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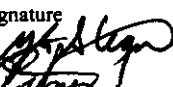

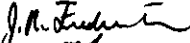



ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 662260

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13a. Description of Change							
13b. Design Baseline Document? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No							
Document updated to reflect actual practice and clarify that fuel cleanliness will be assessed, not inspected.							
USQ Screening Number: K-00-1493							
14a. Justification (mark one)				14b. Justification Details			
Criteria Change <input type="checkbox"/>				Update required to bring document into compliance with actual practice.			
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21. Approvals										
Signature Design Authority G.E. Stegen  Cog. Eng. A.L. Pitner  Cog. Mgr. J.R. Frederickson  QA D.W. Smith  Safety Environ. Other A.L. Pajunen  PE Davis 	Date 12/5/00 12/4/00 12/4/00 12/4/00 _____ _____ 12/4/00 12/5/00 _____ _____ _____ _____ _____	Signature Design Agent PE QA Safety Design Environ. Other DEPARTMENT OF ENERGY Signature or a Control Number that tracks the Approval Signature ADDITIONAL	Date _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____							

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Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
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Division: SNF

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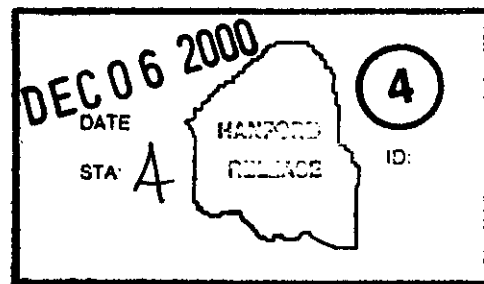
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List of Acronyms

EOC	Equipment Operations Center
FRS	Fuel Retrieval System
MCO	Multi-Canister Overpack
OCRWM	Office of Civilian Radioactive Waste Management
PCM	Primary Cleaning Machine
PSI	Phased Startup Initiative
QARD	Quality Assurance Requirements and Description
SNF	Spent Nuclear Fuel

PLANNING DOCUMENT FOR SNF FUEL CLEANLINESS ASSESSMENT PROCESS (OCRWM)

1.0 OBJECTIVE

The Fuel Retrieval System (FRS) Process Validation Procedure (Stegen 2000) requires that a specified quantity of fuel processed through the Primary Cleaning Machine (PCM) be assessed for cleanliness during initial operational and process validation testing. Specifically, these assessments are visual examinations of the fuel, performed to confirm that the PCM adequately cleans the fuel elements of canister sludge. The results of these examinations will be used to demonstrate that residual quantities of canister particulate on fuel elements loaded into Multi-Canister Overpacks (MCOs) are within projected levels used to establish safety basis limits (Slougher 2000).

The fuel assessments, performed as part of the validation process, will be conducted during the Hot Operations portion of the Phased Startup Initiative (PSI) of the Fuel Retrieval and Integrated Water Treatment Systems (Pajunen 2000). Hot Operations testing constitutes Phases 3 and 4 of the PSI. The fuel assemblies in all candidate canisters will be thoroughly examined during these test phases (highly degraded fuel assemblies that qualify as scrap are exempt from evaluation). During subsequent production operation of the FRS, only periodic examinations for cleanliness will be performed and documented.

This document describes the specific processes and techniques that will be applied in performing the cleanliness assessments, and the methodology used to verify that the documented assessment results conform to Office of Civilian Radioactive Waste Management (OCRWM) requirements. The procedures and processes presented here are in conformance with the Quality Assurance Program Plan for Implementation of the OCRWM Quality Assurance Requirements and Description (QARD) for the Spent Nuclear Fuel (SNF) Project (QAPP-OCRWM-001).

2.0 INSPECTION TEAM

A select panel of four or five individuals with relevant experience disciplines will be assembled to perform the cleanliness assessments on the fuel elements during the process validation campaign. The inspection team members will have collective expertise in process engineering, characterization, operations, safety, or modeling. The panel will have completed training to satisfy basic process engineering requirements, and will be familiar with technical assumptions associated with fuel cleanliness.

In addition, a certified Quality Control Inspector will verify that required data are properly recorded. All personnel on the inspection team will be trained and qualified in accordance with Administrative Procedure TN-8-027 to meet minimum requirements of the OCRWM QARD (DOE/RW/0333P), Section 10.2.9, "Qualification of Inspection and Test Personnel."

3.0 ASSESSMENT CRITERIA

The inner and outer surfaces of each disassembled fuel element will be examined to determine whether residual canister sludge after fuel cleaning exceeds allowable limits. Specifically, a fuel assembly would fail the cleaning criteria should either of the following conditions be found to exist after cleaning (Stegen 2000):

- Visual examinations identify a bore obstruction that cannot be attributed to features of the element (e.g., clad defects or clips) or coatings.
- When removing the inner element from the outer element, and/or during subsequent examination of both elements, the total quantity of particulate matter (excluding coating material) observed is equivalent to or exceeds a cone that is 1 inch in diameter at the base and 0.3 inches high.

Figures 1 and 2 show nominal views of how such a cone-shaped pile would appear in relation to the size of a fuel assembly. The volume of this material is 1.3 cm³.

4.0 ASSESSMENT PROCESS

All examination operations will be performed in conformance with approved procedures for conducting the FRS Phased Startup Hot Operations.

Cleanliness assessments of the fuel will be performed on a real time basis by the inspection team during conduct of the Hot Operations portion of the Phased Startup of the FRS. At least three team members must be present to form an inspection team quorum. All examination operations will be videotaped to provide video records for subsequent evaluation if needed.

The selected location for performing the examinations is the Equipment Operating Center (EOC). This allows for direct communication between the inspection team and operations personnel. These communications will be conducted between the EOC Operations Test Director and an appointed Engineering Test Director on the Inspection Team. This communication will be necessary to direct the positioning of fuel elements to achieve optimum viewing orientations, and to coordinate the collection of released sludge into an appropriate configuration for volume assessment. One member of the inspection team may be occasionally situated in the basin for overall observation of the cleaning and handling operations.

The examination station shall be equipped with two VCRs for recording the cleaning assessment activities. Each VCR will be SVHS quality and have date-time stamp capability for imprinting the videotapes. Each VCR will have access (via a switcher) to at least four selected camera feeds from the EOC video distribution center. The examination station will also be equipped with a computer connected to the Hanford Local Area Network. Signal feeds from the examination station will be extended to the lunchroom for general audience viewing.

Visual examinations of the fuel elements will commence once the fuel has been dumped from the canister onto the process table following cleaning in the PCM. Care should be exercised to maintain the assemblies intact during the dumping process; i.e., try to avoid separating the inner elements from the outer elements when dumping the canister contents on the table. However, even if the elements are inadvertently separated during the dumping process, they will still undergo examination.

After dumping on the process table, the fuel assemblies will be individually transferred to the separation station for disassembly. Each separated fuel element will be visually examined for damage, consistent with damage categories previously employed in characterization assessments (Pitner 1998). The four damage categories are listed below. It is not anticipated that many (if any) fuel elements in the "Defected" category will be found after cleaning.

- Intact – No evidence of cladding rupture or end cap breach.
- Breached – Minor cladding rupture or end cap breach, but with no corroded fuel visible at the breach location.
- Defected – Definite evidence of cladding breach with reacted or corroded fuel present at the breach location. The amount of reacted fuel may be significant, but there is no gross cladding splitting, element dilation, or fuel voiding.
- Bad – Gross failure is evident with substantial element dilation, cladding splitting, breakage, or fuel voiding.

It is anticipated that "Bad" fuel elements will often be categorized as scrap destined for loading in MCO scrap baskets, and as such will not undergo evaluation. Scrap is defined as fuel pieces less than 3 inches in their largest dimension, or as fuel elements with both ends dilated such that neither end will fit into the go/no-go gauge. All fuel elements loaded into MCO fuel baskets will undergo cleanliness assessment.

During assembly separation, the inner fuel element will be pushed from the outer element into a specially fabricated tray to facilitate collection of any canister sludge that may be dislodged during element separation (Figure 3). The collection tray shall be free of sludge before each disassembly operation. The external surfaces of the separated elements will be visually examined for any residual canister particulate material. If possible, any such material should be physically dislodged and added to any inventory of particulate collected during element disassembly. Should bore examinations indicate the possible presence of sludge, the elements will be turned vertical to drain the material into the collection tray. Care should be taken to preclude the inclusion of any aluminum hydroxide flakes in the sludge inventory.

After removal of the inner assembly from the collection tray, the amount of sludge particulate present in the tray will be visually assessed. It is anticipated that in general this assessment will suffice to determine whether the 1.3-cm³ limit has been exceeded. A secondary option is also available to the inspection team to assist in their evaluation of the sludge inventory. This involves temporarily attaching (slip fit) a special adapter to the tip of the secondary cleaning

station vacuum wand (Figure 4), and suctioning the particulate material from the tray into the transparent known-volume chamber on the end of the adapter to help determine whether the 1.3 cm³ volume limit has been exceeded. This adapter will be developed in laboratory testing (Pitner 2000), but is expected to be a semi-quantitative tool at best (all canister sludge may not be captured by the fine-mesh filter). The sludge collection adapter would be changed out after each use.

The bore of each disassembled fuel element will be examined using the available back-lighted fixture at the examination station, and the observations compared to the evaluation criteria described above (Section 3.0).

Based on the results of the above assessments, the fuel assembly will be judged to either pass or fail the cleanliness criteria. The damage level and results of the cleanliness assessment for each fuel element examined will be recorded on data sheets (Stegen 2000). During Phase 3 testing, fuel inspection team members will work as a group to determine the cleanliness of elements. This will provide experience for the inspection team with the actual assembly views available using FRS processing equipment. During Phase 4 testing, individual inspection team member cleanliness judgements will be recorded. The individual judgements will be compared at the conclusion of processing a canister. If disagreements are recorded between the individual observations, examination videotape will be reviewed by the group to investigate the basis for differences. The results of this review, along with the consensus decision, will be recorded in the comment field of the inspection team data sheet.

5.0 PROCESS EVALUATION

Phase 3 of PSI process validation testing consists of equipment operability verification. It is anticipated that at least six canisters of fuel will be processed during this phase of the testing to demonstrate satisfactory cleaning performance of the PCM. All fuel element except "Bad" elements that qualify as scrap will be examined during Phase 3 testing. Some of the PCM operating parameters may be adjusted during this phase of the testing to improve or optimize PCM cleaning performance. The Design Authority and manager of Process Engineering will review the test results and decide whether to continue or conclude parameter testing (Stegen 2000)

Phase 4 of the PSI constitutes the actual process validation testing for the PCM. It will involve a minimum of 29 canisters of fuel selected on a random basis from the K West Basin fuel inventory. Fuel examination will again be performed on all but the "Bad" fuel elements that qualify as scrap during Phase 4 testing. The basis for determining whether cleaning performance is acceptable is presented in Stegen (2000).

The cleanliness assessment team members are selected for their experience and expertise in various SNF disciplines, and as such form a select panel for the purpose of performing the fuel cleanliness assessments. A certified Quality Control Inspector will verify that required data are properly recorded.

Upon completion of the FRS process validation testing, a final report will be prepared describing the PCM performance and validation testing results. This report will form the basis for validating the PCM performance and verifying that canister particulate loading levels in MCOs will not exceed safety basis limits. Quality Assurance review and signoff will be required to confirm that the examination data have been appropriately documented. Nuclear Safety will also review and approve the final report to corroborate that the assessment results are within the safety basis for MCO fuel loading.

After the process is validated, periodic examinations of sample lots of cleaned fuel will be performed in the production mode. These assessments will verify there has been no degradation of the cleaning process during production operations (Stegen 2000). Cleanliness assessments of the production samples will be the same as those performed on cleaned fuel during process validation testing. Similar data sheets will be used to record damage levels and the results of the cleanliness assessment. These packages of data sheets constitute quality records for the MCO loading inventories, and will also be subjected to peer reviews to satisfy OCRWM documentation requirements. The peer reviews may entail the use of video records generated during the examination processes.

6.0 REFERENCES

- Pajunen, A. L., 2000, Phased Startup Initiative Phases 3 and 4 Test Plan and Test Specification (OCRWM), HNF-4898, Rev. 1B, Fluor Hanford, Richland, Washington.
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- Quality Assurance Program Plan for Implementation of the OCRWM QARD for the Spent Nuclear Fuel Project, QAPP-OCRWM-001, Rev. 6, Fluor Daniel Hanford, Richland, Washington.
- DOE/RW/0333P, Office of Civilian Radioactive Waste Management Quality Assurance Requirements and Description.

Figure 1. Conical Particulate Pile in Relation to Fuel Assembly - Overall View.

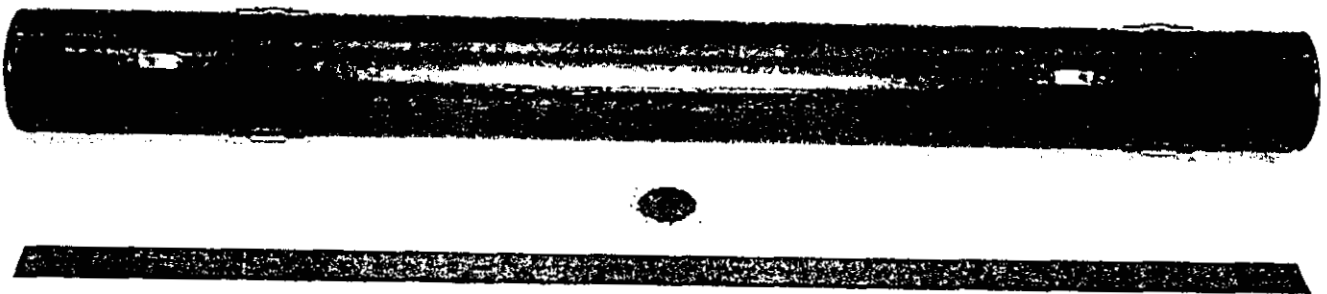


Figure 2. Conical Particulate Pile in Relation to Fuel Assembly - End View.

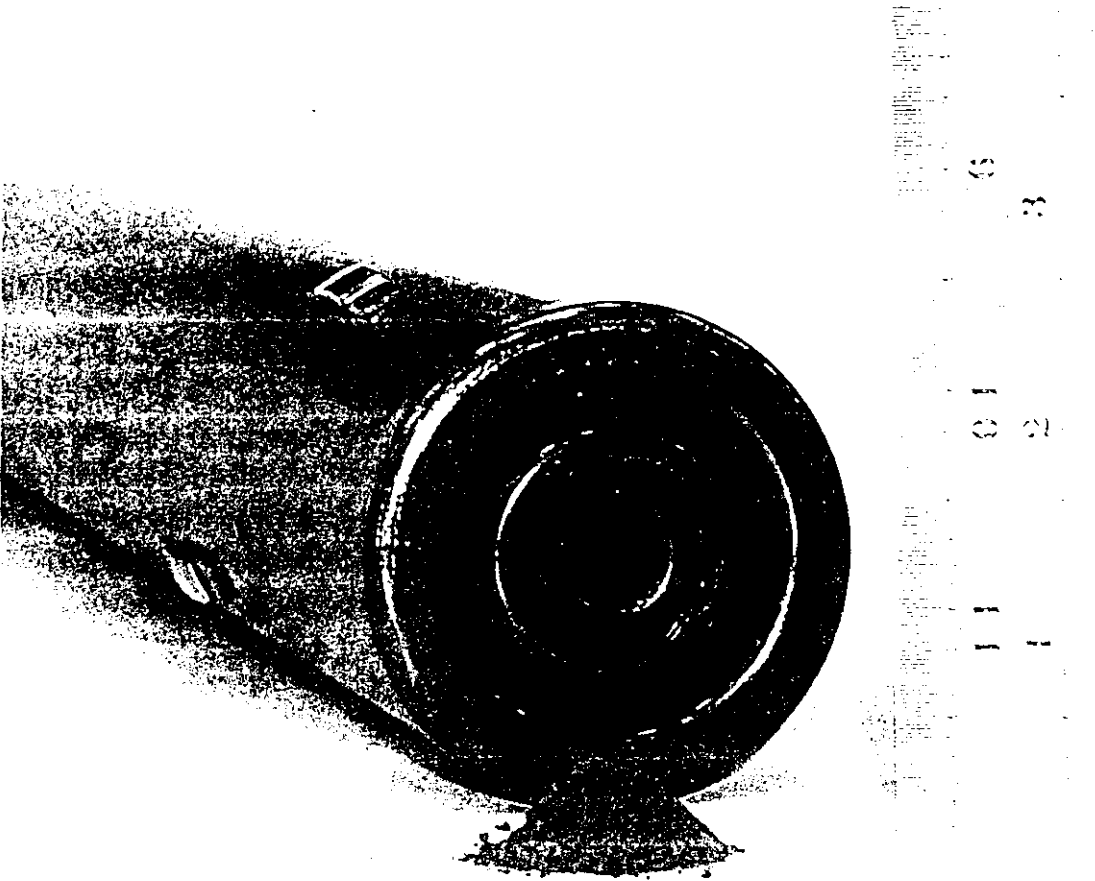


Figure 3. Schematic of Canister Sludge Collection Tray.

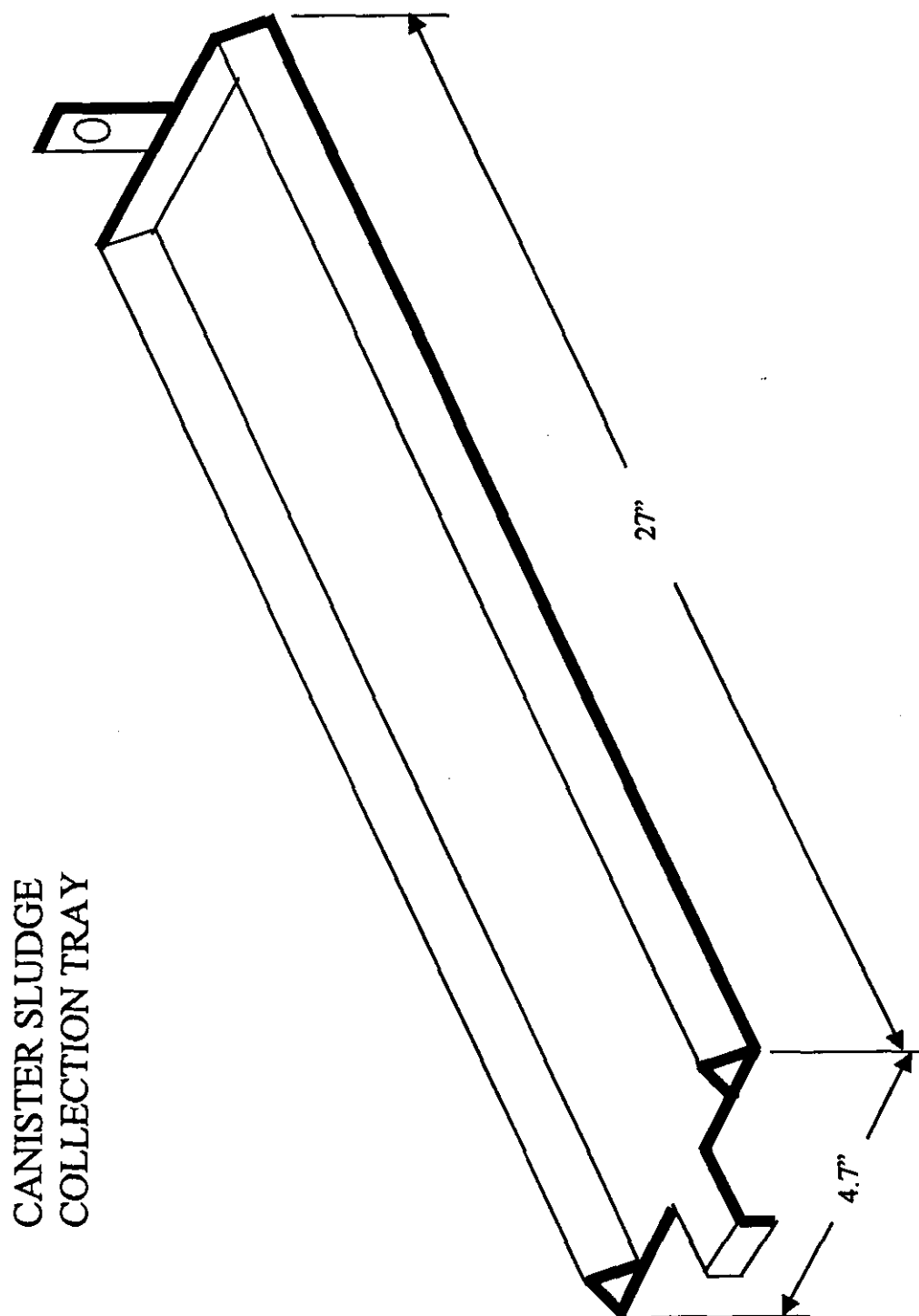


Figure 4. Sludge Pickup Adapter for Particulate Volume Assessment.

