

## **Management Control Procedure**

# **Receipt of Spent Nuclear Fuel**

**Idaho  
Cleanup  
Project**

CH2M ♦ WG Idaho, LLC is the Idaho Cleanup Project contractor for the U.S. Department of Energy

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## ACRONYMS

ALARA	as low as reasonably achievable
ANSI/ANS	American National Standards Institute/American Nuclear Society
ATR	Advanced Test Reactor
BEA	Battelle Energy Alliance
CFL	central file location
CFR	Code of Federal Regulations
C of C	certificate of compliance
CPP	Chemical Processing Plant, currently INTEC
CSE	criticality safety evaluation
CWI	CH2M•WG Idaho, LLC
DOE	U. S. Department of Energy
DOE-HQ	U. S. Department of Energy - Headquarters
DOE-ID	U. S. Department of Energy, Idaho Operations Office
DRR	domestic research reactor
EDMS	Electronic Document Management system
ES&H	Environmental, Safety & Health
FCF	Facility Change Forms
FHU	fuel handling unit
FRC	Fuel Receipt Criteria
FRCo	fuel receipt coordinator
FRR	foreign research reactor
GFSI	Government Furnished Services and Information
GNS	Gesellschaft für Nuklear-Service
H&R	hoisting and rigging
ICP	Idaho Cleanup Project
IFSF	Irradiated Fuel Storage Facility
IMI	Impact Measurement Index
INL	Idaho National Laboratory

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INTEC	Idaho Nuclear Technology and Engineering Center
ISO	International Standard Organization
MBA	material balance area
MCP	management control procedure
NAC-LWT	Nuclear Assurance Corporation-legal weight truck
NEPA	National Environmental Policy Act
NMC	nuclear material custodian
NMD	Nuclear Material Disposition
NQA	Nuclear Quality Assurance Standard
NRC	Nuclear Regulatory Commission
OSB	Operational Safety Board
QA	Quality Assurance
RCRA	Resource Conservation Recovery Act
RSD	required shipper's data
RTC	Reactor Technology Complex
RW	DOE Office of Civilian Radioactive Waste Management
RWP	radiological work permit
SAR	Safety Analysis Report
SARP	safety analysis report for packaging
SME	subject matter expert
SNF	spent nuclear fuel
SNM	special nuclear material
T&FR	technical and functional requirements
TID	tamper indicating device
TN-FSV	Transnuclear-Fort Saint Vrain
TPR	technical procedure
TRIGA	training, research, and isotope reactors (built by General Atomics)
TSR	Technical Safety Requirement

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## 1. PURPOSE/BACKGROUND

### 1.1 Purpose

The purpose of this procedure is to define the process for receiving spent nuclear fuel (SNF) and associated quantities of accountable nuclear material including special nuclear material (SNM) at the Idaho Nuclear Technology and Engineering Center (INTEC). INTEC is located at the Idaho National Laboratory (INL) and is operated by the Idaho Cleanup Project (ICP) under CH2M•WG Idaho LLC (CWI).

This Management Control Procedure (MCP) is applicable to off-site receipts like those from domestic research reactors (DRR), foreign research reactors (FRR), and specified DOE and non-DOE facilities. This MCP is also applicable to on-site Advanced Test Reactor (ATR) receipts from the Reactor Technology Complex (RTC). The scope of this MCP excludes shipper preparation activities for loading at the shipping facility and transportation activities between the shipper's facility and INTEC but includes actions at the shipping facility required to support receipt at the INL/ICP (e.g., fuel inspections, shipper-supplied equipment and tools inspections, and QA program evaluations, as applicable).

The scope of this MCP excludes activities associated with Nuclear Regulatory Commission (NRC)-licensed facilities at the INL, activities associated with return of U.S. Navy SNF to the Naval Reactors Facility, transfer of SNF between INTEC facilities, and transfer of SNF from INTEC facilities to off-site locations.

This procedure and appendices also provide SNF shippers, the U.S. Department of Energy, Idaho Operations Office (DOE-ID), and the INL/ICP with the essential information for transferring SNF to an INTEC storage facility and an understanding of the receipt process.

**NOTE 1:** *DOE actions will be governed by DOE standard procedures. This procedure does not direct the actions of DOE but identifies DOE actions that are required for the receipt of SNF at the INL/ICP.*

**NOTE 2:** *Interface, contact, and contract roles are an item-by-item, project-by-project determination. DOE-ID will designate which roles will be performed by Battelle Energy Alliance (BEA), CWI, the shipper, DOE-ID, and which will be a joint activity/responsibility. This determination will be made for carriers (transportation companies), subcontractors, etc.*

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**1.2 Background**

As stated in the *Amendment to the Record of Decision for the Department of Energy (DOE) Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste Management Programs Environmental Impact Statement*, dated February 28, 1996, the INL/ICP is allowed to receive SNF from DOE sites, universities, foreign research reactors (FRR), and specified DOE and non-DOE facilities.

As noted in the contract DEA-AC07-051D14516, the ICP scope of work includes receipts from ATR.

**2. RESPONSIBILITIES/PREREQUISITES**

**2.1 Responsibilities**

The following responsibilities are assigned to ensure proper application of this MCP and successful project execution.

Performer	Responsibilities
INTEC Director	Transmits approval letter to the shipper for the Required Shipper’s Data (RSD) forms. Transmits formal notification to DOE-ID confirming receipt date window.
Project Lead	Oversees all ICP activities related to receipts from DRR/FRR and specified DOE and non-DOE facilities and acts as primary ICP interface with the shipper. Review for adequacy of data from shipper (or others) to ensure acceptability of fuel packaging, and equipment (if any). Enlists the help of others as needed.
Fuel Inspector	Performs visual inspections of fuel.
Fuel Receipt Coordinator (FRCo)	Reviews the required shipper’s data to ensure completeness of documents; that all reference documentation is provided; and data is sufficient to complete the applicable portions of the fuel receipt and handling forms and Fuel Storage Management Database with respect to fuel and packaging data. Prepares fuel receipt documentation. Prepares fuel transfer requirements checklist. In conjunction with the Material Balance Area (MBA) Custodian, also known as the Nuclear Material Custodian (NMC), oversees ICP activities related to ATR receipts and acts as ICP interface with ATR.

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Performer	Responsibilities
Nuclear Facility Manager	Reviews RSD forms for compatibility with storage facility and to identify any potential operational and facility issues. Implements revisions to safety basis documents and implements cask specific requirements.
Safeguards and Security	Reviews RSD forms to identify any potential safeguards and security issues, including accountability issues. Revises Physical Security Plan as required. Develops DOE safeguards shipper/receiver agreements as required. Determines material categorization and material measurement requirements. Provides safeguards approval to ship to the shipper. Maintains transfer and inventory records.
Material Balance Area (MBA) Custodian (or Alternate(s)) <i>(The term Nuclear Material custodian (NMC) has been changed to Material Balance Area (MBA) Custodian. These terms are interchangeable and refer to the same defined roles and responsibilities.)</i>	Reviews RSD forms for compatibility with storage facility and to identify any potential operational and facility issues. Witnesses transfer checks. In conjunction with FRCO, oversees ICP activities related to ATR receipts and acts as ICP interface with ATR.
Engineering	Develops engineering calculations to support receipt and unloading of SNF shipment as required.
NMD Team Lead	Revises or creates Technical Procedures (TPRs) to support receipt and unloading of SNF shipment as required. Receives and unloads the SNF shipment.
Criticality Safety	Reviews RSD forms and evaluates data for any potential criticality safety issues and if the data is adequate for a criticality safety evaluation (CSE) for this shipment (if needed). Checks the range of values to assure that all fall within what has been evaluated for the proposed fuel(s) to be shipped. Develops criticality safety evaluations as required.
Safety Analysis	Reviews RSD forms to determine if the information is sufficient for an evaluation of the safety basis documentation for this fuel shipment. Revises safety basis documents as required.
Quality Assurance (QA)	Reviews RSD forms to identify any potential QA issues. Reviews and approves shipper's documentation as requested for furnished equipment.

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Performer	Responsibilities
Hoisting and Rigging (H&R) Engineer	Reviews hoisting and rigging documentation for equipment provided by others. Revises or creates lift plans as required.
Environmental Safety and Health (ES&H)	Reviews information, including RSDs, to identify any ES&H issues and to ensure data is sufficient for analysis and evaluations of radiological, industrial, fire, explosion, hazardous waste and Resource Conservation Recovery Act (RCRA) risks and hazards, waste and emissions covered by current permits, and for National Environmental Policy Act (NEPA) document change requirements.
Radiological Controls	Conducts ALARA reviews and develops radiological work permits (RWPs).
Training	Develops training plans and training materials as required. Provides training.
Materials and Technology	Reviews RSD information for materials compatibility at the receiving facility. Identifies any potential issues.
Nuclear Engineering	Reviews RSD to check the fuel and/or reactor operating data and calculated values on the RSD forms are adequate.
Transportation	Reviews RSD to check for any potential packaging and transportation issues.

## 2.2 Prerequisites

2.2.1 For off-site shipments, DOE-ID has provided written notification to ICP of the SNF receipt at INTEC. The scope of work has been included in an approved budget.

**NOTE:** *To support preparation schedules, notification should be received at least nine months prior to arrival for an FRR shipment and four months prior to arrival for a DRR shipment.*

2.2.2 The scope of work for CWI has been defined and Government Furnished Services and Information (GFSI) identified.

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### 3. OFF-SITE SNF RECEIPT PROCESS

This section describes the process of approval, preparation, and receipt of SNF to the INL/ICP for storage and applies to receipt of SNF from sources external to the INL.

#### 3.1 Project Initiation and General Activities

**NOTE:** *Form 434.32, “INL/ICP SNF Receipt Checklist,” is an aid for the Project Lead to document the completion of required SNF receipt activities and may be used or not used as deemed necessary by the Project Lead.*

- 3.1.1 **Project Lead:** IF a Form 434.32, “INL/ICP SNF Receipt Checklist,” was initiated to track SNF receipt activities THEN document completion of required SNF receipt activities on the form throughout the process.
- 3.1.2 **Project Lead:** Obtain a project number from the Electronic Data Management System (EDMS). Ensure all required correspondence directing INL/ICP to receive SNF and associated documentation are filed in the SNF Satellite File Location (SFL) by the assigned records coordinator.
- 3.1.2.1 Ensure records are filed per the Records Schedule Matrix,” MCP-557, “Records Management,” and MCP-1286, “Fuel Handling and Storage Inventory and Records (Supplement to MCP-557).”

#### 3.2 Transmit Required Shippers Data (RSD) Forms and Instructions

**NOTE:** *The purpose of the Fuel and Packaging RSD is to provide detailed fuel and packaging information that will be used to establish the receipt and storage methodology; to support safety analysis, safeguards reporting requirements, and environmental document preparation/approval; and to support equipment design, fabrication, and testing.*

- 3.2.1 **Project Lead:** Provide a copy of this procedure (including the Shipper’s Checklist [External Receipts] from Appendix B, and INTEC Facility Information for the Shipper from Appendix C) and the following forms to the shipper:
- A. Form 434.28, “Fuel and Packaging RSD Form”
  - B. Form 434.28A, “Fuel Unit RSD Form”
  - C. Form 434.28B, “Shipper References RSD Form”
  - D. Form 434.30, “Proposed Shipment Contents RSD Form”
  - E. Form 434.31, “Shipment Contents RSD Form.”

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- 3.2.2 Conduct an initial visit or discussion with the shipper to clarify INL/ICP requirements contained in this MCP and forms, discuss protocol for exchanging information, and establish initial schedule expectations. Request the shipper to complete Form 434.28, 434.28A, and 434.28B. Assist the shipper as necessary to ensure the draft RSD is accurately completed.

**NOTE:** *Electronic transmittal is initially preferred to expedite the review process. Final transmittals should be hardcopies.*

### 3.3 Complete Fuel and Packaging RSD and Fuel Unit RSD

- 3.3.1 Determine Fuel Condition

**NOTE:** *Documentation of fuel unit or fuel cladding degradation relies on the shipper's fuel and reactor history records and/or expertise during visual inspections. The quality and availability of data is expected to vary widely from reactor to reactor. Structural integrity may be credited in the ICP safety basis depending upon the fuel type. Therefore, ICP reserves the right to perform visual inspections of fuel (at the shipper facility) prior to approval of the RSD.*

- 3.3.1.1 Project Lead: In conjunction with affected parties, identify the methodology for determining any fuel unit degradation (to structural integrity) or fuel cladding degradation. Assist the shipper in documenting the methodology on Form 434.28, "Fuel and Packaging RSD." For TRIGA shipments, the methodology must include a visual inspection (performed by either the shipper or the ICP at the ICP's discretion) against the criteria identified in Form FRM-898, "TRIGA Fuel Examination Data Sheet," or Form FRM-899, "TRIGA Incoloy Fuel Pin Examination Data Sheet."
- 3.3.1.2 Fuel Inspector: If a visual inspection by ICP is required, make arrangements with the shipper for the inspection. If necessary, develop criteria for the inspection based on fuel unit features to be credited in the safety basis, complete the inspection, and document results. For TRIGA inspections, use PLN-218, "Examination of Training, Research, Isotope, General Atomics (TRIGA), and Other Fuels," and Form FRM-898, "TRIGA Fuel Examination Data Sheet," or Form FRM-899, "TRIGA Incoloy Fuel Pin Examination Data Sheet."

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### 3.3.2 Identify Proposed Modifications to Fuel Condition

Project Lead: Assist the shipper in identifying proposed changes to fuel configuration (e.g., cutting, new lifting fixtures, disassembly) needed for shipment or storage at the INL/ICP. Assist the shipper in documenting changes on Form 434.28.

### 3.3.3 Cask Selection

Project Lead: Assist the shipper and others (e.g., DOE, BEA) to determine cask selection. Consider receipt facility limitations in the cask selection. Assist the shipper in documenting the cask selection on Form 434.28.

### 3.3.4 Equipment Design

Project Lead: In conjunction with affected parties, determine whether the shipper will provide any new fuel storage/handling devices or new cask handling equipment for use at the INL/ICP. If equipment is identified, then request and approve documentation as identified in Step 3.4.2.4. Assist the shipper in documenting any designs on Form 434.28.

### 3.3.5 Cask Documentation

Project Lead: Request the shipper provide a copy or make available electronically the cask Safety Analysis Report for Packaging (SARP) and the cask Certificate of Compliance (C of C) or Certificate of Competent Authority that covers the proposed shipments. Assist the shipper in documenting the SARP and certificate on Form 434.28.

### 3.3.6 Fuel and Packaging RSD and Fuel Unit RSD Review and Approval

**NOTE:** *Review comments made that are not germane to the reviewer's area of expertise may or may not be submitted to the shipper for resolution. The decision to submit or not rests with the Project Lead.*

3.3.6.1 Project Lead: Receive the completed draft Form 434.28, "Fuel and Packaging RSD," Form 434.28A, "Fuel Unit RSD," and Form 434.28B, "Shipper References RSD," with accompanying documentation from the shipper. Initiate and coordinate formal review of the draft Forms 434.28, 434.28A, and 434.28B. A review by the subject matter experts listed below, and any that might be added, can be requested or omitted at the discretion of the Nuclear Facility Manager (NFM).

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- A. Criticality Safety
- B. Environmental, Safety and Health
- C. Fuel Receipt Coordinator (FRCO)
- D. Project Lead
- E. Materials and Technology
- F. Nuclear Engineering (may be BEA or subcontractor)
- G. Quality Assurance
- H. Receipt Facility Systems Engineer
- I. Receipt Facility MBA Custodian (may be the same as the Receipt Facility Manager or designee)
- J. Safeguards and Security
- K. Safety Analysis
- L. Receipt Facility Manager or designee
- M. Transportation.

3.3.6.2 Project Lead/Reviewers: Review the data in field of expertise using the criteria and the guidelines of Appendix C and provide formal review comments using Form 412.13, “ICP Controlled Document Review Comments and Resolutions,” or equivalent. Work with the shipper to resolve comments and document acceptance of comment resolutions.

3.3.6.3 Project Lead: Receive Form 434.28, 434.28A, and 434.28B with comment resolutions incorporated and approved (signed) by the shipper. Verify comment resolution incorporation.

**NOTE:** *The signed 412.13 forms and equivalents are QA records.*

3.3.6.4 INTEC Director: Transmit RSD approval letter to the shipper approving the completed RSDs.

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### 3.4 Complete ICP Actions to Receive Fuel

The INL/ICP will perform actions required to prepare for the receipt of the shipper's SNF. These actions are described in the following subsections.

**NOTE:** *Many of the steps are interrelated and may be performed concurrently.*

#### 3.4.1 Environmental Checklist

Project Lead: Determine the level of environmental review for the SNF receipt per MCP-3480, "Environmental Instructions for Facilities, Processes, Materials and Equipment," and complete Form 451.01, "Environmental Checklist," if required. Ensure any actions identified in the approved checklist are completed prior to fuel receipt.

#### 3.4.2 Equipment and Facility Modifications

3.4.2.1 Project Lead: In conjunction with the receiving facility and affected parties, determine whether new equipment or facility modifications for use at the INL/ICP are required. Consider any repackaging required upon receipt.

3.4.2.2 Project Lead: In conjunction with affected parties (e.g., shipper, BEA, DOE-ID), determine responsibility for providing equipment or facility modifications for use at the INL/ICP. Consider items like alignment pins, bolt removal tools, and lifting yokes.

3.4.2.3 Project Lead: Develop new equipment or facility modifications provided by ICP per MCP-2811, "Nuclear Facility Change." Any Facility Change Forms (FCFs) must be completed through operations turnover before use of the new or modified equipment.

3.4.2.4 Requirements for Shipper Furnished Equipment.

**NOTE 1:** *If new cask handling equipment, fuel storage devices, and/or handling devices are procured by the company in support of the receipt of SNF, the company procurement procedures will be used to ensure the equipment meets the necessary requirements and is acceptable for use.*

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**NOTE 2:** *This section ensures that equipment that is furnished by the shipper meets necessary requirements and is acceptable for use. QA programs, designs, test reports, and fabrication packages are examples of documentation that can be used to accept shipper furnished equipment.*

**NOTE 3:** *The DRR/FRR Program may use the design document Technical and Functional Requirements (TFR)-2524, “Externally Fabricated Components for Research Reactor Fuel Storage at the Irradiated Fuel Storage Facility,” as a source of requirements for equipment designs.*

3.4.2.4.1 Project Lead/Quality Assurance/Engineering:  
For new equipment that will be furnished by the shipper for use at the INL/ICP, determine the documentation required for acceptance of the new equipment.

3.4.2.4.2 Project Lead: Issue a letter to request the required documentation for the new equipment from the shipper.

3.4.2.4.3 Project Lead/Quality Assurance/Engineering:  
Review and comment on the shipper’s submitted documentation.

3.4.2.4.4 Project Lead: Compile comments and assist the shipper to resolve comments.

3.4.2.4.5 Project Lead: Issue a letter to the shipper documenting the review and approval of the documentation provided by the shipper.

### 3.4.3 Existing External Hoisting and Rigging Equipment

Project Lead/H&R Engineer: In conjunction with affected parties, determine whether external sources will provide any existing hoisting and rigging (H&R) equipment (e.g., cask yoke, ISO container fixture) for use at the INL/ICP. If required, request submittal of hoisting and rigging equipment documentation. Review hoisting and rigging documentation for compliance with PRD-650, “ICP Hoisting and Rigging Requirements,” and approve documentation.

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### 3.4.4 Criticality Safety Evaluations (CSEs)

Project Lead (in conjunction with Criticality Safety and Criticality Safety Officer): Determine whether new or revised CSEs are required to support receipt, unloading and storage activities. Develop CSEs to support receipt, unloading and storage activities per PRD-112, “Criticality Safety Program.”

### 3.4.5 Safety Basis Document(s)

3.4.5.1 Project Lead Safety Analysis: Determine whether safety basis document revisions are required and develop revisions per MCP-1176, “Safety Analysis Process,” and MCP-1326, “Spent Nuclear Fuel Cask Receipt/Transport Process.” (See responsibilities in Section 2.1).

3.4.5.2 Project Lead/Engineering: In conjunction with Safety Analysis and the receiving facility, identify any supporting engineering calculations required for safety basis development or implementation. Submit Form 431.39, “Engineering Services Work Request,” as needed. Complete requested engineering calculations per MCP-2374, “Formal Analyses and Calculations.”

3.4.5.3 Nuclear Facility Manager: If required, implement revisions to the safety basis documents per MCP-1519, “ICP Projects Requirement Change Implementation.”

### 3.4.6 Safeguards and Security Documents

**NOTE:** *Interactions for safeguards purposes between shipping and receiving organizations are defined and limited to approved Safeguards Nuclear Materials Representatives as identified in the Reporting Identification Symbol (D2) Directory maintained by the Nuclear Materials Management Safeguards System (NMMSS) per DOE Manual 470.4-6, Nuclear Material Control and Accountability, Sections A and B, and NRC NUREG/BR-0006, “Instructions for Completing Nuclear Material Transaction Reports.”*

3.4.6.1 Project Lead/Safeguards and Security: Determine whether an existing Physical Security Plan addresses the proposed receipt. If required, revise the Physical Security Plan per MCP-228, “Physical Security Protection.”

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- NOTE:** *Fuel configuration and packaging is typically credited in the ICP safety basis. In addition, equipment interfaces for unloading at the ICP can be affected by minor deviations in fuel configuration and packaging. Therefore, ICP reserves the right to observe fuel packaging and cask loading and perform transfer checks of fuel at the shipper facility.*
- 3.4.6.2 Project Lead/Safeguards and Security: Determine the material categorization and the method (including any measurements) and location to perform transfer checks (during cask loading at the shipper’s facility or during cask unloading at INTEC) as identified in MCP-2752, “Shipments, Receipts and Transfers of Nuclear Materials.”
- 3.4.6.3 Safeguards and Security: Determine whether special packaging methods are required to maintain safeguards material accountability (e.g., splitting or combining materials amongst cans) and for future inventory purposes (e.g., ease of retrieval for specific fuel elements).
- 3.4.6.4 Safeguards and Security: Determine whether a DOE safeguards shipper/receiver agreement is required. If required, complete the agreement per MCP-2752.
- 3.4.6.5 Safeguards and Security: For foreign receipts, obtain information on obligation requirements through DOE-ID, DOE-HQ, NRC, or the Department of State.
- 3.4.7 Technical Procedures and Lift Plans
- 3.4.7.1 NMD Team Lead: Revise or create Technical Procedures (TPRs) as required to support receipt, unloading and storage activities per MCP-3562, “Hazard Identification, Analysis and Control of Operational Activities,” and MCP-2985, “Chapter XVI - Operations Procedures.”
- 3.4.7.2 Nuclear Facility Manager/Project Lead: Ensure cask specific requirements (for example, from the SARP, Certificate of Compliance, Certificate of Competent Authority, Transport Plan) are incorporated into TPRs per MCP-1326, “Spent Nuclear Fuel Cask Receipt/Transport Process.”

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- 3.4.7.3 H&R Engineer: Revise or create Lift Plans as required to support receipt, unloading and storage activities per MCP-6504, “Hoisting and Rigging Lift Determination and Lift Plan Preparation.”
- 3.4.8 ALARA Review and Radiation Work Permit (RWP)
- 3.4.8.1 Project Lead: Submit Form 441.47, “Radiological Control Pre-Job Planning Checklist.”
- 3.4.8.2 Radiological Controls: Conduct an ALARA review based on the activities to be performed in accordance with *Manual 15, Radiological Controls Manual*. If required, prepare and issue Radiological Work Permits (RWPs) per *Manual 15*.
- 3.4.9 Training
- 3.4.9.1 NMD Team Lead or Designee: If directed by the Nuclear Facility Manager, submit Form 361.36, “Training Request Form,” for the activities.
- 3.4.9.2 Training: Analyze training needs and, if required, develop and obtain approval on a Training Plan per *Manual 12, Training and Qualifications*. Develop training materials and provide training per the training plan and *Manual 12*.
- 3.4.9.3 Project Lead: If equipment from external sources is required for dry runs, make arrangements for equipment delivery/return.
- 3.4.10 Review for Readiness
- 3.4.10.1 Project Lead: Complete readiness determination per MCP-2783, “Startup and Restart of Nuclear Facilities.” Obtain Operational Safety Board (OSB) review and approval per CTR-59, “Nuclear Material Disposition Operational Safety Board.”
- 3.4.10.2 Project Lead: Coordinate completion of readiness activities identified on the approved Appendix C form from MCP-2783.
- NOTE:** *A form-fit-function review should be considered as part of the readiness activities.*

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- 3.4.10.3 FRCO/MBA Custodian: If necessary, prepare the Fuel Transfer Requirements Checklist Form per MCP-1285, “Prepare Fuel Handling Paperwork.”
- 3.4.10.4 Nuclear Facility Manager: Complete review for readiness as identified on approved Appendix C form from MCP-2783.

### 3.5 Loading and Shipment of SNF

**NOTE:** *Many of the steps below are interrelated with activities from Section 3.4 and may be performed concurrently.*

- 3.5.1 Project Lead: Establish the loading and shipping schedule with the concurrence from the INTEC Director and affected parties. Request the shipper to send Form 434.30, “Proposed Shipment Contents RSD,” and an updated Form 434.28A, “Fuel Unit RSD Form,” and Form 434.28B, “Shipper References RSD Form,” if required.
- 3.5.2 Project Lead: Make arrangements for shipment of supporting equipment (e.g., cask or fuel handling equipment.)
- 3.5.3 Project Lead: Upon receipt of the Form 434.30 (and 434.28A and 434.28B if required), coordinate a limited review by the Project Lead, FRCO, Safeguards and Security, and MBA Custodian. Determine if there are any significant deviations from Form 434.28, “Fuel and Packaging RSD,” previously provided and approved. For significant deviations, revise Form 434.28 per Step 3.3.6.
- 3.5.3.1 Project Lead: Receive Form 434.30 (and 434.28A and 434.28B if required) with comment resolutions incorporated and approved (signed) by the shipper. Verify comment resolution incorporation.
- 3.5.3.2 INTEC Director: Transmit RSD approval letter to the shipper approving the completed Form 434.30 (and revised Form 434.28A and 434.28B if required). Include DOE-ID on letter distribution to notify DOE of the completion of Forms 434.28, 434.28A, 434.28B, and 434.30, agreed upon receipt date window, and the agreed upon transfer check methodology.

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### 3.5.4 Can Loading

**NOTE:** *Safeguards and Security requires INL/ICP verification of can contents for material control and accountability purposes.*

3.5.4.1 Project Lead: If shipment will contain cans, coordinate timing for can loading with shipper.

3.5.4.2 MBA Custodian or Alternate MBA Custodian or Authorized Designee: Witness loading of cans per MCP-2752, "Shipments, Receipts and Transfers of Nuclear Materials."

### 3.5.5 Transfer Checks

3.5.5.1 MBA Custodian or Alternate MBA Custodian or Authorized Designee: If determined in Step 3.4.6 that transfer checks will be performed at the shipper's facility, complete transfer checks per MCP-2752 and PLN-312, "Loading and Shipping of DRR/FRR Fuel," as applicable.

**NOTE:** *Forms FRM-586, "NAC-LWT Basket Insert Loading Verifications," FRM-587, "NAC-LWT TRIGA Cask Loading Verification Data Sheet," and FRM-588, "NAC-LWT Basket Insert Loading Verification Incoloy TRIGA," are currently available for use during transfer checks. Additional forms may need to be generated to support other fuel/cask configurations.*

3.5.5.2 MBA Custodian/Witness: If transfer checks are performed at the shipper's facility, install and witness tamper indicating devices (TIDs) on cask(s) per MCP-2752 and TPR-6445, "Tamper Indicating Device Application and Removal," for domestic shipments or MCP-9255, "Foreign Research Reactor Tamper Indicating Device Application/Removal and Control."

### 3.5.6 Shipment Contents Forms and Notifications

3.5.6.1 Project Lead: Notify the shipper to provide the transportation carrier and the INL/ICP with Form 434.31, "Shipment Contents RSD."

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3.5.6.2 Project Lead: Remind the shipper to provide notification to the receiving INL/ICP Safeguards and Security Department of the intended shipment. Remind the shipper to provide the INL/ICP Safeguards and Security Department with the intended shipment date before shipping per MCP-2752.

**NOTE:** *Interactions for safeguards purposes between shipping and receiving organizations are defined and limited to approved Safeguards Nuclear Materials Representatives as identified in the Reporting Identification Symbol (D2) Directory maintained by the Nuclear Materials Management Safeguards System (NMMSS) per DOE Manual 470.4-6, Nuclear Material Control and Accountability, Sections A and B, and NRC NUREG/BR-0006, "Instructions for Completing Nuclear Material Transaction Reports."*

3.5.6.3 Safeguards and Security: Provide approval to ship per MCP-2752.

3.5.6.4 Project Lead: For shipment of nuclear material leaving a facility during the last week of a month, remind the shipper to provide notification as required in *DOE Manual 470.4-6, Material Control and Accountability*, and NRC NUREG/BR-0006, "Instructions for Completing Nuclear Material Transaction Reports."

3.5.6.5 Project Lead: Upon receipt of Form 434.31, "Shipment Contents RSD," coordinate a limited review by the Project Lead, FRCo, and MBA Custodian to determine if there are any deviations from the previously approved Form 434.30, "Proposed Shipment Contents RSD." If deviations are identified then contact the Nuclear Facility Manager, Safeguards and Security, and the MBA Custodian to resolve deviations.

3.5.6.6 FRCo: Complete fuel transfer forms per MCP-1285, "Fuel Handling Paperwork."

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### 3.6 Receipt and Unloading of Shipment

This section covers the receipt of the shipper's SNF, receipt verification of the SNF, and unloading the shipping cask. It includes placement of the SNF into storage, preparing the empty shipping cask for return shipment, loading the empty cask onto the transport, and turning the empty shipping cask over to the transportation carrier for transport according to the shipper's instruction.

3.6.1 Project Lead/Safeguards and Security: Ensure the shipper (for domestic receipts) or Safeguards and Security (for foreign receipts) has prepared and distributed a DOE/NRC F741 and 741A form for shipments containing reportable quantities no later than 24 hours or 1 workday following a shipment.

3.6.2 NMD Team Lead: Receive and unload the SNF shipment per approved TPRs.

3.6.2.1 Verify each shipment includes Form 434.31, "Shipment Contents RSD."

3.6.2.2 MBA Custodian: If transfer checks were not previously performed, complete transfer checks in accordance with MCP-2752, "Shipments, Receipts and Transfers of Nuclear Materials." If shipper/receiver differences are identified, stop activities and make notifications as identified in MCP-2752.

**NOTE:** *Discrepancies, depending upon the severity and Impact Measurement Index (IMI) determination, investigation and resolution may involve the INL Safeguards and Security Organization, the shipping facility's Safeguards Organization, the respective DOE Field Offices, NRC Office, and Headquarters Offices.*

3.6.3 MBA Custodian/Safeguards and Security: Complete Form 472.18, "Nuclear Material Transfer Record," and DOE/NRC F 741 form per MCP-2752.

3.6.4 Project Lead: IF a Form 434.32, "INL/ICP SNF Receipt Checklist," was initiated to track SNF receipt activities, THEN provide a copy of the completed Form 434.32, "INL/ICP SNF Receipt Checklist," to the records coordinator for filing.

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3.6.5 Project Lead/FRCO: Verify all project documentation has been submitted to the designated CFL.

**NOTE:** *Upon receipt of the SNF, the final approved RSDs, 412.13 comment forms, approved documents, other shipping information, and receipt and storage records become quality assurance records which are maintained in the SNF SFL by the records coordinator.*

#### 4. RECEIPT OF ADVANCED TEST REACTOR (ATR) FUEL

**NOTE 1:** *For ATR shipments, the ATR under the INL (BEA) is the shipper and the ICP (CWI) is the receiver.*

**NOTE 2:** *LAG-211, “Memorandum of Agreement for the Transportation Safety Document for the ATR Spent Fuel Element Transfer Cask (PLN-936),” provides additional information on roles and responsibilities for transfer of the ATR cask between the Reactor Technology Complex (RTC) and INTEC. PLN-936, “Transport Safety Document for the ATR Spent Fuel Element Transfer Cask,” is the safety basis document that covers transfer activities.*

##### 4.1 Required Shipper’s Data Forms

4.1.1 FRCO/MBA Custodian: Ensure that ATR has completed Form 434.28, “Fuel and Packaging RSD.”

4.1.1.1 If the form has not been completed, request the shipper complete Form 434.28, “Fuel and Packaging RSD,” And corresponding Form 434.28B, “Shipper References RSD.” Assist ATR as necessary to ensure the draft RSD is accurately completed.

4.1.1.2 Review and approve Form 434.28 and 434.28B per Step 3.3.6.

**NOTE:** *Form 434.28A for ATR receipts is not completed with the initial Form 434.28 submittal.*

##### 4.2 Shipment Contents

4.2.1 FRCO/MBA Custodian: Coordinate shipment schedules with ATR. Request Form 434.28A, “Fuel Unit RSD,” and an updated Form 434.28B, “Shipper References RSD,” and Form 434.30, “Proposed Shipment Contents RSD,” from ATR for each group of proposed shipments.

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4.2.2 FRCO: Receive the draft Form 434.28A and 434.28B for review from ATR. Upon receipt of Form 434.28A, 434.28B, and 434.30, initiate and coordinate a limited review by Safeguards and Security, FRCO, and MBA Custodian. Determine if there are any significant deviations from Form 434.28, "Fuel and Packaging RSD," previously provided and approved. For significant deviations, revise Form 434.28 per Step 3.3.6.

4.2.2.1 FRCO/MBA Custodian: Receive Form 434.28A and 434.28B with comment resolutions incorporated and approved (signed) by ATR. Verify comment resolution incorporation.

4.2.2.2 INTEC Director: Transmit Form 434.28A, 434.28B, and 434.30, approval letter to ATR approving the shipment campaign.

#### 4.3 Loading and Shipment of ATR Fuel

4.3.1 FRCO: Receive serial numbers of the elements in the proposed shipment from ATR.

4.3.2 FRCO/MBA Custodian: Compare the serial numbers to the previously approved Form 434.28A and ensure that numbers are contained on the table. If numbers do not match, revise Form 434.28A per Section 4.2.

4.3.3 FRCO/MBA Custodian: Verify the fuel is approved for storage and document this on Form INTEC-6829, "Fuel Receipt Required Shipper's Data Checklist," per MCP-1285, "Prepare Fuel Handling Paperwork."

4.3.4 FRCO: Complete fuel transfer forms under the direction of the MBA Custodian per MCP-1285.

#### 4.4 Receipt and Unloading of Shipments

**NOTE:** *INL (BEA) Safeguards and Security prepares and distributes a completed DOE/NRC F741 and 741A form for shipments containing reportable quantities no later than 24 hours or 1 workday following a shipment per MCP-2752, "Shipments, Receipts and Transfers of Nuclear Materials."*

4.4.1 NMC: Complete Form 472.18, "Nuclear Material Transfer Record," per MCP-2752, "Shipments, Receipts and Transfers of Nuclear Materials."

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4.4.2 FRCo: Verify receipt documentation has been submitted to the designated SFL.

**NOTE:** *Upon receipt of the SNF, the final approved RSDs, 412.13 comment forms, approved documents, (such as shipper supplied documentation for furnished equipment and vendor data from procured equipment,) other shipping information, and receipt and storage records become quality assurance records which are maintained in the SNF SFL by the records coordinator.*

## 5. RECORDS

Completed Forms 412.13, “ICP Controlled Document Review Comments and Resolutions”

Completed Form 434.28, “Fuel and Packaging RSD Form”

Completed Form 434.28A, “Fuel Unit RSD Form”

Completed Form 434.28B, “Shipper References RSD Form”

Completed Form 434.30, “Proposed Shipment Contents RSD Form”

Completed Form 434.31, “Shipment Contents RSD Form”

Completed Form 434.32, “INL/ICP SNF Receipt Checklist” (if used)

Completed Form 451.01, “Environmental Checklist”

Completed Form 472.18, “Nuclear Material Transfer Record”

Completed Form DOE/NRC F741 and 741A

Completed Form FRM-315, “ATR Receipt Authorization Checklist”

Completed Form FRM-586, “NAC-LWT Basket Insert Loading Verification”

Completed Form FRM-587, “NAC-LWT TRIGA Cask Loading Verification Data Sheet”

Completed Form FRM-588, “NAC-LWT Basket Insert Loading Verification Incoloy TRIGA”

Completed Form FRM-898, “TRIGA Fuel Examination Data Sheet”

Completed Form FRM-899, “TRIGA Incoloy Fuel Pin Examination Data Sheet”

Completed Form INTEC-6829, “Fuel Receipt Required Shipper’s Data Checklist”

**NOTE:** *MCP-557, “Records Management,” the INL Records Schedule Matrix, and associated record types list(s) provide current information on the storage, turnover, and retention requirements for these records.*

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## 6. DEFINITIONS

None

## 7. REFERENCES

Record of Decision 60FR28680, *June 1, 1995 for the DOE Programmatic Spent Nuclear Fuel Management as amended and the Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement*, DOE/EIS-203-F, April 1995.

*DOE Manual 470.4-6, Nuclear Material Control and Accountability*

NRC NUREG/BR-0006, “Instructions for Completing Nuclear Material Transaction Reports”

CTR-59, “Nuclear Material Disposition Operational Safety Board”

IAG-211, “Memorandum of Agreement for the Transportation Safety Document for the ATR Spent Fuel Element Transfer Cask (PLN-936)”

*Manual 12, Training and Qualification*

*Manual 13, Quality Assurance Program*

*Manual 15, Radiological Controls Manual*

MCP-135, “Document Management”

MCP-228, “Physical Security Protection”

MCP-557, “Records Management”

MCP-1176, “Safety Analysis Process”

MCP-1285, “Prepare Fuel Handling Paperwork”

MCP-1286, “Fuel Handling and Storage Inventory and Records (Supplement to MCP-557)”

MCP-1326, “Spent Nuclear Fuel Cask Receipt/Transport Process”

MCP-1519, “ICP Projects Requirement Change Implementation”

MCP-2374, “Formal Analyses and Calculations”

MCP-2752, “Shipments, Receipts and Transfers of Nuclear Materials”

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MCP-2783, “Startup and Restart of Nuclear Facilities”

MCP-2811, “Nuclear Facility Change”

MCP-2985, “Chapter XVI -Operations Procedures”

MCP-3480, “Environmental Instructions for Facilities, Processes, Materials and Equipment”

MCP-3562, “Hazard Identification, Analysis and Control of Operational Activities”

MCP-6504, “Hoisting and Rigging Lift Determination and Lift Plan Preparation”

MCP-9255, “Foreign Research Reactor Tamper Indicating Device Application/Removal and Control”

PLN-218, “Examination of Training, Research, Isotope, General Atomics, (TRIGA) and Other Fuel”

PLN-312, “Loading and Shipping of DRR/FRR Fuel”

PLN-533, “Quality Assurance Program Plan for High Level Waste and Spent Nuclear Fuel”

PRD-112, “Criticality Safety Program”

PRD-650, “ICP Hoisting and Rigging Requirements”

PRD-5071, “Quality Assurance Program”

PRD-5079, “Identification and Control of Items”

PRD-5084, “Handling, Storage, and Shipping”

PRD-5088, “Quality Assurance Records”

TPR-6445, “Tamper Indicating Device Application and Removal”

## **8. APPENDIXES**

Appendix A, Shipper’s Checklist (External Shipments)

Appendix B, INTEC Facility Information for Shipper

Appendix C, Guidelines for Reviewing and Evaluating SNF Shipment Information

Appendix D, Procedure Basis

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## Appendix A

### Shipper's Checklist (External Shipments)

This checklist provides guidance on ICP's expectations of information/actions from the shipper. This is not meant to be a comprehensive list but highlights major items required to support ICP's receipt. The shipper does NOT need to return a completed list to ICP.

Action Complete	Action	MCP-2861 Reference
I. General		
<input type="checkbox"/>	a) Obtain agreement with DOE-ID SNF Program Manager for shipment to the INL.	Not Applicable
II. Actions to Support Form 434.28, "Fuel and Packaging RSD"		
<input type="checkbox"/>	a) In conjunction with ICP, determine the methodology for determining any fuel unit degradation (to structural integrity) or fuel cladding degradation.	3.3.1.1
<input type="checkbox"/> N/A <input type="checkbox"/>	b) If visual inspection performed by the shipper is required by item II-a, complete the visual inspection and document results.  If visual inspection performed by ICP is required by item II-a, schedule and support the inspection activities.	3.3.1.1 & 3.3.1.2
<input type="checkbox"/>	c) In conjunction with ICP, identify proposed changes to fuel configuration (e.g., cutting, new lifting fixtures, disassembly) need for shipment or storage at the INL/ICP.	3.3.2
<input type="checkbox"/>	d) Complete measurements, calculations/modeling for Form 434.28A, "Fuel Unit RSD."	Not Applicable
<input type="checkbox"/>	e) In conjunction with other affected parties including ICP, determine cask selection.	3.3.3
<input type="checkbox"/>	f) In conjunction with other affected parties including ICP, determine whether the shipper (or shipper's representatives) will provide any new fuel storage/handling devices or cask handling equipment for use at the INL/ICP.	3.3.4
<input type="checkbox"/> N/A <input type="checkbox"/>	g) If yes to item II-f, provide requested documentation to ICP for review/approval.	3.3.4 & 3.4.2.4

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Action Complete	Action	MCP-2861 Reference
<input type="checkbox"/> N/A <input type="checkbox"/>	h) If yes to item II-f, receive QA program approval letter from ICP documenting approval of required documentation.	3.4.2.4.5
<input type="checkbox"/> N/A <input type="checkbox"/>	i) If yes to item II-f, and if necessary, receive technical and functional requirements for equipment designs from ICP.	3.3.4 & 3.4.2.4
<input type="checkbox"/> N/A <input type="checkbox"/>	j) If yes to item II-f, provide requested equipment designs to ICP for review/approval.	3.3.4 & 3.4.2.4
<input type="checkbox"/>	k) In conjunction with other affected parties including ICP, determine whether the shipper (or shipper's representatives) will provide any existing hoisting and rigging equipment (e.g., cask yoke, ISO container fixture) for use at the INL/ICP.	3.3.4 & 3.4.3
<input type="checkbox"/> N/A <input type="checkbox"/>	l) If yes to item II-m, provide hoisting and rigging equipment documentation to ICP for review/approval.	3.4.3
<input type="checkbox"/>	m) Submit cask SARP and Certificate of Compliance or Certificate of Competent Authority to ICP for review.	3.3.5
<input type="checkbox"/>	n) Submit Form 434.28, "Fuel and Packaging RSD;" Form 434.28A, "Fuel Unit RSD;" and Form 434.28B, "Shipper References RSD;" to ICP for review/approval. Include copies of references identified on Form 434.28 that are not on file at the INL/ICP.	3.3.6.1
<input type="checkbox"/>	o) Receive approval letter from ICP on Forms 434.28, 434.28A and 434.28B.	3.3.6.4

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Action Complete	Action	MCP-2861 Reference
III. Actions to Support Shipment		
<input type="checkbox"/> N/A <input type="checkbox"/>	a) If yes to item II-f, submit requested documentation to ICP for review/approval.	3.4.2.4
<input type="checkbox"/>	b) In conjunction with ICP, determine the method and location to perform transfer checks (during cask loading at the shipper's facility or during cask unloading at INTEC).	3.4.6.2
<input type="checkbox"/> N/A <input type="checkbox"/>	c) If required by ICP, review and concur with a shipper/receiver agreement.	3.4.6.4
<input type="checkbox"/>	d) Submit Form 434.30, "Shipment Contents RSD," and a revised Form 434.28A, "Fuel Unit RSD," and Form 434.28B, "Shipper References RSD," if required for ICP review/approval.	3.5.3
<input type="checkbox"/>	e) Establish a can loading (if applicable), cask loading and shipping schedule with ICP.	3.5.1 & 3.5.4
<input type="checkbox"/>	f) Receive approval from ICP on Form 434.30 and revised Form 434.28A and 434.28B (if applicable).	3.5.3.2
<input type="checkbox"/> N/A <input type="checkbox"/>	g) Load cans (if applicable) with ICP personnel witnessing.	3.5.4
<input type="checkbox"/> N/A <input type="checkbox"/>	h) If transfer check is performed at shipper facility, load cask with ICP personnel witnessing.	3.5.5
<input type="checkbox"/>	i) Notify INL/ICP Safeguards and Security Department of intended shipment and provide shipment date as soon as it is known. Receive INL/ICP Safeguards and Security approval.	3.5.6.2
<input type="checkbox"/>	j) Complete Form 434.31, "Shipment Contents RSD," submit to ICP, and send with shipment.	3.5.6.1
<input type="checkbox"/> N/A <input type="checkbox"/>	k) Send DOE/NRC F741 and 741A forms (if applicable) no later than 24 hours or 1 workday following shipment.	3.6.1

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## Appendix B

### INTEC Facility Information for the Shipper

The following information is provided to the shipper as background information. Specific Technical and Functional Requirements (T&FRs) for equipment, packaging and storage devices will be determined for each fuel receipt in conjunction with the INL/ICP.

#### I. General Requirements and Constraints

##### A. Packaging

1. If the integrity of the cladding is suspect, the fuel must be canned (cans, tubes, containers, etc.) prior to shipping unless specifically exempted by the INL/ICP.
2. All sealed fuel containers shall be configured to vent while stored in a IFSF fuel storage area rack position, unless an analysis demonstrated structural integrity for potential over pressurization (Technical Safety Requirement [TSR] constraint).

**NOTE:** *For the purpose of this document, a fuel handling unit (FHU) is the smallest item that is handled as a unit, such as a basket, bucket, fuel module, assembly, element, or rod (i.e., the fuel unit), or in the case of small items, it may be a can of fuel pieces.*

3. Each item that is handled will meet the FHU identification requirements. For example, if a basket is removed from a cask and placed in a stand and then the contents of the basket (e.g., cans) are transferred to a bucket, then the cans and the buckets must meet the FHU identification requirements.
4. For cases in which multiple configurations are to be handled at the INL/ICP (see the example above), the INL/ICP will approve the FHU designation (e.g., can or basket). Typically the basket or bucket will be designated as the FHU and not the can for the example given.

The following are the FHU identification requirements if the FHU is not the fuel unit.

**NOTE:** *Unique fuel unit identification number requirements apply if the FHU is the fuel unit.*

- A. Each FHU will be identified using a number or letter/number series that is unique. The FHU number has to be unique from all existing FHUs in storage.
- B. The same identification marking will appear on the FHU (and fuel unit) and in Required Shipper's Data Forms.

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- C. The marking will be permanent and attached to the FHU in a way that the identification is not lost during subsequent process steps, such as fuel cutting, disassembly, underwater storage, or any other necessary procedures.
  - D. The material used to identify the FHU will be compatible with the chemistry of the fuel and the storage medium and will not cause deterioration of the fuel, can, or handling fixture due to bimetallic corrosion or other incompatibilities.
5. For safeguards purposes, item identifications for material in the safeguard's inventory should correspond to the actual identifications on the material. If items are altered (e.g., cut, disassembled), the individual pieces must have identification markings.
  6. All fuel received will be packaged to allow storage for at least 50 years without loss of FHU configuration and handling capability.
  7. SNF packaging material will be 304L, other low carbon austenitic stainless steel, or an INL/ICP-approved material for the specific storage application and facility. Nonfuel materials to be included in the contents SNF packaging (cans, tubes, containers, canisters, baskets, buckets, etc.) must be approved by the INL/ICP. Non-fuel containers must be identified as containing non-fuel when they are stored with accountable quantities of nuclear material.
  8. Load-bearing components of the SNF packaging will be designed to withstand five times the expected load based on ultimate strength of the material, or three times based on yield strength, whichever is more restrictive.
  9. Materials that promote gas generation or contain significant free organic materials are prohibited.
  10. Whether a can will provide containment or confinement is based on the fuel material, its condition, and the facilities the can will be stored in (both shipper and receiver facilities). The INL/ICP will determine whether containment or confinement is required.
  11. Seals for irradiated material cans will be metallic and designed to withstand the total cumulative radiation dose for the duration of storage at the INL/ICP.
  12. Cans must be analyzed for vertical drop accidents by analysis or by physical drops. Analysis of the worst-case drop scenario/configuration at INL/ICP is required.

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13. Cans must be tested to verify containment (if applicable) and integrity. The method must be agreed on by the INL/ICP and will depend on the storage facility.

**NOTE:** *Containment tests performed in the past include the following:*

- A. Hydro test to 1.25 design pressure at standard temperature and pressure.
- B. Analyze for leak-rate using helium at design pressure and maximum expected pressure. Leak-rate should be less than  $10^{-6}$  cm<sup>3</sup> (at standard temperature and pressure)/sec.

### **B. Handling and Rigging Fixtures**

Handling and rigging fixtures includes rigging, slings, spreader bars, tools, yokes, fuel handling and storage fixtures, etc. The following is applicable only to fixtures that will be used by the INL/ICP or at the INL/ICP.

Fixtures are usually required for underwater storage and may be required for dry storage. Generally, they are either attached to the fuel, or the fuel is placed in them prior to shipment for use in handling the fuel at the INL/ICP and are not reusable (i.e., not returnable to the shipper).

The following are the required shipper handling and rigging properties/conditions for the receipt of SNF at the INL/ICP:

1. Fixtures (for fuel, SNF packaging or transportation packaging) to be used at the INL/ICP will be designed to withstand five times the expected load based on ultimate strength of the material, or three times based on yield strength, whichever is more restrictive. Each fixture will be load tested to at least 1.5 times its expected load.
2. Fixtures will have a unique identification number. Criteria for FHU identification above apply.
3. Fixture material must be compatible with the fuel, cladding, and SNF packaging materials.
4. Fixtures will have a design life based on the expected duration of storage at the INL/ICP.
5. SNF handling equipment used in INL/ICP facilities will have positive latch and positive latch indication.
6. The shipper will provide load test documentation of all equipment provided by the shipper to be used by the INL/ICP.

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### C. Quality Assurance

The following are the QA requirements for the receipt of SNF at the INL/ICP:

1. Shippers providing any fuel storage/handling devices or cask handling equipment for use at the INL/ICP will provide requested documentation for approval by INL/ICP.

## II. Facility-Specific Information

The specific SNF storage facilities of interest within INTEC include:

1. Irradiated Fuel Storage Facility (IFSF) (CPP-603B)
2. (Underwater) Fuel Storage Area (CPP-666)
3. Underground Fuel Storage Facility (CPP-749).

The IFSF at INTEC is expected to store nearly all of the off-site shipments received at the INL/ICP through 2034. The following subsections describe each of these facilities and define the role each plays in storing SNF and SNM.

Facility-specific requirements and criteria are based on the facility type and facility constraints. These requirements are based on the size of the SNF receiving area, crane capacities, whether the facility is wet or dry storage, and so on. These requirements are also based on facility-specific safety basis requirements.

### A. Irradiated Fuel Storage Facility (IFSF) (CPP-603B)

The facility consists of a cask receiving area, shielded fuel handling cave and aboveground fuel storage area. Each storage position consists of an 18-in.-diameter stainless steel or carbon steel canister stored vertically in a rack within the storage area. SNF is normally transferred from the shipping cask/package into the canisters in the fuel handling cave.

The shipping cask/package is taken into the handling cave using a transfer car. Casks are normally hung vertically from their upper trunnions in a fixture on the car. The following casks have been used before at IFSF:

1. Nuclear Assurance Corporation-Legal Weight Truck (NAC-LWT) Cask
2. Gesellschaft für Nuklear-Service (GNS)-16 Cask
3. Transnuclear-Fort Saint Vrain (TN-FSV) Cask
4. JMS-87Y-18.5 T Cask
5. General Electric (GE)-2000 Cask (future use).

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### **Cask Receiving Area**

The cask receiving area contains an east-west truck bay, north-south truck bay, and truck ramp, which are accessed through roll-up doors.

### **Fuel Handling Cave**

The fuel handling cave in the IFSF is where several SNF transfer functions are performed that include receiving casks, transferring SNF between shipping casks and storage canisters, preparing SNF for storage, and performing operations in the fuel conditioning station. Floor wells for temporary storage of canisters and a shuttle bin is used for transferring canisters between the fuel handling cave and the fuel storage area. In addition, the cave is equipped with the cask transfer car used to transfer casks between the fuel handling cave and the cask receiving area. A fuel conditioning station is located in one of the floor wells and is used to condition (vacuum dry) SNF if required.

### **Fuel Storage Area**

The fuel storage area contains the carbon steel racks that provide both spacing and support for the 636 fuel storage canisters. The storage rack maintains the canisters in a staggered 24-in. center-to-center spacing for criticality control purposes.

Carbon steel and stainless steel canisters are used for storing SNF in the IFSF in an approved array. Once the canisters are loaded with spent fuel, they are transferred from the fuel handling cave to the fuel storage area via the shuttle bin. After the canisters are in the fuel storage area, they are placed by crane in the storage rack in an approved array.

### **Requirements**

The following are the facility-specific constraints for SNF receipt in the Irradiated Fuel Storage Facility (IFSF).

1. The IFSF is a dry storage facility. Wet storage is not permitted.
2. Carbon steel or stainless steel canisters are used for storing SNF in the IFSF. These canisters are 18 in. in diameter and 11 ft long and are stored vertically in a rack within the storage area. The maximum storage length is 132 in. within an IFSF storage canister.
3. The loaded canister cannot exceed a gross weight of 2,000 lb. The weight assumption is based on the seismic analyses of the storage rack and other facility components.

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4. The shipping package is taken into the handling cave using a transfer car. The maximum clearance of the transfer car above the bottom of the trunnions is 2 ft. The maximum clearance of the transfer car below the bottom of the trunnions is 18 ft. The maximum cask diameter that can be handled is 103 in. Transfer car adapters must be approved for use for each cask. (Using a different cask may require the design and manufacture of an adapter for the transfer car.)
5. The cask used must be capable of being unloaded from the top in the IFSF fuel handling cave.
6. The cask receiving area is serviced by a Judson-Pacific crane (CRN-SF-001) that has a trolley travel of approximately 27 ft and a maximum hook height of 24 ft. The current maximum cask weight that can be handled is 60 tons.
7. The fuel handling cave is equipped with manipulators, a 10-ton transfer crane and hoist for fuel movements, floor wells for temporary fuel storage canisters, and a shuttle bin for transferring canisters between the fuel handling cave and the fuel storage area.
8. Only 3 tons can be lifted over the mezzanine.
9. The transportation package must fit through the applicable IFSF rollup door.
10. There are currently three IFSF-approved packaging/basket handling fixtures: a fixed lifting bail, a lifting pintle, and the NAC grapple tool for the NAC-LWT cask system. When applicable, one of these facility-specific lifting fixtures will be used for any SNF packaging (basket, bucket, etc.) shipped to the INL/ICP.

### **B. Underwater Fuel Storage Area (CPP-666)**

The CPP-666 underwater fuel storage area at INTEC consists of a truck receiving area, cask receiving area and six underwater storage pools containing storage racks. Fuel is normally stored in a handling container (basket or bucket sized for the fuel and the storage rack), which can be handled with a hook tool.

Loaded Casks are placed underwater in the unloading pools. The SNF is removed from the cask typically using hook tools and the fuel handling crane. SNF may be repackaged if required and transferred to a storage pool for storage in a rack.

The following are the facility-specific for SNF receipt in CPP-666.

1. CPP-666 is a wet storage facility. Dry storage is not currently permitted.
2. Storage Pools 1 and 2 are 41 ft 0 in. deep and Storage Pools 3 through 6 are 31 ft 0 in. deep.

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3. Storage rack position sizes are 8 in. (aluminum only), 10 in., 12 in., and 18 in. All positions are square, and the maximum allowable fuel length is 116 in.
4. Fuel is normally stored in a handling fixture (basket or bucket) sized for the fuel and the storage position, which can be handled with a hook tool.
5. Cask handling capabilities are limited by a 130-ton cask-handling crane.
6. The unloading pools are 35 ft and 43 ft deep, and 6 ft of water must be maintained over the exposed fuel at all times.
7. Casks will be unloaded from the top.
8. The cask on its transport cannot be taller than 18 ft 9 in. based on rollup door access.
9. Cask handling is limited by the design of unloading Pool 2 basemat at 100 tons.

### C. Underground Fuel Storage Facility (CPP-749)

The Underground Fuel Storage Facility at INTEC (CPP-749) consists of two generations of vertical dry storage vaults located underground with top access. Each vault is encased in grout and consists of a 30-in. diameter carbon steel pipe. The capability is provided to each vault to detect moisture leakage and to purge and test the atmosphere. A shield plug placed in the upper portion of the vault provides radiation protection at ground level. Second generation vaults are sealed with a bolted cover plate and have seal-welded bottoms.

**NOTE:** *The Peach Bottom Casks do not have a Certificate of Compliance and are limited to use within the boundaries of the INL/ICP.*

Use of a bottom-unloading cask is required to store fuel in the dry well storage vaults. This capability is currently provided by two Peach Bottom Casks owned by the ICP. Use of another cask would require the design and manufacture of an assembly to mate the cask to the top of the vault and provide shielding to operators, in addition to other handling equipment.

**NOTE:** *Special circumstances may allow above ground storage of nuclear material in casks or shipping packages within the facility perimeter.*

The following are the facility-specific constraints for SNF receipt in CPP-749.

1. The CPP-749 is a dry storage facility. Wet storage is not permitted.
2. The CPP-749 does not provide a containment boundary. All fuels must be canned to provide a containment boundary to fission products according to DOE Order 420.1B.

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3. The outer can must meet the criteria of American National Standards Institute/American Nuclear Society (ANSI/ANS)-57.9.
4. Contamination on the exterior of the can must be within the radiological control limits of 49 CFR 173.443 for shipment packages (this is required because the can is exposed to the environment during handling activities).
5. Vertical drop tests will be from 3 ft and 25 ft for cans/containers.
6. Each second generation vault consists of a 30-in. diameter carbon steel pipe with a seal-welded bottom and is encased in grout. Each first generation vault has a grouted bottom. The maximum storage length is 170 in. (facility constraint). A shield plug placed in the upper portion of the vault provides radiation protection at ground level. Each second generation vault is sealed with a bolted cover plate with gasket. Each first generation vault has a welded cover.
7. Transfer into CPP-749 is by directly unloading a loaded basket or bucket down into the storage position. This limits storage position loading abilities. This capability is currently provided by two Peach Bottom Casks owned by INL/ICP. A Peach Bottom Cask weighs approximately 30 tons and has an internal diameter of 26 in. and an internal length of 159 in. These dimensions provide the size limits for canisters capable of being stored: 25.5 in. diameter and 158.5 in. long.
8. Cask handling capabilities are limited by the mobile crane cask handling limit.
9. Use of a bottom unloading cask is required to store fuel in the dry well storage vaults.

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## Appendix C

### Guidelines for Reviewing and Evaluating SNF Shipment Information

Assigned reviewers should use the following as an informal guide for their review and evaluation of RSD form information (Forms 434.28 and 434.28A) in their field of expertise. Primary responsibility for items is identified in parentheses.

1. Is the data sufficient to complete the applicable portions of the fuel receipt and handling forms and Fuel Storage Management Database with respect to fuel and packaging data? Are the documents complete and is all reference documentation provided? (Fuel Receipt Coordinator)
2. Can the material be stored and handled safely in the proposed receipt facility? If yes, how will this be accomplished? (Nuclear Material Custodian/System Engineer/Nuclear Facility Manager)
3. Consider the following restrictions:
  - A. The fuel storage canister loading is limited to those specified in the IFSF Approved Fuel List (LST-331). Only one fuel type is stored in each fuel storage canister unless mixing of fuels is specifically allowed by the approved configurations in the IFSF Approved Fuel List. (TSR-114)
  - B. Fuel handling (types, configuration, and quantity limits) is limited to approved FHUs defined in the IFSF Approved Fuels List (LST-331). (TSR-114) (Nuclear Facility Manager)
  - C. Fuel handling (types, configuration, and quantity limits) is limited to approved FHUs defined in the CPP-666 FSA Approved Fuels List (LST-334). (TSR-113) (Nuclear Facility Manager)
  - D. Fuel handling (types, configuration, and quantity limits) is limited to approved FHUs defined in the CPP-749 Underground Fuel Storage Facility (UGFSF) Approved Fuels List (LST-339). (TSR-112) (Nuclear Facility Manager)
4. Would additional storage facilities (wet or dry) be required for the material? (MBA Custodian/System Engineer/Nuclear Facility Manager)

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5. Is a shipment packaging available (cask) for the proposed shipment? If yes, does the packaging have a current Certificate of Compliance or Certificate of Competent Authority and has a Safety Analysis Report been issued for packaging? (MBA Custodian/System Engineer/Nuclear Facility Manager)
6. Will special facility equipment be required? (System Engineer/Project Lead)
7. Is the fuel and/or reactor operating data and calculated values adequate? (Nuclear Engineering)
8. Is the data sufficient for material accountability? (Safeguards and Security)
9. Is the data sufficient to perform a criticality safety evaluation (CSE) for this shipment? (Criticality Safety)
10. Is the data sufficient to perform safety analysis and support revisions, as required, to receipt facility Safety Analysis Reports (SARs)? As appropriate, review for compliance with the proposed cask/shipping package authorization basis (Safety Analysis Report for Packaging, Certificate of Compliance, transport plan, etc.). (Safety Analysis)
11. Is the data sufficient for analysis and evaluations of safety hazards like industrial, fire, explosion, and other low consequence, high probability hazards associated with the receipt, storage, or disposition of the material? Does this material pose a special thermal, radiological, plutonium, or sodium hazard demanding special handling controls? (Environmental, Safety and Health)
12. Is the data sufficient for analysis and evaluations of Resource Conservation Recovery Act (RCRA) risks for any solid waste generated during receipt, storage, or disposition of the material? Are there any detectable quantities of characteristic listed hazardous waste other than those generated as a result of nuclear fission? (Environmental, Safety and Health)
13. Is the data sufficient for analysis and evaluation of wastes or emissions from receipt, storage, or disposition of this material? Are activities covered under INL environmental permits? Would changes to permits be necessary? Are safeguards inventory transfer or termination requirements met? (Environmental, Safety and Health/Safeguards and Security)
14. Is the data sufficient for analysis and evaluations of National Environmental Policy Act (NEPA) documentation? Would changes to NEPA documentation be necessary for receipt, storage, or disposition of this material? (Environmental, Safety and Health)

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15. Is the data sufficient to identify materials compatibility concerns at the receiving facility? Are there any corrosion issues that need to be addressed? Will the material maintain its integrity in the proposed storage environment? Will the material adversely affect the storage facility? (Materials and Technology)
16. Is the data sufficient to ensure compliance with QA procedures? (Quality Assurance)

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## Appendix D

### Procedure Basis

Step	Basis	Source
3.3	Complete Fuel Description Documentation for Fuel Receipt	PRD-5088 PLN-533
3.4.6	Maintain a Physical Security Plan.	PLN-1466 DOE M 470.4-2 CHG 1
Subsection 3.4, Subsection 3.5, Subsection 3.6, Subsection 4.4	Maintain nuclear material control and accountability.  Complete DOE/NRC 741 and 741A forms.  Perform transfer checks.	DOE M 470.4-6 CHG 1 LRD-11500 NRC NUREG/BR-0006
Subsection 3.3, 3.4.4, 3.4.5, Subsection 4.1	Establish facility safety requirements.  Complete Criticality Safety Evaluations.  Complete Safety Basis Documentation.	DOE O 420.1B PRD-112
3.4.2.4	Complete Documentation for Shipper furnished equipment	PRD 5079 PRD-5084
3.4.3, 3.4.7	Complete Hoisting and Rigging Documentation.	PRD-650
Appendix D, Item 3	Comply with fuel storage requirements to implement TSR-112, TSR-113, and TSR-114	TSR-112 TSR-113 and TSR-114