Temperature
☐ Inadequate Configuration Knowledge	☐ Volumetric Expansion	☐ Snow
☐ Combustible Loading	☐ Oxidation	☐ Ash Loading
☐ Inadequate Seals	☐ Flammability	☐ Aircraft Crash
☐ Water Sources	☐ Toxicity	☐ Vehicle Accident
☐ Inadequate Drains	☐ Hydrolysis	☐ Onsite Transportation
☐ Preventive Maintenance Failure	☐ Crystallization	☐ Adjacent Facility Accident
☐ Administrative Control	☐ Other - Specify	☐ Other-specify
☐ Human Error		
☐ Chemical Reactions		
☐ Contamination		
☐ Inadequacy of Design Basis		
☐ Design Deficiency		
☐ Flooding		
☐ Fire		
☐ Other SAR Accidents		
☐ Other-specify		

SITE: INEL	FACILITY (Building or Location): RWMC - ILTSF Pad 2
	PARTITIONED AREA: No partitioning applies

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

FACILITY

Aging/Degradation:
Although not observed at this time, some future degradation of the cargo containers is possible.

Corrosion/Embrittlement:
If moisture enters the cargo containers some corrosion of 6M outer drums is possible.

MATERIAL

Aging/Radioactivity :
The containers were initially received as "Contact Handled" waste (no more than 200 mr/h at the container surface); radioactive decay is leading to an increase in radiation fields, which has moved the containers to the "Remote Handled" category.

SITE: INEL	FACILITY (Building or Location): RWMC - ILTSF Pad 2
	PARTITIONED AREA: No partitioning applies

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integrity
[ ] Contamination	[Y] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Criticality
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[Y] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[Y] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): RWMC - ILTSF Pad 2
	PARTITIONED AREA: No partitioning applies

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

FACILITY

Structural Failure/Increased Radioactivity Level:
The aging/radioactive/breach of packaging (from corrosion of container or degradation of facility) decay process discussed above will lead to higher radiation level at the container surface and this has already been observed. However, analysis has shown that no further increase in the radioactive source term will occur.

MATERIAL

Breach of Packaging:
Damage to or destruction of the outer container and spacer material of the 6M drums could also lead to increases in radiation levels. Release of material from the inner container is not expected.

SITE: INEL	FACILITY (Building or Location): RWMC - ILTSF Pad 2
	PARTITIONED AREA: No partitioning applies

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[ ] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integrity
[ ] Contamination	[ ] Breach of Packaging	[ ] Release of Materials
[Y] Criticality	[ ] Fire	[Y] Radiation and Releases from Criticality
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[ ] Structural Failure		
[ ] Equipment Failure		
[Y] Material Release		
[Y] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): RWMC - ILTSF Pad 2
	PARTITIONED AREA: No partitioning applies

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

Increased Radioactivity Level - the aging/radioactive decay process discussed above will lead to higher radiation level at the container surface; this has already been observed; damage to or destruction of the outer container and spacer material of the 6M drums could also lead to increases in radiation levels.

Material Release - because of the double containment and the nature of the material this is highly unlikely to occur due to any cause other than criticality mentioned below.

Criticality - would require extremely severe damage to drums that destroys outer container and spacing material, then an unfavorable rearrangement of inner containers and moderation. Water between inner containers would tend to isolate them and decrease criticality potential. Water would have to leak into inner containers. Extremely unlikely.

Radiation and Releases from Criticality - See criticality discussion above.

SITE: INEL	FACILITY (Building or Location): RWMC - ILTSF Pad 2
	PARTITIONED AREA: No partitioning applies

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	**Contamination**	**Exposure**	**Injury**	**Ground**	**Water**	**Air**	**Contamination**	**Exposure**	**Injury**
Increased Radioactivity Level									

Explanation

Increased Radioactivity Level:
Increased radiation levels could subject workers to exposure above guidelines. No contamination, injury, environmental effects, or effects on the public would result from this. All effects would be local and, in fact, restricted to personnel actually handling drums.

Criticality:
The probability of a criticality is very small but it cannot be totally discounted.

Applicable References

SITE: INEL	FACILITY (Building or Location):RWMC - ILTSF Pad 2
	PARTITIONED AREA: No partitioning applies

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Criticality (Material)		Y							

Explanation

Criticality:
The probability of a criticality is very small but it cannot be totally discounted.

Applicable References

SITE: INEL	FACILITY (Building or Location) RESL (CFA-690)
	FUNCTION: Radiological & Chemical

Question 1: SITE

DOE Headquarters Facility Landlord: EM
DOE Headquarters Program Sponsor: EM
Facility Age: 33

Design Life: 25

Location of Facility on Site and Distance to Site Boundary

The Radiological and Environmental Sciences Laboratory (RESL) is located at the Central Facilities Area (CFA) of the Idaho National Engineering Laboratory (INEL) (see Figure RESL-1) in the western section of CFA on Albany Avenue in building CFA-690 (see Figure RESL-2). RESL is located approximately 8 km from the nearest INEL site boundary.

The operational status of the facility is that the facility is in use and operating. The authorization basis for RESL is CFA 690 and 676 Safety Analysis that categorizes the facility as not a nuclear facility with operations that are routinely-accepted-by-the-public. RESL has had one occurrence report (OR) in the last 15 months that resulted in slight contamination in the radioactive material storage vault when a glass vial containing radioactive liquid was broken. HEU was not involved.

Due to the small amount of HEU (< 1.5 grams), RESL has been analyzed as a single partition. The majority of HEU is located in the radioactive material storage vault with lesser amounts in laboratory rooms 119 and 133.

SITE: INEL	FACILITY (Building or Location)	RESL (CFA-690)
	FUNCTION:	Radiological & Chemical
	Question 1: SITE	

Design Mission, Interim Mission, Current Use
The facility mission is to provide a laboratory where radiochemical analysis of collected biological and environmental samples may be performed and where radiological dosimeters may be irradiated and analyzed. The processes at CFA-690 include normal office activities, preparation and analysis of radiological and chemical samples, groundwater sample preparation and monitoring, and irradiation and analysis of personnel dosimeters.

Operational Status
In use

Historical Information
RESL has had one occurrence report (OR) in the last 15 months that resulted in slight contamination in the radioactive material storage vault when a glass vial containing radioactive liquid was broken. HEU was not involved.

List Authorization Basis
"RESL CFA-690 and 676 Safety Analysis", March 1996.

Describe Important or Unique Design Features
Building is designed for radiological and chemical laboratory functions.

Describe Weaknesses in the Design Basis
None.

Structural Design
Concrete/slab

Partitioned Areas of HEU within facility
RESL

Description of Partitioned Areas
Due to the small amount of HEU (< 1.5 grams), RESL has been analyzed as a single partition. The majority of HEU is located in the radioactive material storage vault with lesser amounts in laboratory rooms 119 and 133.

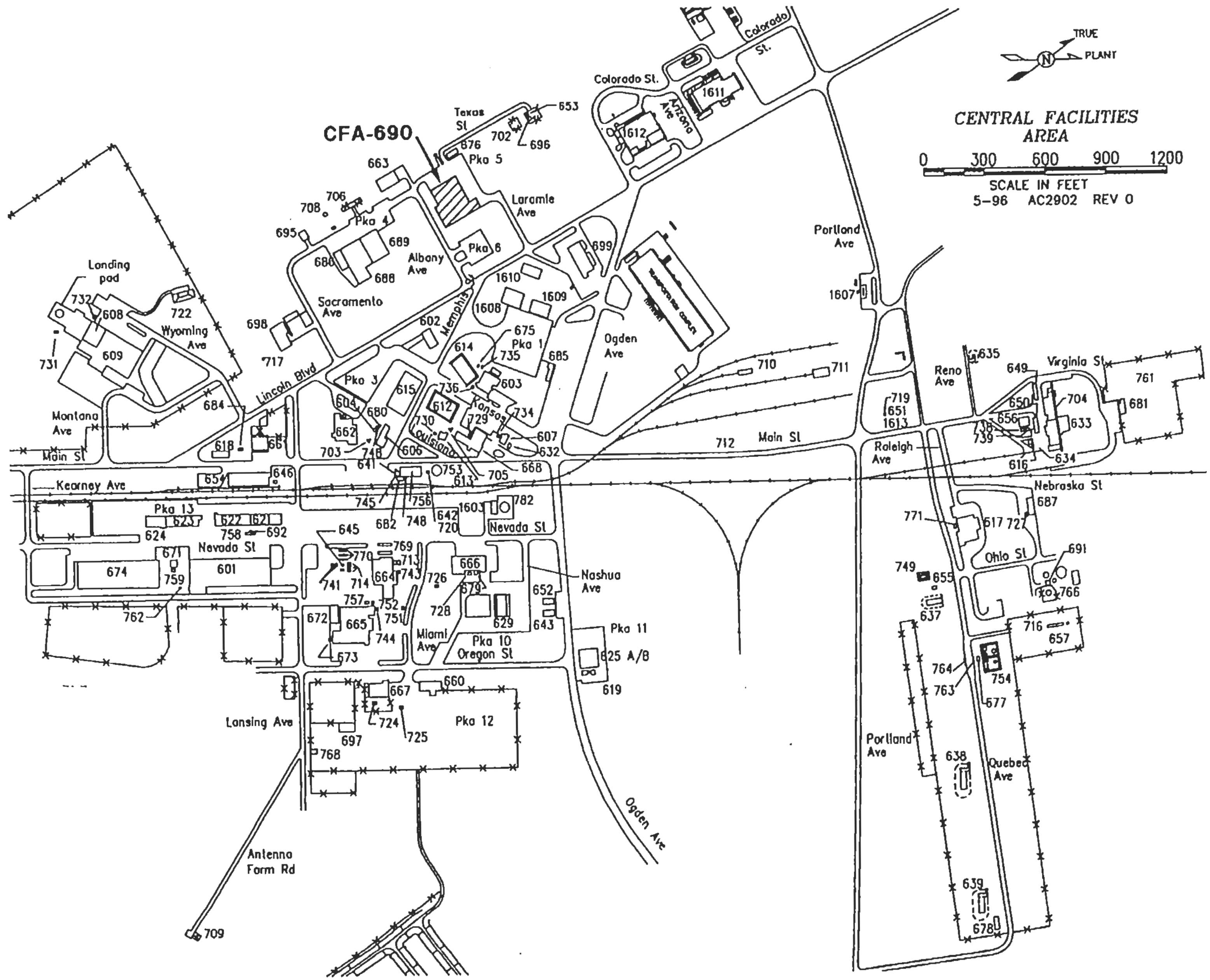
Amount & Location of Hazardous Material Collocated or Commingled with HEU
None.

Process Material Transfers
None.

On-Site Transportation
None.

Staff Levels & Experience
8 trained employees with 3 to 15 years experience.

Applicable References
1). "RESL CFA-690 and 676 Safety Analysis," March, 1996.


CENTRAL FACILITIES AREA
0 300 600 900 1200
SCALE IN FEET
5-96 AC2902 REV 0
TRUE
PLANT
N
CFA-690
Colorado St.
Arizona Ave
Texas St
Pko 5
Laramie Ave
Pko 4
Pko 6
Albany Ave
Sacramento Ave
Landing pad
Wyoming Ave
Lincoln Blvd
Memphis
Pko 3
Pko 1
Kansas
Louisiana
Ogden Ave
Portland Ave
Montana Ave
Main St
Kearney Ave
Pko 13
Nevada St
Nashua Ave
Pko 11
825 A/B
Miami Ave
Pko 10
Oregon St
Lansing Ave
Pko 12
Antenna Form Rd
Reno Ave
Virginia St
Raleigh Ave
Nebraska St
Ohio St
Quebec Ave

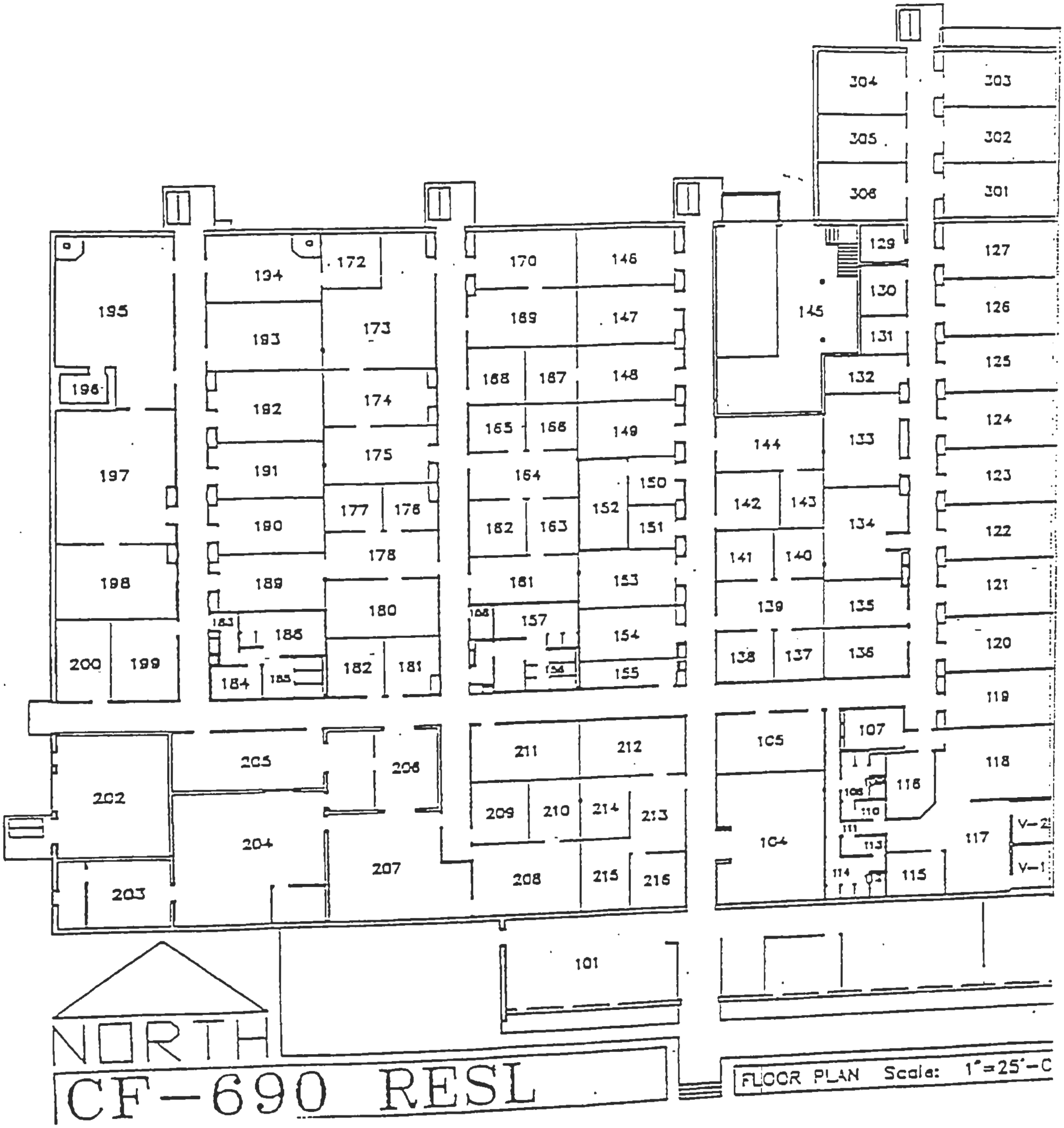


Figure RESL-2 Floor Plan of CFA-690

SITE: INEL	FACILITY (Building or Location): RESL (CFA-690)
	PARTITIONED AREA: RESL

Question 2: What barriers are used to protect the workers, the public and environment from HEU?

For each partitioned area identified in Question 1, list the facility barriers used to protect the worker and the public/environment. Use below for identifying barriers. Multiple barriers usually employed should be noted.

BARRIER TYPES

Worker Barrier[1]	Public/Environmental Barrier[2]	Criticality [1,2]	Administrative Barrier[3]
[ ] Gloveboxes	[Y] Facility/Building Boundary	[ ] Double Contingency Applied	[Y] Procedure: Operation, Maint.
[ ] Transfer System	[ ] HVAC/Confinement	[Y] Double Contingency Not Applied (specify)	[Y] Material Limts
[ ] Duct	[ ] Liquid Containment/Dike	(e.g., Mass Absorbers Geometry Interaction Concentration Moderation Enrichment Reflection Volume)	[Y] Monitoring
[ ] Filter	[ ] Bay, Cells, Magazines		[ ] Configuration Control
[Y] Vault	[ ] Canyons		[ ] Quality Assurance
[ ] Room	[ ] Pads		[Y] Conduct of Operations
[ ] Hot Cell/Canyon	[Y] Site Boundary		[ ] Authorization Basis
[ ] Hood	[ ] Trenches		[Y] Training
[ ] Piping	[Y] Storage Vault		[ ] Organization
[Y] Shielding	[ ] Fire Suppression		[ ] Lessons-Learned
[ ] Distance	[ ] Alarm System		[ ] Testing
[ ] Respiratory Protection	[ ] Other - Specify		[ ] Trending
[ ] Protective Clothing			[Y] Records
[ ] Remote Handling			[ ] Standards
[Y] Confinement System			[ ] External Regulation
[ ] Burial Ground			[ ] Surveillance
[ ] Tanks			[ ] Personnel Reliability Assurance Program
[ ] Alarm System			[ ] Worker/Access Occupancy Limits
[ ] Temporary Barriers			[Y] Emgergency Response
[ ] Other-specify			[ ] Other-specify
[ ] None			

1. *Barriers between HEU and worker.*
2. *Barriers between HEU and public/environment.*
3. *Includes management controls. Temporary administrative requirements are included in Question 6 as compensatory measures.*

SITE: INEL	FACILITY (Building or Location): RESL (CFA-690)
	PARTITIONED AREA: RESL

Question 2: BARRIER TYPES

Describe each barrier identified above and its intended protective functions.

Worker Barrier Narrative:

The radioactive material source vault is a 5-ft by 8-ft room with locked door and 18-in thick concrete walls for shielding that are fire rated for 3 hours. The reference standards are contained in small sealed poly bottles (less than or equal to 100 ml each) on a rack with 2-in high by 3/8-in thick plastic splash shield. The U-235 encapsulataed source stored in Room 119 is kept in a lead brick shielded locked 1/2-in plastic box. The sources stored in Room 133 are kept in a locked drawer.

Public/Environment Barrier Narrative:

HEU is stored inside the RESL building which provides the facility boundary. The closest co-located facility, CFA-689, is located approximately 400 m to the west. RESL is approximately 8 km from the nearest INEL site boundary.

Criticality Barrier Narrative:

Criticality is not a concern for RESL as it has an administrative control in place that does not allow more than 100 grams of fissile material in the facility (the limiting safe subcritical mass for the most fissile isotope, PU-239, is 450 grams).

Administrative Barrier Narrative:

Radiological control procedures are used by trained personnel whenever HEU is in use at RESL.

The fissile material limit for RESL is 100 grams.

Radioactive material in the vault is surveyed weekly. Radioactive sources are leak checked every 6 months by trained radiological control personnel.

Personnel accessing HEU are required to be trained as radiological workers.

A computer program is used for accountability purposes for all radioactive material at RESL.

Evacuation alarms are provided at RESL in the event that the facility must be evacuated in an emergency.

SITE: INEL	FACILITY (Building or Location) RESL (CFA-690)
	PARTITIONED AREA: RESL

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	Very Highly	Other Reference Standards	P0	Vault	18	4	0.001

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Small poly bottles of liquid/powder for containment.

Describe material at risk, which constitutes a source term.

2.42E-4 Ci U-235

SITE: INEL	FACILITY (Building or Location) RESL (CFA-690)
	PARTITIONED AREA: RESL

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	Very Highly	Sealed Sources	F0	Process Area	Unknown	1	~~0.0004~~ 0.00004

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Source sealed for containment

Describe material at risk, which constitutes a source term.

8.0E-8 Ci U-235

06/04/96

SITE: INEL	FACILITY (Building or Location) RESL (CFA-690)
	PARTITIONED AREA: RESL

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	U-233<10 ppm	Other Reference Standards	P0	Vault And Process Area	32	3	0.00[illegible] 0.00001

Cumulative Inventory Differences

0.0000

Describe packaging and its intended protective function(s).

Small poly bottles of liquid for containment.

Describe material at risk, which constitutes a source term.

1.5E-4 Ci U-233

SITE: INEL	FACILITY (Building or Location) RESL (CFA-690)
	PARTITIONED AREA: RESL

Question 3: HEU Holdings and Packaging

Material Form	Grade of HEU	Material Form Description	Packaging Types	Location	Range of Age	No. of Packages	Mass (kg)
Sources and Samples	U-233<10 ppm	Sealed Sources	F0	Process Area	Unknown	2	~~0.0000~~ 1.3E-11

Cumulative Inventory Differences
0.0000 ·

Describe packaging and its intended protective function(s).
Source sealed for containment.

Describe material at risk, which constitutes a source term.
2.9E-8 Ci U-233

06/04/96

SITE: INEL	FACILITY (Building or Location): RESL (CFA-690)
	PARTITIONED AREA: RESL

Question 4: POTENTIAL CAUSES

Facility	Material	External
☐ Process Material Transfer	☐ Aging	☐ Fire
☐ Inadvertent Transfers	☐ Container Seal Degradation	☐ Explosion
☐ Aging/Degradation	☐ Pressurization	☐ Earthquakes
☐ Equipment Failure	☐ Pyrophoricity	☐ Subsidence
☐ Change in Mission	☐ Radioactivity	☐ Winds
☐ Other Collocated Hazards	☐ Chemical Reactivity	☐ Floods
☐ Corrosion/Embrittlement	☐ Radiolysis	☐ Extreme Temperature
☐ Inadequate Configuration Knowledge	☐ Volumetric Expansion	☐ Snow
☐ Combustible Loading	☐ Oxidation	☐ Ash Loading
☐ Inadequate Seals	☐ Flammability	☐ Aircraft Crash
☐ Water Sources	☐ Toxicity	☐ Vehicle Accident
☐ Inadequate Drains	☐ Hydroloysis	☐ Onsite Transporation
☐ Preventive Maintenance Failure	☐ Crystallization	☐ Adjacent Facility Accident
☐ Administrative Control	☐ Other - Specify	☐ Other-specify
☐ Human Error		
☐ Chemical Reactions		
☐ Contamination		
☐ Inadequacy of Design Basis		
☐ Design Deficiency		
☐ Flooding		
[Y] Fire		
☐ Other SAR Accidents		
☐ Other-specify		

SITE: INEL	FACILITY (Building or Location): RESL (CFA-690)
	PARTITIONED AREA: RESL

Question 4: POTENTIAL CAUSES

Describe Each Potential Cause Identified Above:

A fire could occur at RESL that could affect the storage vault and/or Rooms 119 and/or 133. The facility is sprinklered and has low combustible loading in areas containing HEU.

06/04/96

SITE: INEL

FACILITY (Building or Location): RESL (CFA-690)

PARTITIONED AREA: RESL

Question 5: POTENTIAL EFFECTS

Facility	Material	External
[Y] Fire	[ ] Criticality	[ ] Loss of Site Integrity
[ ] Explosion	[ ] Material Release	[ ] Loss of Building Integrity
[ ] Contamination	[ ] Breach of Packaging	[ ] Release of Materials
[ ] Criticality	[ ] Fire	[ ] Radiation and Releases from Critiicality
[ ] Leakage/Spills	[ ] Other-specify	
[ ] Other Accidents-specify		
[ ] Structural Failure		
[ ] Equipment Failure		
[ ] Material Release		
[ ] Increased Radioactivity Level		
[ ] Other-specify		

SITE: INEL	FACILITY (Building or Location): RESL (CFA-690)
	PARTITIONED AREA: RESL

Question 5: POTENTIAL EFFECTS

Describe Each Effect Identified Above:

A fire could occur at RESL that could affect the storage vault and/or Rooms 119 and/or 133. A release of HEU is not expected to occur due to facility fire protection design and secure packaging of HEU.

SITE: INEL	FACILITY (Building or Location):RESL (CFA-690)
	PARTITIONED AREA: RESL

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Fire (Facility)									

Explanation

A release of HEU from RESL due to a fire would not result in worker contamination, exposure, or injury since all personnel would evacuate the facility and the HEU loading is small (< 1.5 grams). The environment is not expected to be adversely affected since the HEU released would be a small fraction of < 1.5 grams (a conservative release fraction for the material is on the order of 1E-2 to 1E-3). The public would not be exposed to contamination, exposure, or injury due to the site boundary distance from RESL (8 km).

Applicable References

1. "RESL CFA-690 and 676 Safety Analysis," March 1996.

Question 7: Site Summary

Site: INEL

Provide and overall assessment of the site ES&H vulnerabilities.

The Site Assessment Team (SAT) identified nine vulnerabilities, three at CPP-651, the Unirradiated Fuel Storage Facility; two at CPP-640, the Headend Process Plant; three at the Radioactive Waste Management Complex; and one institutional vulnerability across the INEL site. These vulnerabilities are very limited in consequence in that except for one vulnerability they only have the potential to effect site workers. Only in the case of a fire at CPP-640 could the environment potentially be effected. In no case does the potential exist for the public to be involved. Qualitatively in terms of risk (i.e., consequence and likelihood), from the SAT's viewpoint, the number 1 ranked vulnerability, (i.e., the loss of moderator control at CPP-640), was significantly more important in comparison to the other eight vulnerabilities. These other vulnerabilities, although ranked in order in this assessment, are of relatively equal importance. With regard to the probability of having one of these vulnerabilities occur, the SAT deemed that except for the institutional vulnerability associated with aging facilities with inactive quantities of HEU, the likelihood of occurrence for the remaining vulnerabilities to be very remote, (i.e., the vulnerability is not expected to happen during the lifetime of the facility or activity.

Important ES&H Concerns

While in the future ES&H vulnerabilities may arise related to the handling, processing, and shipping of HEU that is currently in storage, for now the site's most important ES&H vulnerabilities are related to HEU storage. These vulnerabilities can be grouped into six main categories.

1. Vulnerabilities at two of the facilities have the potential for causing an inadvertent criticality that could effect workers due to loss of moderator control [i.e., the unintentional introduction of (a) water from fire suppression systems into storage cans at CPP-651, (b) moderator via piping into vessels at CPP-640, or © rain water from leaks in the roof or water from ruptured fire sprinkler lines into spilled HEU on the floor of a CPP-640 cell].

2. A fire at CPP-640 also has the potential for breaching the barriers and thereby causing a release of HEU resulting in worker exposure and/or environmental contamination.

3. Two vulnerabilities have the potential for worker contamination due to container damage from earthquakes or extreme winds [i.e., (a) vessel damage at CPP-640 due to earthquakes or extreme winds and (b) damage to fuel storage racks and cans at CPP-651 due to earthquakes].

4. Vulnerabilities at two facilities have the potential for causing an inadvertent criticality that could effect workers due to loss of configuration control (i.e., drum degradation at the Intermediate Level Transuranic Storage Facility Pad or Transuranic Storage Area Pads at RWMC allowing the reconfiguration of the inner containers with fissile material).

5. One vulnerability at the RWMC Air Support Building has the potential for unnecessary radiation exposure to site workers.

SITE: INEL	FACILITY (Building or Location):RESL (CFA-690) PARTITIONED AREA: RESL

Question 6: POTENTIAL CONSEQUENCES

	Worker			Environment			Public		
Effect	Contamination	Exposure	Injury	Ground	Water	Air	Contamination	Exposure	Injury
Fire (Facility)									

Explanation

A release of HEU from RESL due to a fire would not result in worker contamination, exposure, or injury since all personnel would evacuate the facility and the HEU loading is small (< 1.5 grams). The environment is not expected to be adversely affected since the HEU released would be a small fraction of < 1.5 grams (a conservative release fraction for the material is on the order of 1E-2 to 1E-3). The public would not be exposed to contamination, exposure, or injury due to the site boundary distance from RESL (8 km).

Applicable References

1. "RESL CFA-690 and 676 Safety Analysis," March 1996.

Question 7: Site Summary

Site: INEL

Provide and overall assessment of the site ES&H vulnerabilities.

The Site Assessment Team (SAT) identified nine vulnerabilities, three at CPP-651, the Unirradiated Fuel Storage Facility; two at CPP-640, the Headend Process Plant; three at the Radioactive Waste Management Complex; and one institutional vulnerability across the INEL site. These vulnerabilities are very limited in consequence in that except for one vulnerability they only have the potential to effect site workers. Only in the case of a fire at CPP-640 could the environment potentially be effected. In no case does the potential exist for the public to be involved. Qualitatively in terms of risk (i.e., consequence and likelihood), from the SAT's viewpoint, the number 1 ranked vulnerability, (i.e., the loss of moderator control at CPP-640), was significantly more important in comparison to the other eight vulnerabilities. These other vulnerabilities, although ranked in order in this assessment, are of relatively equal importance. With regard to the probability of having one of these vulnerabilities occur, the SAT deemed that except for the institutional vulnerability associated with aging facilities with inactive quantities of HEU, the likelihood of occurrence for the remaining vulnerabilities to be very remote, (i.e., the vulnerability is not expected to happen during the lifetime of the facility or activity.

Important ES&H Concerns

While in the future ES&H vulnerabilities may arise related to the handling, processing, and shipping of HEU that is currently in storage, for now the site's most important ES&H vulnerabilities are related to HEU storage. These vulnerabilities can be grouped into six main categories.

1. Vulnerabilities at two of the facilities have the potential for causing an inadvertent criticality that could effect workers due to loss of moderator control [i.e., the unintentional introduction of (a) water from fire suppression systems into storage cans at CPP-651, (b) moderator via piping into vessels at CPP-640, or © rain water from leaks in the roof or water from ruptured fire sprinkler lines into spilled HEU on the floor of a CPP-640 cell].

2. A fire at CPP-640 also has the potential for breaching the barriers and thereby causing a release of HEU resulting in worker exposure and/or environmental contamination.

3. Two vulnerabilities have the potential for worker contamination due to container damage from earthquakes or extreme winds [i.e., (a) vessel damage at CPP-640 due to earthquakes or extreme winds and (b) damage to fuel storage racks and cans at CPP-651 due to earthquakes].

4. Vulnerabilities at two facilities have the potential for causing an inadvertent criticality that could effect workers due to loss of configuration control (i.e., drum degradation at the Intermediate Level Transuranic Storage Facility Pad or Transuranic Storage Area Pads at RWMC allowing the reconfiguration of the inner containers with fissile material).

5. One vulnerability at the RWMC Air Support Building has the potential for unnecessary radiation exposure to site workers.

6. One site institutional vulnerability has the potential for worker contamination and exposure due to barrier failures (i.e., while the consequence of each barrier failure would be minor, the overall likelihood of barrier failure due to human error is significant due to the large number of aging facilities storing HEU and the diversity of barrier types.

Description of HEU Activities.

Those HEU activities that pose the highest risk to the workers and environment involve storage. Large amounts of HEU are stored in a few large volume, unsafe geometry, vessels in the Mechanical Handling Cave and Cells 3 and 4 of the Rover Facility at CPP-640. HEU is stored in a metal cabinet, shipping containers, and storage racks at CPP-651. HEU and U-233 are stored under various conditions at several locations within the Radioactive Waste Management Complex. HEU is stored for limited applications at various aging facilities across the site.

Current Planned Actions.

Current and planned actions to minimize worker exposure, reduce environmental risks, and protect the public at the site are as follows:

CPP-640: This facility is in a deactivation phase and its HEU material is scheduled for removal by September 1998.

CPP-651: Current plans (pending approval) call for shipping the material in this facility to Oak Ridge National Laboratory beginning in FY 1998.

Aging Facilities (Institutional Vulnerability): Funding is needed to consolidate the HEU in these facilities into more suitable long-range storage. There is no plan in place to correct this situation.

RWMC ILTSF: Plans are being developed to transfer the DOT 6M drums stored at this facility to a more secure and observable location.

RWMC TSA: The TSA Retrieval Enclosure has been constructed and will be operated to retrieve all containers on the earth covered pads such as those at TSA. Retrieved containers will be repackaged, if necessary, and transferred to storage locations where the containers can be inspected for corrosion on a specified frequency. Eventually, all containers, including the U-233 drums, will be shipped to the Waste Isolation Pilot Plant for permanent disposition. Retrieval is scheduled to begin in 2003 and last until 2015.

Noteworthy Program or Practices

Noteworthy programs or practices at the various facilities related to High Enriched Uranium storage are as follow:

CPP-640
The process vessels have been isolated from moderator sources to prevent an accidental

criticality. Piping leading to the vessels has been cut and capped. Although the central portion of the facility, which was build in 1961, is not seismically qualified to current standards, it was designed to standards not significantly different from DOE-STD-1020-94 criteria and does consist of rather robust, thick, reinforced concrete walls.

CPP-651

Compensatory measures taken to reduce the probability of a fire hose flooding of the racks included administrative controls and a Halon fire suppression system. An inadvertent criticality due to seismic damage and moderator introduction is prevented by precluding water sources in the vault, positioning cadmium poison in the racks, and utilization of a seismically qualified facility.

Aging Facilities (Institutional Vulnerability)

Limitations on the amount of HEU in any one facility location, combined with numerous barriers, help reduce the severity of any possible release.

RWMC ILTSF

The substantial thickness of the outer and inner containers of the DOT 6M drums will resist significant corrosion. The spacing material between the inner and outer containers will not readily disappear from natural processes, and will significantly resist rearrangement of the inner container array configuration. The drums are packed six at a time into metal bins, with three bins to a cargo container. Considering this spacing, which would not likely disappear even with severe corrosion, a criticality is still extremely unlikely, but the resulting configuration has not been analyzed. Even if a criticality should occur, the shield wall around the cargo containers would provide significant shielding.

RWMC TSA Pads

Moisture barriers are built into the container stack between the stack and the earth cover. For about the last year, the earth covered pads have been covered by the steel structure of the TSA Retrieval Enclosure. The substantial thickness of the outer and inner containers will resist significant corrosion. The spacing material between inner and outer containers will not readily disappear from natural processes and will significantly resist rearrangement of the inner container array configuration. Even if a criticality should occur, surrounding waste containers and the earth cover over the pad would provide significant shielding.

APPENDIX C

SITE ASSESSMENT TEAM
VULNERABILITY ASSESSMENT FORMS

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Appendix C
Site Assessment Team Vulnerability Assessment Forms
Index

Vulnerability ID Number	Executive Summary	Report Section Reference
INEL/CPP-640/SAT/01	A few large volume, unsafe geometry vessels in the Mechanical Handling Cave and Cells 3&4 of the Rover facility contain large amounts of uranium. While dry, these vessels are critically safe. The addition of moderator to a vessel, however, could create a critical system. Also the addition of moderator into a process cell, combined with a spill of material from one of the vessels, could result in a criticality on the cell floor. This facility relies on maintaining tight control on the amount of moderator present in order to remain critically safe. The roof of the facility leaks. Water exists in the lower level of the fire sprinkler system, but the system is isolated from the upper level.	2.1.5
INEL/CPP-640/SAT/02	CPP-640, which houses the Rover process system, is not seismically qualified to current standards (built in 1961). The process cell walls are thick, reinforced concrete shielding walls and appear to be structurally sound. A severe earthquake could potentially cause structural damage, compromising process vessels and other confinement features, resulting in localized spread of contamination. The CPP-640 roof is not qualified to withstand extreme winds, and wind failure of the roof could cause damage to confinement features in the MHC area of the Rover system, resulting in localized contamination spread and loss of strict moderator control.	2.1.5
INEL/CPP-651/SAT/03	Fuel storage racks containing LANL material in Room 102 of CPP-651 do not meet design requirements of ≤ 0.95 Keff when the cans are fully flooded and loaded to the maximum allowable U-235 limit.	2.1.6
INEL/CPP-651/SAT/04	CPP-651 inner building (north and south vaults) and south vault fuel storage racks have not been verified to be seismically qualified. A seismic event could cause a failure of the inner building which supports all fuel storage racks. Damage to fuel storage racks and rack supports could result in criticality due to loss of geometry.	2.1.6

Vulnerability ID Number	Executive Summary	Report Section Reference
INEL/SAT/05	Collectively, these facilities increase the probability that an incident with HEU could happen in one of these facilities, in the next 5-10 years. Although the quantity of material in each facility is low, reducing the severity at each site, a problem still exists in storing small quantities of inactive HEU throughout the INEL.	
INEL/RWMC-ILTSF/SAT/06	Corrosion of containers in the shielded configuration is possible. Criticality safety of the U-233 containers is based on an assumption of arrays of intact containers maintaining a designed spacing. If that spacing is lost, criticality becomes possible, although extremely unlikely.	2.3.3
INEL/RWMC-TSA/SAT/07	Corrosion of containers is possible, although moisture barriers are built into the earth covered container stack. Criticality safety of the U-233 containers is based on an assumption of arrays of intact containers maintaining a designed spacing. If that spacing is lost, criticality becomes possible.	2.3.2

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-640/SAT/01

Block 1: *Title of the Vulnerability. (<20 words)*

Possibility of Loss of Moderator Control in CPP-640 (Rover Facility).

Block 2: *Executive Summary. (<50 words) Concise description of the sequence of events leading to the vulnerability.*

A few large volume, unsafe geometry vessels in the Mechanical Handling Cave and Cells 3&4 of the Rover Facility, contain large amounts of uranium. While dry, these vessels are critically safe. The addition of moderator to a vessel, however, could create a critical system. Also, the addition of moderator into a process cell, combined with a spill of material from one of the vessels, could result in a criticality on the cell floor. This facility relies on maintaining tight control on the amount of moderator present in order to remain critically safe. The roof of the facility leaks. Water exists in the lower levels of the fire sprinkler system, but the system is isolated from the upper level.

Block 3: *Describe the condition or weakness, including the material, material form, quantity (if unclassified), packaging type and number of packages, and facility and other barriers that contribute to the vulnerability.*

Vulnerability Description/Information	
Material and material form	Oxides
Material at risk (approximate mass [kg] and composition of material which may participate in the release—not necessarily the inventory of material at a given location)	160.0
Packaging type and number of packages	V7 (flanged); 3 packages
Facility and other barriers	Isolated cell within a confined facility.
Condition or weakness	Roof leaks, penetrations exist in cell walls.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-640/SAT/01

Block 4: *Potential causes and effects of barrier failure that contribute to the vulnerability.*

Floor Criticality:

Causes: Loss of moderator control could result from leaky roof or rupture of fire sprinkler lines.

Effects: Loss of moderator control combined with a spill of HEU material from a vessel could result in a criticality on the cell floor.

Vessel Criticality:

Causes: Moderator could enter a process vessel via piping connected to the vessel.

Effects: Addition of moderator into a process vessel containing HEU material could result in a criticality in the process vessel.

Block 5: *Compensatory measures that reduce the severity of the vulnerability.*

Floor Criticality:

Tarps have been placed over the MHC and Cells 3/4 containment tents as an additional deterrent to moderator entering the areas in question. Surveillance is conducted every six hours to check for moderator intrusion, fire hazards, and ventilation operability. Tarps are verified weekly. Fire safety personnel also inspect weekly for fire hazards and combustible loading.

Vessel Criticality:

The process vessels have been isolated from moderator sources. Piping leading to the vessels has been cut and capped.

Block 6: *Possible consequences of the vulnerability.*

Loss of moderator control could result in a criticality on the cell floor or in a process vessel.

ES&H Vulnerability Assessment Form
Vulnerability # INEL/CPP-640/SAT/01
Block 7: *Time period in which the consequences of the vulnerability might occur (e.g., 0 to 5 years; 5 years to facility end-of-life; may not occur during facility lifetime).* Such an event is not expected during the next two years at which time all HEU will be removed from the facility.
Block 8: *Comments, views, or plans by the site operations office and site contractor relative to mitigating or minimizing any potential vulnerability. Describe the plan and schedule of corrective actions (if any).* This facility is in a deactivation phase and the HEU material is scheduled for removal by September 1998.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-640/SAT/01

Block 9: *Database information.* **NOT APPLICABLE FOR CRITICALITY**

Radionuclide Source Parameters

Isotope	Physical Form	Chemical Form	MAR_i (g)

Collocated Chemicals and Release Products

Chemical		Release Product	
Name	Mass (g)	Name	Mass (g)

Release Path Parameters[1]

Chemical Form and Release Products	DR_i	ARF_i	RF_i	LPF_i

Exposure Parameters[1]

Chemical Form and Release Products	V (meter³)	t (minutes)	ΔT (minutes)	X/Q	
				Ex-facility	Public

Block 10: *Comments and references for parameter selection.*

ES&H Vulnerability Assessment Form		
Vulnerability # INEL/CPP-640/SAT/01		
Signature, Team Member (Chuck Stuart)	Date	
Signature, Team Leader	Date	

1. Described in the Assessment Plan.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-640/SAT/02

Block 1: *Title of the Vulnerability. (<20 words)*

Potential compromise of confinement structures due to severe earthquake or extreme winds.

Block 2: *Executive Summary. (<50 words) Concise description of the sequence of events leading to the vulnerability.*

CPP-640, which houses the Rover process system, is not seismically qualified to current standards (built in 1961). The process cell walls are thick, reinforced concrete shielding walls and appear to be structurally sound. A severe earthquake could potentially cause structural damage, compromising process vessels and other confinement features, resulting in localized spread of contamination. The CPP-640 roof is not qualified to withstand extreme winds and wind failure of the roof could cause damage to confinement features in the MHC area of the Rover system, resulting in localized contamination spread and loss of strict moderator control.

Block 3: *Describe the condition or weakness, including the material, material form, quantity (if unclassified), packaging type and number of packages, and facility and other barriers that contribute to the vulnerability.*

Vulnerability Description/Information	
Material and material form	Oxides
Material at risk (approximate mass [kg] and composition of material which may participate in the release—not necessarily the inventory of material at a given location)	160
Packaging type and number of packages	V7 (flanged); 3 packages
Facility and other barriers	Worker Barriers: Gloveboxes, confinement tents, ducts, filters, hot cell, piping and tanks.
Condition or weakness	Facility and inner structures are not seismically or wind qualified.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-640/SAT/02

Block 4: *Potential causes and effects of barrier failure that contribute to the vulnerability.*

Causes: Earthquakes and high winds.

Effects: Structural failure, equipment failure, material release, loss of building integrity, localized contamination spread.

Block 5: *Compensatory measures that reduce the severity of the vulnerability.*

The central portion of the building housing the Rover system consists of thick, reinforced concrete walls for shielding purposes and is considered rather robust. The mechanical handling cave and process equipment of the Rover project was designed to withstand the design basis earthquake at the time (0.24g horiz., 0.16g vert.). DOE-STD-1020-94 is currently 0.24g for PC4 and 0.17g for PC3.

Block 6: *Possible consequences of the vulnerability.*

Although building CPP-640 is not qualified for seismic or high wind loading, based on the information above, resistance is expected to be quite good. Possible consequences would likely be limited to contamination and exposure of workers.

Block 7: *Time period in which the consequences of the vulnerability might occur (e.g., 0 to 5 years; 5 years to facility end-of-life; may not occur during facility lifetime).*

This event is not expected to occur during the remaining lifetime of the facility. (2 - 5 years)

Block 8: *Comments, views, or plans by the site operations office and site contractor relative to mitigating or minimizing any potential vulnerability. Describe the plan and schedule of corrective actions (if any).*

This facility is in a deactivation phase and the HEU material is scheduled for removal by September 1998.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-640/SAT/02

Block 9: *Database information.*

Radionuclide Source Parameters

Isotope	Physical Form	Chemical Form	MAR_I (g)
U-235	Ash/Powder	Oxides	160,000

Collocated Chemicals and Release Products

Chemical		Release Product	
Name	Mass (g)	Name	Mass (g)
None			

Release Path Parameters[1]

Chemical Form and Release Products	DR_I	ARF_I	RF_I	LPF_I
Uranium Oxides	1.00	2×10^{-3}	.3	10^{-6}

Exposure Parameters[1]

Chemical Form and Release Products	V (meter^3)	t (minutes)	ΔT (minutes)	X/Q	
				Ex-facility	Public
Uranium Oxides	4×10^3	0	5	10^{-2}	10^{-6}

Block 10: *Comments and references for parameter selection.*

ES&H Vulnerability Assessment Form	
Vulnerability # INEL/CPP-640/SAT/02	
Signature, Team Member (Richard Rahl)	Date
Signature, Team Leader	Date

1. Described in the Assessment Plan.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-651/SAT/03

Block 1: *Title of the Vulnerability. (<20 words)*

Potential Flooding of Fully Loaded Cans

Block 2: *Executive Summary. (<50 words) Concise description of the sequence of events leading to the vulnerability.*

Fuel storage racks containing LANL material in Room 102 of CPP-651 do not meet design requirements of ≤ 0.95 Keff when the cans are fully flooded and loaded to the maximum allowable U-235 limit.

Block 3: *Describe the condition or weakness, including the material, material form, quantity (if unclassified), packaging type and number of packages, and facility and other barriers that contribute to the vulnerability.*

Vulnerability Description/Information	
Material and material form	U-235, various oxides and carbides of uranium mixed with graphite
Material at risk (approximate mass [kg] and composition of material which may participate in the release—not necessarily the inventory of material at a given location)	All fuel stored in the Area 102 LANL racks, up to 1500 kg
Packaging type and number of packages	Up to 660 cans
Facility and other barriers	CPP-651 South Vault and CPP-651 outer building
Condition or weakness	LANL fuel storage racks in Room 102 of CPP-651 do not meet design requirements of ≤ 0.95 Keff when the racks are fully flooded and loaded to the maximum allowable U-235 limit.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-651/SAT/03

Block 4: *Potential causes and effects of barrier failure that contribute to the vulnerability.*

Cause: Due to a fire in South Vault of CPP-651, fire fighters may spray water on LANL fuel storage racks, causing a number of cans (which are not water tight) to fill with water.

Effects: Criticality if the cans that fill with water are loaded at or near maximum U-235 loading limit and sufficient number of cans completely fill up.

Block 5: *Compensatory measures that reduce the severity of the vulnerability.*

Compensatory measures to reduce the possibility of fire hose flooding of the LANL racks are:

1. Administrative controls on combustible materials brought into CPP-651.
2. Administrative combustible material floor loading limit in the South Vault of CPP-651.
3. Administrative control prohibiting smoking in CPP-651.
4. Haylon fire suppression system in the South Vault.

Block 6: *Possible consequences of the vulnerability.*

Flooding of LANL fuel cans in their stored positions could result in a criticality under certain conditions.

Block 7: *Time period in which the consequences of the vulnerability might occur (e.g., 0 to 5 years; 5 years to facility end-of-life; may not occur during facility lifetime).*

Such an event is not expected during the next 40 years, the remaining lifetime of this facility.

Block 8: *Comments, views, or plans by the site operations office and site contractor relative to mitigating or minimizing any potential vulnerability. Describe the plan and schedule of corrective actions (if any).*

Current plans (pending approval) call for shipping this material to Oak Ridge National Laboratory beginning in FY 1998.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-651/SAT/03

Block 9: *Database information.* **NOT APPLICABLE FOR A CRITICALITY**

Radionuclide Source Parameters

Isotope	Physical Form	Chemical Form	MAR_i (g)

Collocated Chemicals and Release Products

Chemical		Release Product	
Name	Mass (g)	Name	Mass (g)

Release Path Parameters[1]

Chemical Form and Release Products	DR_i	ARF_i	RF_i	LPF_i

Exposure Parameters[1]

Chemical Form and Release Products	V (meter^3)	t (minutes)	ΔT (minutes)	X/Q	
				Ex-facility	Public

Block 10: *Comments and references for parameter selection.*

ES&H Vulnerability Assessment Form	
Vulnerability # INEL/CPP-651/SAT/03	
Signature, Team Member	Date
Signature, Team Leader	Date

1. Described in the Assessment Plan.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-651/SAT/04

Block 1: *Title of the Vulnerability. (<20 words)*

Lack of seismic quantities of storage recess.

Block 2: *Executive Summary. (<50 words) Concise description of the sequence of events leading to the vulnerability.*

CPP-651 inner building (north and south vaults) and south vault fuel storage racks have not been verified to be seismically qualified. A seismic event could cause a failure of the inner building which supports all fuel storage racks. Damage to fuel storage racks and rack supports could result in criticality due to loss of geometry.

Block 3: *Describe the condition or weakness, including the material, material form, quantity (if unclassified), packaging type and number of packages, and facility and other barriers that contribute to the vulnerability.*

Vulnerability Description/Information	
Material and material form	U-235 various form (metal, oxide, compound, alloy)
Material at risk (approximate mass [kg] and composition of material which may participate in the release—not necessarily the inventory of material at a given location)	All fuel stored in CPP-651 north and south vaults, up to 2400 kg U-235
Packaging type and number of packages	Up to 416 drums, 1141 can rack positions, 130 fluorinel rack positions, 1440 sample cabinet positions, and 7 PWR boxes
Facility and other barriers	CPP-651 outer building
Condition or weakness	CPP-651 inner building (north and south vaults) and south vault fluorinel fuel storage racks have not been verified to be seismically qualified.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-651/SAT/04

Block 4: *Potential causes and effects of barrier failure that contribute to the vulnerability.*

Cause: Earthquake may cause CPP-651 inner building (north and/or south vaults) and racks to collapse.

Effect: Criticality due to loss of fixed spacing (geometry).

Block 5: *Compensatory measures that reduce the severity of the vulnerability.*

In order for criticality to become a possibility, the loss of fixed spacing would probably require the addition of moderator to become a concern. Measures to mitigate this vulnerability include:

1. No water sources in the south vault of CPP-651.
2. Cadmium poison exists between positions in the fluorinel racks, PWR boxes, and sample cabinet.
3. The outer CPP-651 building is seismically qualified.

Block 6: *Possible consequences of the vulnerability.*

Failure of the inner building and racks could result in a criticality under certain conditions.

Block 7: *Time period in which the consequences of the vulnerability might occur (e.g., 0 to 5 years; 5 years to facility end-of-life; may not occur during facility lifetime).*

Such an event is not expected during the next 40 years, the remaining lifetime of this facility.

Block 8: *Comments, views, or plans by the site operations office and site contractor relative to mitigating or minimizing any potential vulnerability. Describe the plan and schedule of corrective actions (if any).*

Current plans (pending approval) call for shipping this material to Oak Ridge National Laboratory or the Savannah River Site beginning in FY-1997.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/CPP-651/SAT/04

Block 9: *Database information.* **NOT APPLICABLE FOR A CRITICALITY**

Radionuclide Source Parameters

Isotope	Physical Form	Chemical Form	MAR_i (g)

Collocated Chemicals and Release Products

Chemical		Release Product	
Name	Mass (g)	Name	Mass (g)

Release Path Parameters[1]

Chemical Form and Release Products	DR_i	ARF_i	RF_i	LPF_i

Exposure Parameters[1]

Chemical Form and Release Products	V (meter^3)	t (minutes)	ΔT (minutes)	X/Q	
				Ex-facility	Public

Block 10: *Comments and references for parameter selection.*

ES&H Vulnerability Assessment Form	
Vulnerability # INEL/CPP-651/SAT/04	
Signature, Team Member	Date
Signature, Team Leader	Date

1. Described in the Assessment Plan.

ES&H Vulnerability Assessment Form
Vulnerability # INEL/SAT/05
Block 1: *Title of the Vulnerability. (<20 words)* Aging facilities with inactive quantities of HEU.
Block 2: *Executive Summary. (<50 words) Concise description of the sequence of events leading to the vulnerability.* Numerous aging facilities throughout the INEL contain small amounts of inactive HEU which collectively pose a higher probability of spread of contamination. Collectively, these facilities increase the probability that an incident with HEU could happen in one of these facilities, in the next 5-10 years. Although the quantity of material in each facility is low, reducing the severity at each site, a problem still exists in storing small quantities of inactive HEU throughout the INEL.
Block 3: *Describe the condition or weakness, including the material, material form, quantity (if unclassified), packaging type and number of packages, and facility and other barriers that contribute to the vulnerability.*

Vulnerability Description/Information	
Material and material form	Various
Material at risk (approximate mass [kg] and composition of material which may participate in the release—not necessarily the inventory of material at a given location)	Limited to the contents of any one container being handled
Packaging type and number of packages	Various
Facility and other barriers	Various
Condition or weakness	Large number of storage locations increases the probability of an occurrence.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/SAT/05

Block 4: *Potential causes and effects of barrier failure that contribute to the vulnerability.*

With so many areas storing small amounts of HEU, and the wide range of different barrier types being used, increases the chance that one or more barriers could fail. The following is a list of facilities which have less than 350 g of HEU. This material is either not being used or is being stored in aging facilities or both

Small Quantity (<300 g) HEU

Building	Building Age	Form	Number of Locations
TRA 603	30 yrs	Standards and Samples	3
TRA 604	30 yrs	Standards and Samples	1
CPP 602	43 yrs	Reference Samples	6
CPP 627	41 yrs	Samples	3
CPP 637	10 yrs	Samples	3
CPP 657	43 yrs	Standards	1
CPP 666	11 yrs	Samples	1
RESL	33 yrs	Sealed Sources and Reference Standards	3

When a custodian does not have very much HEU to monitor, it becomes a lower priority. This by itself increases the chance of the HEU not being managed properly, and compromises the integrity of the barriers. The effects should be minimal and may include contamination of workers, and possible environmental release.

Block 5: *Compensatory measures that reduce the severity of the vulnerability.*

Small quantities of HEU in any one facility site, combined with numerous barriers, reduce the severity of a possible release.

Block 6: *Possible consequences of the vulnerability.*

If barriers are compromised there could be a slight contamination of workers and possibly the environment.

ES&H Vulnerability Assessment Form
Vulnerability # INEL/SAT/05
Block 7: *Time period in which the consequences of the vulnerability might occur (e.g., 0 to 5 years; 5 years to facility end-of-life; may not occur during facility lifetime).* 0 years to facility end of life.
Block 8: *Comments, views, or plans by the site operations office and site contractor relative to mitigating or minimizing any potential vulnerability. Describe the plan and schedule of corrective actions (if any).* Funding is needed to consolidate the HEU, currently being held in aging facilities, into more suitable long-range storage. There is no plan in place to correct this situation.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/SAT/05

Block 9: *Database information.*

Radionuclide Source Parameters

Isotope	Physical Form	Chemical Form	MAR (g)
U-235	Liquid	UNO_3	10

Collocated Chemicals and Release Products

Chemical		Release Product	
Name	Mass (g)	Name	Mass (g)

Release Path Parameters[1]

Chemical Form and Release Products	DR_i	ARF_i	RF_i	LPF_i
UNO_3	1.0	$2x10^{-4}$	.5	10^{-3}

Exposure Parameters[1]

Chemical Form and Release Products	V (meter[3])	t (minutes)	ΔT (minutes)	X/Q	
				Facility	Public
UNO_3	600		1	[illegible]	[illegible]

Block 10: *Comments and references for parameter selection.*

ES&H Vulnerability Assessment Form	
Vulnerability # INEL/SAT/05	
Signature, Team Member	Date
Signature, Team Leader	Date

1. Described in the Assessment Plan.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/RWMC-ILTSF/SAT/06

Block 1: *Title of the Vulnerability. (<20 words)*

Container Corrosion on ILTSF Pad.

Block 2: *Executive Summary. (<50 words) Concise description of the sequence of events leading to the vulnerability.*

Corrosion of containers in the shielded configuration is possible. Criticality safety of the U-233 containers is based on an assumption of arrays of intact containers maintaining a designed spacing. If that spacing is lost, criticality becomes possible, although extremely unlikely.

Block 3: *Describe the condition or weakness, including the material, material form, quantity (if unclassified), packaging type and number of packages, and facility and other barriers that contribute to the vulnerability.*

Vulnerability Description/Information	
Material and material form	U-233 in the form of UO_2 in intact fuel rods
Material at risk (approximate mass [kg] and composition of material which may participate in the release—not necessarily the inventory of material at a given location)	14.7 kg of U-233
Packaging type and number of packages	53 DOT specification 6M 110 gal drums
Facility and other barriers	Containers are in steel bins inside three metal cargo containers. The cargo containers are surrounded by a concrete block wall for shielding. DOT specification 6M drums, consisting of metal outer and inner containers, with spacing material in between. Criticality safety relies on mass limit per container and geometry, i.e., proper spacing of inner containers. Fuel cladding significant reduces the potential for material dispersion if the containers are breached.

ES&H Vulnerability Assessment Form	
Vulnerability # INEL/RWMC-ILTSF/SAT/06	
Condition or weakness	Corrosion of the cargo containers may cause water inleakage, which in turn, could cause the 6M drums to corrode. If the 6M drums corrode, they may not continue to provide the spacing of the inner containers on which the criticality analysis is based. The condition of the 6M drums or the cargo container roofs has not been inspected since 1994.

Block 4: *Potential causes and effects of barrier failure that contribute to the vulnerability.*

Potential causes and effects of barrier failure - Corrosion of the cargo container roofs may allow water to enter the container. Eventually, the metal bins in which the 6M drums are stored may fill with water. Then it is possible for the 6M drum outer and inner containers to corrode. Under those conditions, the spacing of the inner containers cannot be relied upon anymore.

Block 5: *Compensatory measures that reduce the severity of the vulnerability.*

The substantial thickness of the outer and inner containers of the 6M drums will resist corrosion. The spacing material between inner and outer containers will not readily disappear from natural processes, but will resist rearrangement of the inner container array configuration. The drums are packed six at a time into metal bins, with three bins to a cargo container. Considering this spacing (which would not likely disappear even with severe corrosion), a criticality is still extremely unlikely, but the resulting configuration is not analyzed. Even if a criticality should occur, the shield wall around the cargo containers would provide significant shielding.

Block 6: *Possible consequences of the vulnerability.*

Personnel exposure to excessive radiation.

Block 7: *Time period in which the consequences of the vulnerability might occur (e.g., 0 to 5 years; 5 years to facility end-of-life; may not occur during facility lifetime).*

It is unlikely that a criticality would occur during the next 15 years, the remaining lifetime of the facility.

ES&H Vulnerability Assessment Form
Vulnerability # INEL/RWMC-ILTSF/SAT/06
Block 8: *Comments, views, or plans by the site operations office and site contractor relative to mitigating or minimizing any potential vulnerability. Describe the plan and schedule of corrective actions (if any).* Plans are being developed to transfer the 6M drums to a more secure and observable location.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/RWMC-ILTSF/SAT/06

Block 9: *Database information.* **NOT APPLICABLE FOR CRITICALITY**

Radionuclide Source Parameters

Isotope	Physical Form	Chemical Form	MAR_i (g)

Collocated Chemicals and Release Products

Chemical		Release Product	
Name	Mass (g)	Name	Mass (g)

Release Path Parameters[1]

Chemical Form and Release Products	DR_i	ARF_i	RF_i	LPF_i

Exposure Parameters[1]

Chemical Form and Release Products	V (meter^3)	t (minutes)	ΔT (minutes)	X/Q	
				Ex-facility	Public

Block 10: *Comments and references for parameter selection.*

ES&H Vulnerability Assessment Form	
Vulnerability # INEL/RWMC-ILTSF/SAT/06	
Signature, Team Member	Date
Signature, Team Leader	Date

1. Described in the Assessment Plan.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/RWMC-TSA/SAT/07

Block 1: *Title of the Vulnerability. (<20 words)*

Container corrosion on TSA Pads.

Block 2: *Executive Summary. (<50 words) Concise description of the sequence of events leading to the vulnerability.*

Corrosion of containers is possible, although moisture barriers are built into the earth covered container stack. Criticality safety of the U-233 containers is based on an assumption of arrays of intact containers maintaining a designed spacing. If that spacing is lost, criticality becomes possible.

Block 3: *Describe the condition or weakness, including the material, material form, quantity (if unclassified), packaging type and number of packages, and facility and other barriers that contribute to the vulnerability.*

Vulnerability Description/Information	
Material and material form	U-233 in the form of UO_2 pellets in metal cans, intact or partial fuel rods, and "solidified grinding sludge" from the manufacture of fuel pellets.
Material at risk (approximate mass [kg] and composition of material which may participate in the release—not necessarily the inventory of material at a given location)	Less than 50 kg of U-233
Packaging type and number of packages	Approximately 150 DOT specification 6M drums.

ES&H Vulnerability Assessment Form	
Vulnerability # INEL/RWMC-TSA/SAT/07	
Facility and other barriers	Earth covered container arrays with built-in moisture barriers; TSA Retrieval building over earth cover. DOT specification 6M drums, consisting of metal outer and inner containers, with spacing material in between. Criticality safety relies on mass limit per container and geometry, i.e., proper spacing of inner containers. Fuel cladding significantly reduces the potential for material dispersion if the containers are breached.
Condition or weakness	Corrosion of containers is possible and cannot be observed if it takes place.

Block 4: *Potential causes and effects of barrier failure that contribute to the vulnerability.*

Corrosion of outer and inner containers, combined with pressure of the container stacks and earth cover, could rearrange the container array, destroying the array geometry that criticality safety relies on.

Block 5: *Compensatory measures that reduce the severity of the vulnerability.*

Moisture barriers are built into the container stack between the stack and the earth cover. For about the last year, the earth covered pads have been covered by the steel structure of the TSA Retrieval Enclosure. The substantial thickness of the outer and inner containers will resist corrosion. The spacing material between inner and outer containers will not readily disappear from natural processes and will resist rearrangement of the inner container array configuration. Even if a criticality should occur, surrounding waste containers and the earth cover over the pad would provide significant shielding.

Block 6: *Possible consequences of the vulnerability.*

Personnel exposure to excessive radiation from a criticality.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/RWMC-TSA/SAT/07

Block 1: *Title of the Vulnerability. (<20 words)*

Container corrosion on TSA Pads.

Block 2: *Executive Summary. (<50 words) Concise description of the sequence of events leading to the vulnerability.*

Corrosion of containers is possible, although moisture barriers are built into the earth covered container stack. Criticality safety of the U-233 containers is based on an assumption of arrays of intact containers maintaining a designed spacing. If that spacing is lost, criticality becomes possible.

Block 3: *Describe the condition or weakness, including the material, material form, quantity (if unclassified), packaging type and number of packages, and facility and other barriers that contribute to the vulnerability.*

Vulnerability Description/Information	
Material and material form	U-233 in the form of UO_2 pellets in metal cans, intact or partial fuel rods, and "solidified grinding sludge" from the manufacture of fuel pellets.
Material at risk (approximate mass [kg] and composition of material which may participate in the release—not necessarily the inventory of material at a given location)	Less than 50 kg of U-233
Packaging type and number of packages	Approximately 150 DOT specification 6M drums.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/RWMC-TSA/SAT/07

Facility and other barriers	Earth covered container arrays with built-in moisture barriers; TSA Retrieval building over earth cover. DOT specification 6M drums, consisting of metal outer and inner containers, with spacing material in between. Criticality safety relies on mass limit per container and geometry, i.e., proper spacing of inner containers. Fuel cladding significantly reduces the potential for material dispersion if the containers are breached.
Condition or weakness	Corrosion of containers is possible and cannot be observed if it takes place.

Block 4: *Potential causes and effects of barrier failure that contribute to the vulnerability.*

Corrosion of outer and inner containers, combined with pressure of the container stacks and earth cover, could rearrange the container array, destroying the array geometry that criticality safety relies on.

Block 5: *Compensatory measures that reduce the severity of the vulnerability.*

Moisture barriers are built into the container stack between the stack and the earth cover. For about the last year, the earth covered pads have been covered by the steel structure of the TSA Retrieval Enclosure. The substantial thickness of the outer and inner containers will resist corrosion. The spacing material between inner and outer containers will not readily disappear from natural processes and will resist rearrangement of the inner container array configuration. Even if a criticality should occur, surrounding waste containers and the earth cover over the pad would provide significant shielding.

Block 6: *Possible consequences of the vulnerability.*

Personnel exposure to excessive radiation from a criticality.

ES&H Vulnerability Assessment Form

Vulnerability # INEL/RWMC-TSA/SAT/07

Block 9: *Database information.* **NOT APPLICABLE FOR CRITICALITY**

Radionuclide Source Parameters

Isotope	Physical Form	Chemical Form	MAR_i (g)

Collocated Chemicals and Release Products

Chemical		Release Product	
Name	Mass (g)	Name	Mass (g)

Release Path Parameters[1]

Chemical Form and Release Products	DR_i	ARF_i	RF_i	LPF_i

Exposure Parameters[1]

Chemical Form and Release Products	V (meter^3)	t (minutes)	ΔT (minutes)	X/Q	
				Ex-facility	Public

Block 10: *Comments and references for parameter selection.*

ES&H Vulnerability Assessment Form	
Vulnerability # INEL/RWMC-TSA/SAT/07	
Signature, Team Member	Date
Signature, Team Leader	Date

1. Described in the Assessment Plan.

APPENDIX D

SITE ASSESSMENT TEAM REFERENCES

Appendix D
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APPENDIX E

SITE ASSESSMENT TEAM INEL SNF FACILITIES SUPPLEMENTAL SITE VULNERABILTIY ASSESSMENT

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Appendix E
INEL SNF Facilities Supplemental Site Vulnerability Assessment

The HEU Vulnerability Assessment Project Leader has requested that the INEL evaluate any spent fuel containing HEU that was not included in the Spent Fuel Vulnerability Assessment (Reference 1). This evaluation has been completed in response to that request.

There are several spent fuel changes that have occurred or are occurring at the INEL and identified to the HEU Vulnerability Assessment Team that meet the scope of the HEU Vulnerability Assessment. These include fuel movements between facilities, new issues identified at some of the facilities, ongoing and anticipated fuel receipts, and spent fuel not previously identified to the Spent Fuel Vulnerability Assessment Team. These are listed below by affected facility and will be addressed further in the responses to the assessment questions. The HEU Vulnerability Assessment Team reviewed these changes and concluded that they did not constitute any new vulnerabilities because of their close relationship to the corrective actions being taken for the Spent Fuel Vulnerability Assessment (Reference 2).

CPP-603

1. As the result of NDE inspections performed on the EBR-II fuel during the full 100% inspection of the fuels in the CPP-603 basins [which was Corrective Action ID.W. 1.2a, b, and c in the Phase III Plan of Action to Resolve Spent Nuclear Fuel Vulnerabilities (Corrective Action Plan)], there are 14 cans of EBR-II fuel found to have had water inleakage. The NDE inspections show that varying amounts of water is in these cans, and that some of the spent fuel may already have deteriorated into a sludge-like material. An action item will be added to the Corrective Action Plan to establish a path forward for interim storage and ultimate disposition of these cans.

CPP-603 IFSF

2. The canning station has been installed in the IFSF fuel handling cell as Corrective Action ID.W.1.1g. This is a new system that will dry and package spent fuel from the CPP-603 basins and other facilities at the INEL and perhaps the DOE complex to prepare the fuel for interim dry storage. There are no perceived vulnerabilities with this station by the Site Assessment Team, and this was agreed with by the WGAT.

Foreign spent fuel receipts will be received into this facility. The issue is described in item 5 under the CPP-666 facility.

CPP-666

3. The reracking project to add additional spent fuel storage capacity is currently in progress. Taller racks, with increased storage density are being installed in Storage Pool 1. The additional capacity will provide storage space for the spent fuel being transferred from the CPP-603 basins, from foreign research reactors and from the Naval spent fuel program. The seismic studies that were completed to support this project identified some structural deficiencies with the concrete walls in the pool area. This was identified as an Unreviewed Safety Question. Resolution of this USQ is currently ongoing and will be part of the updated Plant Safety Document, which is Corrective Action ID.W.2.2.c in the Corrective Action Plan.

4. During the preparations for the reracking project, the racks from Pool 1 were placed into the tr channel and have been loaded with spent fuel. During the loading operations at the north end transfer channel, a radiation stream into the adjacent empty cutting pool occurred. This prom USQ and a resultant evaluation of all the possibly occupied areas around the storage pools that have been affected by higher radiation levels because of the reracking efforts. This USQ will a addressed in Corrective Action ID.W.2.2.c.

5. The Record of Decision has been reached on the receipt of foreign research reactor fuel ir United States. The TRIGA fuel will be sent to the INEL, with the first shipment to occur as soon as 1997. Preparations to receive this fuel into the CPP-666 pools or into the CPP-603 IFSF are just initiated. The WGAT identified three issues that should be addressed during the preparations for r of this fuel: (1) characterization of the new fuel, (2) compatibility with other materials in the poc (3) quality of water, etc. These issues have been of primary concern and are being addressed spent fuel receipts from foreign reactors to the INEL and the Savannah River Site. The Implemer Strategy Plan for Foreign Research Reactor Spent Nuclear Fuel Shipments issued by Jill Lytle le July 1, 1996 describes the steps being taken to ensure that this fuel will be properly characterize in appropriate condition for receipt into the DOE interim storage facilities.

6. Repackaging of the existing Naval and ATR fuels to consolidate the fuels into more efficient s is occurring. This is not a vulnerability, and the repackaging efforts were fully analyzed through Analysis Report addendums prior to initiation of the work.

MTR-603

7. The MTR facility includes "plug storage" capabilities, which were not addressed in the Sper Vulnerability Assessment. This plug storage consists of horizontal tubes that extend from a co wall into a dirt berm. Two of the tubes contain remnants of the PBF program spent fuel samples. samples are being included in the program to remove all spent fuel from the MTR facility for Cor Action ID.E.3.1.e.

8. There are several drums that contain sample residues from the TMI characterization program. residues include acidic and basic solutions and possibly other residue forms. These samples do fissile material. The drums are currently being opened to confirm perceived knowledge of the cc A plan for disposition of these drums to the appropriate INEL waste streams is being prepar action item will be added to the Corrective Action Plan under ID.E.3.1 to track this disposition

RWMC

9. The RWMIS (radioactive waste management inventory system) data base shows that som containers stored at the RWMC hold spent fuel materials that were shipped as waste. This is been raised publicly by INEL stakeholders. Disposition of this material has been addresse RWMC management and is not considered a vulnerability.

Reference 1. Sarbes Acharya (EH-32), HEU Vulnerability Assessment Project Leader, to H Assessment Team Co-Leaders et al, "Simplifying Guidance for ES&H Vulnerability Assessment Containing Spent Fuel Not Previously Evaluated," May 9, 1996

Reference 2. "Spent Fuel Working Group Report on Inventory and Storage of the Department's Spent Nuclear Fuel and Other Reactor Irradiated Nuclear Materials and Their Environmental, Safety, and Health Vulnerabilities," DOE, December 7, 1993.

Question 1. *What is your inventory of Reactor Irradiated Nuclear Material (RINM)?*

The current inventory of Reactor Irradiated Nuclear Material at the INEL is obtainable from the INEL Nuclear Materials Management organization.

There is buried fuel at the RWMC that was not previously assessed. This material consists of spent fuel pieces that were declared as waste and then accepted at the RWMC. This material is in miscellaneous waste boxes commingled with the thousands of other waste boxes stored at the RWMC. This material is described on the RWMIS data base that tracks the RWMC inventory. The material is not the same material (i.e., U-233) addressed in the main body of this report and located at the RWMC TSA, ASB-II, and ILTSC facilities.

There is no irradiated material stored in inactive reactors at the INEL beyond that previously described in the SNF Vulnerability Assessment.

The classified RINH at the INEL consists of the Naval fuel already covered in the Spent Fuel Vulnerability Assessment, or the unirradiated materials from the Naval program, which was included in the HEU site assessment.

The TMI sample materials in the storage drums at TRA are potentially hazardous. To date, only one drum has been opened, and it contained corroded paint cans that in turn had plastic vials of acidic and basic solutions. These are hazardous materials, and a proper management control system is being set up to store them. The remaining drums will be opened to confirm knowledge of their contents, and a disposition plan is being prepared.

Approximately one metric ton of heavy metal will be received in the foreign research reactor spent fuel that has been assigned to the INEL. This fuel consists of aluminum and stainless steel TRIGA fuels.

Question 2. *What is the material condition of your Reactor Irradiated Nuclear Materials?*

The new materials identified in this supplemental response include the TMI sample materials, the PBF sample remains in the MTR plug storage, the buried material in the RWMC, the EBR-II containers within the CPP-603 basins examined by the new NDE equipment, and the spent fuel that will be accepted from the foreign research reactors.

The material condition of the TMI sample materials is largely unknown. The one drum of TMI sample residues contains the corroded paint cans of acidic and basic solutions, which is considered to be inadequate because of the potential for loss of containment, acid-base reactions, etc. A task to inspect and evaluate the materials in the remaining drums is being planned.

The PBF materials in the plug storage have not been inspected for a significant time. However, the program to move the materials from the MTR canal also includes removal of the material from plug storage. Appropriate inspections will be accomplished to characterize these materials prior to movement.

We will not be able to inspect the materials buried at the RWMC.

When the containers underwent the 100% visual inspection, it was noticed that nine EBR-II containers had bubbles emanating from the Swagelok fittings that serve as the lid of the containers. When the new

NDE equipment was used to check for water levels inside the containers, all of the containers were found to have considerable quantities of water. In addition, other containers with no outward evidence of any problems were found to contain water. In addition, the NDE equipment was able to show that some of the EBR-II fuel has deteriorated to sludge, which indicates that the fuel is falling apart. The exact condition of the fuel and sludge in the containers is not known at this time.

The condition of the foreign TRIGA fuels that will be shipped to the INEL are unknown. There are reports that the foreign research reactor operators may not have adequate records for the fuels, and that the existing storage facility conditions may not have been maintained adequately for appropriate protection of the spent fuel. The INEL has participated in development of a detailed implementation plan for receipt of this fuel, and this issue was addressed.

Question 3. *What is your water quality (or coolant quality) conditions?*

This question is inapplicable to the new materials identified.

Question 4. *What is the condition of your facility (facility includes safety systems, structures, and equipment)?*

The CPP-666 facility new issues involved the addition of the new storage racks and the placement of the racks from Pool 1 into the transfer channel for interim storage space pending the installation and readiness assessment of the new Pool 1 racks. Two issues are being considered.

a. The seismic calculations being completed for the reracking project have shown that there are calculated structural overloads within the CPP-666 fuel storage basins in the event of a design-basis earthquake. A USQ evaluation has been prepared and submitted to DOE. Resolution of this issue is underway.

b. A USQ evaluation for the incident involving the radiation streaming through the cutting pool gate was submitted to DOE and accepted. Resolution of this issue is underway.

The canning station just installed in the CPP-603 IFSF fuel handling cell is a new system. There are no specific vulnerabilities identified.

Additional equipment will be necessary for receipt of the foreign research reactor TRIGA fuels. The fuel will probably be received into the CPP-603 IFSF and the CPP-666 facilities. Facility modifications and equipment will be required to accept the intended shipping casks, and the appropriate documentation and personnel training will need to be completed prior to shipment receipts. The shipment program will also include technical assistance to the foreign research reactor operators in assessing the fuel, preparing the fuel for shipment, and loading it into the shipping casks. Support will be provided to the states, Indian tribes, and other cognizant authorities on the shipment routes to provide radiological and security coverage of the shipments.

Question 5. *Are there any significant ES&H open issues?*

There are significant ES&H issues. These are identified in the responses to the earlier questions.

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