RMIS View/Print Document Cover Sheet

This document was retrieved from the Documentation and Records Management (DRM) ISEARCH System. It is intended for Information only and may not be the most recent or updated version. Contact a Document Service Center (see Hanford Info for locations) if you need additional retrieval information.

Accession #: D196058437

Document #: SD-SNF-SM-003

Title/Desc:

CHOICES OF CANISTERS & ELEMENTS FOR THE 1ST FUEL &
CANISTER SLUDGE SHIPMENT FROM K EAST BASIN

Pages: 85

MAR 22 1996

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT

No 615481

2. To: (Receiving Organization) Distribution		3. From: (Originating Organization) Spent Nuclear Fuel Evaluations		4. Related EDT No.: N/A							
5. Proj./Prog./Dept./Div.: Spent Nuclear Fuels Project LD11A		6. Cog. Engr.: B. J. Makenas / 8M710		7. Purchase Order No.: N/A							
8. Originator Remarks: For Release				9. Equip./Component No.: N/A							
				10. System/Bldg./Facility: N/A							
11. Receiver Remarks:				12. Major Assm. Dwg. No.: N/A							
				13. Permit/Permit Application No.: N/A							
				14. Required Response Date: N/A							
15. DATA TRANSMITTED											
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition			
1	WHC-SD-SNF-SM-003	--	0	CHOICES OF CANISTERS AND ELEMENTS FOR THE FIRST FUEL AND CANISTER SLUDGE SHIPMENT FROM K EAST BASIN	N/A	1					
16. KEY											
Approval Designator (F)		Reason for Transmittal (G)			Disposition (H) & (I)						
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)		1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)			1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged						
(G)	(H)	17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)						(G)	(H)		
Reason	Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	Reason	Disp.
1	1	Cog.Eng. B.J. Makenas	<i>B.J. Makenas</i>	3/13/96	H0-40	Distribution Attached				2	
1	1	Cog. Mgr. R.P. Omberg	<i>R.P. Omberg</i>	3/13/96	R3-85						
		QA									
		Safety									
		Env.									
18. <i>B.J. Makenas</i> B.J. Makenas 3/13/96 Signature of EDT Originator		19. <i>R.P. Omberg</i> R.P. Omberg 3/13/96 Authorized Representative for Receiving Organization		21. DOE APPROVAL (if required) Ctrl. No. [] Approved [] Approved w/comments [] Disapproved w/comments							

CHOICES OF CANISTERS AND ELEMENTS FOR THE FIRST FUEL AND CANISTER SLUDGE SHIPMENT FROM K EAST BASIN

B. J. Makenas, A. L. Pitner, and R. B. Baker
Westinghouse Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: 615481 UC: 2070
Org Code: 8M710 Charge Code: LB026
B&R Code: EW3135040 Total Pages: 80

Key Words: K Basin, Sludge, N Reactor Fuel, Characterization

Abstract: The K East Basin contains open-top canisters with up to fourteen N Reactor fuel assemblies distributed between the two barrels of each canister. Each fuel assembly generally consists of inner and outer concentric elements fabricated from uranium metal with zirconium alloy cladding. The canisters also contain varying amounts of accumulated sludge. Retrieval of sample fuel elements and associated sludge for examination is scheduled to occur in the near future. The purpose of this document is to specify particular canisters and elements of interest as candidate sources of fuel and sludge to be shipped to laboratories.

TRADEMARK DISCLAIMER. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

Printed in the United States of America. To obtain copies of this document, contact: WHC/BCS Document Control Services, P.O. Box 1970, Mailstop H6-08, Richland WA 99352. Phone (509) 372-2420; Fax (509) 376-4989.

James Bishop 3-22-96
Release Approval Date

Approved for Public Release

CHOICES OF CANISTERS AND ELEMENTS FOR THE FIRST FUEL
AND CANISTER SLUDGE SHIPMENT FROM K EAST BASIN

B. J. Makenas, A. L. Pitner, and R. B. Baker
Westinghouse Hanford Company

March 1996

Document Title: CHOICES OF CANISTERS AND ELEMENTS FOR THE FIRST FUEL
AND CANISTER SLUDGE SHIPMENT FROM K EAST BASIN

Prepared by: 3/8/96
B. J. Makenas
Spent Nuclear Fuel Evaluations Date

Reviewed by: 3/11/96
A. L. Pitner
Spent Nuclear Fuel Evaluations Date

Reviewed by: 3/11/96
R. B. Baker
Spent Nuclear Fuel Evaluations Date

Reviewed by: 3/11/96
L. A. Lawrence
Spent Nuclear Fuel Evaluations Date

Approved by: 3/13/96
R. P. Omberg, Manager
Spent Nuclear Fuel Evaluations Date

Approved by: 3/11/96
J. Shuen, Program Engineer
SNFP Characterization Program
U.S. Department of Energy
Richland Office Date

Approved by: 3-15-96
D. W. Smith
SNFP Quality Assurance Date

CONTENTS

1.0	INTRODUCTION	4
2.0	SELECTING INITIAL CANISTERS AND ELEMENTS FOR SCREENING	6
2.1	HISTORICAL VIDEO AS A GUIDE FOR SCREENING	6
2.2	CRITERIA FOR CANISTERS SUBJECT TO SCREENING	6
3.0	NARROWING THE LIST OF CANDIDATES	11
3.1	CRITERIA FOR NARROWING THE LIST OF CANDIDATES	11
4.0	REFERENCES	13
	APPENDIX A VIEWS OF CANISTERS SELECTED FOR ULTRASOUND AND VIDEO SCREENING	14

LIST OF FIGURES

1. K East Process Flow	5
----------------------------------	---

LIST OF TABLES

1. List of Candidate Canisters for Screening Examinations	7
2. Responsible Individuals for Final Selection of Fuel Elements for Characterization	12

CHOICES OF CANISTERS AND ELEMENTS FOR THE FIRST FUEL AND CANISTER SLUDGE SHIPMENT FROM K EAST BASIN

1.0 INTRODUCTION

The K East Basin contains open-top canisters with up to fourteen N Reactor fuel assemblies distributed between the two barrels of each canister. Each fuel assembly generally consists of inner and outer concentric elements fabricated from uranium metal with zirconium alloy cladding. Retrieval of sample fuel elements and associated sludge for examination is scheduled to occur in the near future. The purpose of this document is to specify particular canisters and elements of interest as candidate sources of fuel and sludge to be shipped to laboratories. A summary flow chart for the sample retrieval process is given in Figure 1.

The upcoming campaign in the K East Basin will consist of three parts (Serles 1996a, 1996b): (1) the selection and shipment of fuel elements to 327 Building hot cells, (2) the collection of sludge from inside of canisters with shipment to laboratories and (3) handling and in-basin visual examination of elements with determination of sludge adherence to the elements. The objectives for the first and third parts are covered in the fuel Data Quality Objectives (DQO) document for this campaign (Lawrence 1996). Nine fuel elements (all visibly damaged) will be selected and shipped to the hot cell for metallography, furnace testing, and other examinations. Three other fuel assemblies (inner and outer elements) will be the subject of in-basin activities, such as brushing and agitation, which contribute to the design of cleaning equipment involved in the loading of Multi-Canister Overpacks (MCOs). The rationale for sludge collection is discussed in a separate DQO document (Makenas 1996) where it is envisioned that nine sludge samples will be collected from seven fuel laden canister barrels and from two empty or nearly empty barrels. The candidate canisters named in this document were selected at a series of meetings in January and February 1996.

Figure 1. K East Process Flow.
(Excerpted in part from Møllerus 1996)

2.0 SELECTING INITIAL CANISTERS AND ELEMENTS FOR SCREENING

It is assumed that the campaign in K East Basin will consist of several phases. A screening survey of a significant number of selected canisters, by video and ultrasonic methods, will first be accomplished (Pitner 1996a). During this survey video will be used primarily to assess the degree of fuel damage while ultrasound will be used to gauge sludge depth. Down selection of the number of candidate canisters (discussed in Section 3.0) will then be made based on the fuel condition and sludge content of each. Fuel and sludge samples will then be shipped out of the basin. Completion of the fuel element cleaning process demonstration will be the last activity.

2.1 HISTORICAL VIDEO AS A GUIDE FOR SCREENING

It is not possible to survey all canisters in K East Basin at this time as part of the screening examinations. The initial list of candidate canisters for screening, discussed below, is based, in part, on the condition of canisters as seen in the 1994 complete video survey of the K East Basin (Pitner 1995, 1996b). This record of fuel and canister condition may or may not describe the current condition almost 2 years later. Also the angle of viewing in the early survey was arbitrary since several canisters were video taped using one camera location and thus conditions were not always optimal for seeing deeply into canisters.

2.2 CRITERIA FOR CANISTERS SUBJECT TO SCREENING

Table 1 is the list of canisters chosen to be examined by video and ultrasound. The 64 candidate canisters were chosen according to the following criteria derived from the DQO documents (Lawrence 1996; Makenas 1996):

- Canisters must have potential to satisfy DQO identified needs. These include damaged fuel, the need for replicates of the same damage level, bubbles indicating ongoing corrosion, and/or corrosion sufficient to indicate potential sludge.
- Canisters must be under basin grating slots for ease of canister handling and proper utilization of the canister sludge sampler (Baker 1996).
- The list must be of a size to be surveyed in 2 weeks. Sixty-four was judged to be an achievable number based on experience during the 1994 video campaign (Pitner 1995).
- The list must include some older fuel as defined by the data base of key dates and encapsulation dates.
- Aluminum canisters, with potential for canister corrosion product in the sludge, must be included.

Table 1. List of Candidate Canisters for Screening Examinations.

Location	Key	Can	Open End Undiluted	Open End Diluted	Split Cladding	Mod. Breach Crud/Stain	Sludge Empty Can	Sludge Few Clmts	Sludge High Damage	Comment
455W	12285	SS								X
627W	12285	SS		X						X
646E	12285	SS								X
648E	12285	SS								X
1236W	10679	Al								X
1243W	10679	Al								X
1267E	10679	Al								X
1417W	12201	Al	X							
1743W	-----	Al					X			
1845E	10764	SS				X				
1858E	10742	Al								X
2210E	10602	Al				X				
2211W	10456	Al								X
2214E	10602	Al		X						X
2229E	10456	Al			X					
2244W	11183	SS					X			
2248W	12240	SS					X			
2350E	10456	Al		X						X
2353E	10456	Al		X						X
2355W	10456	Al								X
2540E	11372	SS		X						X
2573W	-----	Al					X			
2711E	11372	SS			X					X
2722W	14356	SS								X
2756E	11372	SS								X
3128W	11372	SS				X				Originally in 3136

Table 1. List of Candidate Canisters for Screening Examinations (continued).

Location	Key	Can	Open End Undiluted	Open End Diluted	Split Cladding	Mod. Breach Crud/Stain	Sludge Can Empty	Sludge few Elms	Sludge High Damage	Comment
3727W	10982	Al				X				Stains
3971W	11979	SS							X	
4138W	10982	Al	X						X	
4143W	10982	Al			X				X	
4168E	10001	Al						X		Bubbler
4168W	10001	Al						X		
4321W	11449	SS		X				X		
4359W	15458	SS				X			X	Bubbler
4569E	10350	Al								Spacer Crud
4569W	10350	Al							X	Bubbler
4573W	10350	Al							X	Bubble from "Good" element
4620W	11109	Al	X						X	Slotted Can
4627W	-----	Al					X			
4638E	-----	Al					X			Ruler Meas = 0.625"
4661E	15458	SS					X			Ruler Meas = 0.375"
4767E	-----	SS				X				Crud
4865W	11109	Al	X							Ruler Meas = 0.5"
5043W	10294	Al							X	
5055W	10294	Al							X	Bubbler
5069E	10294	Al							X	
5238W	11897	SS	X						X	Bubbler
5254E	11449	Al	X						X	
5427W	10385	Al							X	Slotted Can
5445E	10385	Al	X						X	Slotted Can
5465E	10385	Al							X	Slotted Can
5465W	10385	Al							X	Bubbler / Slotted Can

Table 1. List of Candidate Canisters for Screening Examinations (continued).

Location	Key	Can	Open End Undiluted	Open End Diluted	Split Cladding	Mod. Breach Crud/Stain	Sludge Empty Can	Sludge Few Elmts	Sludge High Damage	Comment
5608E	11540	SS		X					X	
5618E	11449	SS		X					X	
5618W	11449	SS	X						X	
5655W	-----	SS					X			Ruler Meas = 0.375"
6057E	11806	SS							X	
6069W	14356	Al						X		
6070W	14356	Al			X				X	Bubbler
6071W	14356	Al			X				X	Bubbler
6073W	-----	SS					X			Ruler Meas = 0.625"
6413E	11806	SS				X				Stains
6413W	11806	SS							X	
6757W	12565	SS							X	Resin Beads

- At least some of the candidate damaged elements within the suggested canisters must be easily handled with existing tools (Mollerus 1996) unless the canister is a candidate only to supply sludge samples.
- Candidate canisters must not be near stacks of debris and empty canisters which might take inordinate time to move and which might interfere with survey or canister handling equipment.
- Candidate canisters with badly split fuel elements (with potential to damage survey equipment) may be included in Table 1 but must be surveyed last to avoid jeopardizing completion of the bulk of the survey.

A picture of each candidate canister (circa 1994) is included in Appendix A.

3.0 NARROWING THE LIST OF CANDIDATES

The screening video examinations will establish the current condition of candidate elements with respect to damage and, to some extent, indicate potential stains/crud/sludge adhering to the outside of elements. Ultrasound will indicate the depth of sludge in canisters thus, illuminating both candidate canisters for sludge sampling and elements which might be immersed in sludge and therefore, be candidates for in-basin visual examinations and for rudimentary cleaning studies (such as brief brushing actions). After completion of the screening examinations, representatives of the Westinghouse Hanford Company (WHC) and Pacific Northwest National Laboratory (PNNL) characterization groups, selected Integrated Process Strategy (IPS) design authorities and fuel handling group representatives will pick final candidate canisters for removal of fuel and sludge samples and those canisters which will supply elements to the visual examinations and cleaning studies.

3.1 CRITERIA FOR NARROWING THE LIST OF CANDIDATES

Final candidate canisters, which will provide samples and specific fuel elements to ship, will be selected based on the screening examination data and the following criteria:

- Final candidates for sludge sampling shall, if possible, have at least 300 ml of retrievable sludge in a barrel. Sludge and fuel samples need not come from the same barrel or even the same canister. Note that if a canister is to supply both sludge and fuel, sludge sampling must be done first so that movement of the canister to the fuel retrieval station does not result in lost sludge. An even geographic distribution of chosen canisters throughout the basin is not necessary but proximity to previous floor sludge samples (Welsh 1995) may be a favorable consideration in sampling location selection.
- Canister barrels designated for sludge retrieval must show a number of open channels between elements for the sludge extraction nozzle to penetrate to the canister bottom. These barrels shall be chosen to cover a range of sludge depth, fuel damage, and age (Welsh 1996).
- Fuel elements chosen for the advanced cleaning studies (mechanical washing) cannot be the same as those picked for hot cell shipment since the washing studies are scheduled to be the last activity. Elements chosen for washing studies should have visible particulate material adhering to the outside of the element. Elements should be chosen to cover a variation of particulate morphologies if such differences can be detected in the video survey.
- Fuel elements designated for retrieval and shipment to hot cells shall satisfy the fuel DQOs as summarized in Section 2.2 (i.e., damaged fuel etc.).

- Fuel elements selected for shipment or washing must be easily handled by existing tools (Bridges 1996) based on an assessment of the most recent video data.
- The set of elements selected for bottom-end visual examinations shall contain, as much as possible, elements which are found to be imbedded in sludge at the bottom of a canister. These may be the same elements as those picked for later shipment to hot cells or for washing.
- The set of two empty canisters for sludge sampling shall contain one aluminum canister with evidence of corrosion nodules on the inside wall of the canister. The second empty canister shall be stainless steel.

The list of final target canisters and elements shall be documented by Engineering Change Notice with concurrence by the Manager of Spent Nuclear Fuel Characterization. A list of individuals responsible for formulating the final list is given in Table 2.

Table 2. Responsible Individuals for Final Selection of Fuel Elements for Characterization.

Responsible Individual	Area	Alternate
D.W. Bergmann	Operations interface	J.J. Jernberg
S.C. Marschman	Fuel Selection (PNNL)	J. Abrefah
L.A. Lawrence	Fuel Selection (WHC)	A.L. Pitner
R.B. Baker/K.L. Pearce	Sludge Sampling (Characterization and TWRS Interface)	B.J. Makenas
W.C. Mills	Element Cleaning	J.J. Jernberg
C.R. Miska/J.A. Irwin	Fuel Conditioning and Drying	G.W. Reddick
R.P. Omberg	Management Approval	E.W. Gerber

4.0 REFERENCES

- Baker, R. B., 1996, "System Design Description for Sampling Sludge in K Basin Fuel Storage Containers," WHC-SD-SNF-SDD-004, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Bridges, A. E., 1995, "Test Plan for K Basin Fuel Handling Tools," WHC-SD-SNF-TP-010, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Lawrence, L. A., 1996, "Data Quality Objectives for K East Fuel Examination," WHC-SD-SNF-DQO-009, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Makenas, B. J., 1996, "Data Quality Objectives for K East Basin Canister Sludge Sampling," WHC-SD-SNF-DQO-008, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Mollerus, F. J. and R. B. Baker, 1996, "System Design Description for Sampling Fuel in K Basins," WHC-SD-SNF-SDD-005, Westinghouse Hanford Company, Richland, Washington.
- Pitner, A. L., 1995, "K East Basin Underwater Visual Fuel Survey," WHC-SD-SNF-TI-012, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Pitner, A. L., 1996a, "Test Plan for K East Visual and Ultrasound Survey of Candidate Canisters for Fuel and Sludge Characterization," WHC-SD-SNF-TP-024, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Pitner, A. L., 1996b, "K East Fuel Cleanliness Evaluation," WHC-SD-SNF-TI-018, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Serles, J. A., 1996a, "Test Plan for Sludge Removal Apparatus," WHC-SD-SNF-TP-023, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Serles, J. A., 1996b, "Master Work Plan for K East and K West Phase II Fuel Characterization," MWP-95-005.
- Welsh, T. L., 1995, "Sampling and Analysis Plan for Floor Sludge in the 105-K East Main Basin and Weasel Pit," WHC-SD-SNF-PLN-006, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Welsh, T. L., 1996, "Sample Analysis Plan for Canister Sludge," WHC-SD-SNF-PLN-016, Rev. 0, to be published, Westinghouse Hanford Company, Richland, Washington.

A P P E N D I X A

VIEWS OF CANISTERS SELECTED FOR ULTRASOUND AND VIDEO SCREENING

(These Photographs are Based on the 1994 Video Survey)

Figure A1. Location 455W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A2. Location 627W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A3. Location 646E--Open End / Dilated.

BEST AVAILABLE COPY

Figure A4. Location 668E--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A5. Location 1236W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A6. Location 1243W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A7. Location 1267W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A8. Location 1417W--Open End / Undilated.

BEST AVAILABLE COPY

Figure A9. Location 1743W--Empty Canister / Ruler Measurement.

BEST AVAILABLE COPY

Figure A10. Location 1845E--Moderate Breach / Crud.

BEST AVAILABLE COPY

Figure A11. Location 1858E--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A12. Location 2210E--Moderate Breach.

BEST AVAILABLE COPY

Figure A13. Location 2211W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A14. Location 2214E--Open End / Dilated.

BEST AVAILABLE COPY

Figure A15. Location 2229E--Split Cladding.

BEST AVAILABLE COPY

Figure A16. Location 2244W--Sludge / Few Elements.

BEST AVAILABLE COPY

Figure A17. Location 2248W--Sludge / Few Elements.

BEST AVAILABLE COPY

Figure A18. Location 2350E--Open End / Dilated.

BEST AVAILABLE COPY

Figure A19. 2353E--Open End / Undilated.

BEST AVAILABLE COPY

Figure A20. Location 2355W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A21. Location 2540E--Open End / Undilated.

BEST AVAILABLE COPY

Figure A22. Location 2575W--Empty Canister / Ruler Measurement.

BEST AVAILABLE COPY

Figure A23. Location 2711E--Open End / Dilated.

BEST AVAILABLE COPY

Figure A24. Location 2722W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A25. Location 2756E--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A26. Location 3128W--Split Cladding.

BEST AVAILABLE COPY

Figure A27. Location 3727W--Moderate Breach / Stains.

BEST AVAILABLE COPY

Figure A28. Location 3971W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A29. Location 4138W--Open End / Dilated.

BEST AVAILABLE COPY

Figure A30. Location 4143W--Split Cladding.

BEST AVAILABLE COPY

Figure A31. Location 4168E--Sludge / Few Elements.

BEST AVAILABLE COPY

Figure A32. Location 4168W--Sludge / Few Elements.

BEST AVAILABLE COPY

Figure A33. Location 4321W--Open End / Dilated.

BEST AVAILABLE COPY

Figure A34. Location 4359W--Moderate Breach / Spacer Crud.

BEST AVAILABLE COPY

Figure A35. Location 4569E--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A36. Location 4569W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A37. Location 4573W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A38. Location 4620W--Open End / Undiluted.

BEST AVAILABLE COPY

Figure A39. Location 4627W--Fueled Canister / Ruler Measurement.

BEST AVAILABLE COPY

Figure A40. Location 4638E--Empty Canister / Sludge Measurement.

BEST AVAILABLE COPY

Figure A41. Location 4661E--Moderate Breach / Crud.

BEST AVAILABLE COPY

Figure A42. Location 4767E--Empty Canister / Ruler Measurement.

BEST AVAILABLE COPY

Figure A43. Location 4865W--Open End / Undiluted.

BEST AVAILABLE COPY

Figure A44. Location 5043W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A45. Location 5055W--Open End / Undiluted.

BEST AVAILABLE COPY

Figure A46. Location 5069E--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A47. Location 5238W--Open End / Undiluted.

BEST AVAILABLE COPY

Figure A48. Location 5254E--Open End / Undiluted.

BEST AVAILABLE COPY

Figure A49. Location 5427W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A50. Location 5445E--Open End / Undiluted.

BEST AVAILABLE COPY

Figure A51. Location 5465E--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A52. Location 5465W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A53. Location 5608E--Open End / Dilated.

BEST AVAILABLE COPY

Figure A54. Location 5618E--Open End / Dilated.

Figure A55. Location 5618W--Open End / Undiluted.

BEST AVAILABLE COPY

Figure A56. Location 5655W--Empty Canister / Ruler Measurement.

BEST AVAILABLE COPY

Figure A57. Location 6057E--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A58. Location 6069W--Sludge / Few Elements.

BEST AVAILABLE COPY

Figure A59. Location 6070W--Split Cladding.

BEST AVAILABLE COPY

Figure A60. Location 6071W--Split Cladding.

BEST AVAILABLE COPY

Figure A60. Location 6071W--Split Cladding.

BEST AVAILABLE COPY

Figure A61. Location 6073W--Empty Canister / Ruler Measurement.

BEST AVAILABLE COPY

Figure A62. Location 6413E--Moderate Breach / Stains.

BEST AVAILABLE COPY

Figure A63. Location 6413W--Sludge / High Damage.

BEST AVAILABLE COPY

Figure A64. Location 6757W--Sludge / High Damage

BEST AVAILABLE COPY

DISTRIBUTION SHEET

To	From	Page 1 of 2
Distribution	Spent Nuclear Fuel Evaluations 8M710	Date 03/15/96
Project Title/Work Order		EDT No. 615481
Spent Nuclear Fuel Project		ECN No.

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
------	------	-----------------------------	-----------	------------------------------	-----------------

U.S. Department of Energy,
Richland Field Office

E. D. Sellers	S7-41	X			
J. Shuen	S7-41	X			
P. G. Loscoe	S7-41	X			

Mac Technical Services Company

G. Baston	R3-82	X			
-----------	-------	---	--	--	--

Pacific Northwest Laboratory

J. Abrefah	P7-34	X			
S. C. Marschman	P7-34	X			
K. L. Silvers	P7-27	X			
T. A. Thornton	P7-34	X			

Westinghouse Hanford Company

C. J. Alderman	R3-48	X			
R. B. Baker	H0-40	X			
D. W. Bergmann	R3-86	X			
L. D. Bruggeman	H0-40	X			
A. E. Bridges	H0-40	X			
C. Defigh-Price	X3-79	X			
J. C. Fulton	R3-11	X			
J. R. Frederickson	R3-86	X			
E. W. Gerber	R3-86	X			
D. G. Griffin	T6-20	X			
R. A. Harris	H0-40	X			
V. L. Hoefer	R3-11	X			
J. J. Jernberg	X3-85	X			
S. M. Joyce	T6-04	X			
A. T. Kee	R3-86	X			
L. A. Lawrence	H0-40	X			
C. D. Lucas	X3-67	X			
P. J. MacFarlan	H0-40	X			
B. J. Makenas (5)	H0-40	X			
R. L. McCormack	R3-86	X			
L. M. McWethy	R3-48	X			
C. T. Miller	X3-72	X			
G. L. Miller	T6-06	X			
C. R. Miska	R3-86	X			
F. W. Moore	X3-85	X			
R. P. Omberg	R3-85	X			
K. L. Pearce	R3-48	X			
J. P. Schmidt	X3-78	X			

DISTRIBUTION SHEET

To Distribution	From Spent Nuclear Fuel Evaluations 8M710	Page 2 of 2 Date 03/15/96
Project Title/Work Order Spent Nuclear Fuel Project		EDT No. 615481 ECN No.

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
------	------	-----------------------------	-----------	------------------------------	-----------------

Westinghouse Hanford Company (continued)

P. K. Shen	R3-87	X			
D. W. Siddoway	X3-71	X			
D. W. Smith	R3-11	X			
J. A. Swenson	R3-11	X			
T. L. Welsh	T6-07	X			
M. J. Wiemers	X3-85	X			
Central Files (2)	A3-88	X			
K. A. Robert, SNF	R3-11	X			