

S

SEP 8 2000

Sta. 4

58

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT

629782

2. To: (Receiving Organization) Distribution		3. From: (Originating Organization) Process Engineering		4. Related EDT No.: N/A				
5. Proj./Prog./Dept./Div.: Spent Nuclear Fuel Project		6. Design Authority/ Design Agent/Cog. Engr.: M. J. Packer		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: 11A. Design Based Document? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No USQ: K-00-1097, CVD-00-1544, CSB-00-1192				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	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
	SNF-6440	N/A	0	Spent Nuclear Fuel Project Multi-Canister Overhaul Process Flow Diagram Balance Calculations	S ^N , Q	1	1	/

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	
17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)					
(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	/	Design Authority	W. Goldmann	9/17/00	R3-86
		Design Agent			
1	/	Cog. Eng. M. J. Packer	M. J. Packer	9/15/00	R3-86
1	/	Cog. Mgr. J. R. Frederickson	J. R. Frederickson	9/8/00	R3-86
1	/	QA Dennis W. Smith	D. W. Smith	8/14/00	
1	/	Safety	C. W. Smith	9/15/00	
		Env.			
18.		19.		20.	
Signature of EDT Originator M. J. Packer 9/15/00		Authorized Representative for Receiving Organization J. R. Frederickson 9/8/00		Design Authority/ Cognizant Manager J. R. Frederickson 9/8/00	
21. DOE APPROVAL (if required) Ctrl. No. N/A <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/comments <input type="checkbox"/> Disapproved w/comments					

DISTRIBUTION SHEET

To Distribution	From Process Engineering	Page 1 of 1
Project Title/Work Order Spent Nuclear Fuel Project Multi-Canister Overpack Process Flow Diagram Mass Balance Calculations		Date 7/25/00
		EDT No. 629782
		ECN No. N/A

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

Spent Nuclear Fuel Project

G. D. Bazinet	S8-06	X
D. M. Chenault	R3-86	X
S. K. Farnworth	E6-46	X
J. R. Frederickson	R3-86	X
L. H. Goldmann	R3-86	X
C. R. Hoover	L6-58	X
L. H. Julyk	R3-83	X
M. J. Klem	R3-86	X
S. A. Krieg	S8-06	X
B. D. Lorenz	R3-26	X
D. R. Lucas	L6-58	X
M. K. Martin	L6-58	X
D. W. Medford	X4-01	X
C. T. Miller	X3-79	X
M. J. Packer	R3-86	X
A. L. Pajunen	R3-86	X
D. J. Rains	E6-11	X
E. S. Ruff	E6-15	X
D. L. Sherrell	R3-86	X
D. W. Smith	S2-48	X
K. E. Smith	L6-58	X
J. A. Swenson	R3-11	X
K. C. Tu	E6-46	X
SNF Project Files	R3-11	

Spent Nuclear Fuel Project Multi-Canister Overpack Process Flow Diagram Mass Balance Calculations

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

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

Fluor Hanford

P.O. Box 1000

Richland, Washington

Spent Nuclear Fuel Project Multi-Canister Overpack Process Flow Diagram Mass Balance Calculations

Division: SNF

M. J. Klem
Cogema Engineering Corporation


M. J. Packer
Fluor Hanford

Date Published
September 2000

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

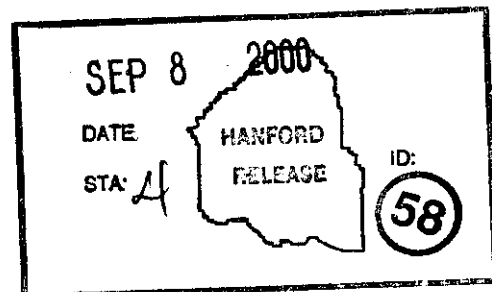
Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

Fluor Hanford
P.O. Box 1000
Richland, Washington


Release Approval

Date

9/8/00



Release Stamp

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.

This report has been reproduced from the best available copy. Available in paper copy and microfiche.

Available electronically at <http://www.doe.gov/bridge>. Available for a processing fee to the U.S. Department of Energy and its contractors, in paper, from:

U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831-0062
phone: 865-576-8401
fax: 865-576-5728
email: reports@adonis.osti.gov(423) 576-8401

Available for sale to the public, in paper, from:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
phone: 800-553-6847
fax: 703-605-6900
email: orders@ntis.fedworld.gov
online ordering: <http://www.ntis.gov/ordering.htm>

Printed in the United States of America

Total Pages:

34

SNF-6440 Rev. 0

TABLE OF CONTENTS

1.0	PURPOSE AND OBJECTIVE	1
2.0	SUMMARY OF FINAL RESULTS AND CONCLUSIONS	1
3.0	ASSUMPTIONS.....	1
4.0	SOFTWARE APPLICATIONS.....	1
5.0	COMPUTER MODEL.....	1
6.0	INPUT DATA.....	1
7.0	CALCULATIONS	2
7.1	Background	2
7.2	Discussion of Stream Calculations	3
7.2.1	IC-087 New MCO Shells to CSB for Cask Loading.....	3
7.2.2	IC-088 Empty MCO Fuel Baskets to K East Basin.....	3
7.2.3	IC-089 Empty MCO Fuel Baskets to K West Basin.....	3
7.2.4	IC-104 K East Basin MCO/Cask Loaded with Baskets.....	4
7.2.5	IC-105 K West Basin MCO/Cask Loaded with Fuel Baskets	5
7.2.6	IC-106 Loaded K East MCO/Cask with Shield Plug Installed.....	6
7.2.7	IC-107 Loaded K West MCO/Cask with Shield Plug Installed	7
7.2.8	IC-125 Empty Scrap Baskets to K East Basin for Fuel Retrieval.....	8
7.2.9	IC-126 Empty Scrap Baskets to K East Basin for Sludge Removal.....	8
7.2.10	IC-127 Empty Scrap Baskets to K West Basin for Fuel Retrieval	8
7.2.11	IC-128 Empty Scrap Baskets to K West Basin for Sludge Removal	8
7.2.12	IC-196 K East Basin Fuel and Scrap Baskets Ready to Load into MCO.....	9
7.2.13	IC-197 K West Basin Fuel and Scrap Baskets Ready to Load into MCO.....	10
7.2.14	ME-1 MCO Shield Plug for K East Basin MCOs	11
7.2.15	ME-2 Loaded MCO/Cask from K East Basin Loadout Pit.....	11
7.2.16	ME-3 Port Number 2 and 4 Blind Cover Plates, Seals and Bolts for K East Basin MCOs.....	11
7.2.17	ME-4 Main Seals for K East Basin MCOs	11
7.2.18	ME-5 Large Hole Cover Plates for K East Basin MCOs.....	12
7.2.19	ME-6 MCO Internal Gas Pressure Sending Units for K East Basin MCOs.....	12
7.2.20	ME-7 Monitored MCO Original Blind Cover Plates for K East Basin MCOs	12
7.2.21	ME-8 Blind Cover Plates for Number One Port of K East Basin Monitored MCOs.....	13
7.2.22	ME-9 Low-Pressure Readout Units for K East Basin Monitored MCOs.....	13
7.2.23	ME-10 Shield Plug Process Tube for K East Basin MCOs.....	13
7.2.24	ME-11 MCO Top Decontamination Material for K East Basin MCOs	13
7.2.25	ME-12 MCO Top Decontamination Waste for K East Basin MCOs.....	13
7.2.26	ME-13 MCO Shield Plug Area Decontamination Material for K East Basin MCOs.....	14
7.2.27	ME-14 MCO Shield Plug Area Decontamination Waste for K East Basin MCOs..	14
7.2.28	ME-15 Addition of MCO Locking and Lifting Ring to K East Basin MCOs.....	14
7.2.29	ME-16 Locking and Lifting Tightening Tool to Storage for K East Basin MCOs ..	14
7.2.30	ME-17 MCO Shield Plug Lift Handling Tool	15
7.2.31	MW-1 Shield Plugs for K West Basin MCOs	15
7.2.32	MW-2 Loaded MCO/Cask from K West Loadout Pit.....	15

7.2.33	MW-3 Port Number 2 and 4 Blind Cover Plates, Seals and Bolts for K West MCOs.....	15
7.2.34	MW-4 Main Seals for K West MCOs.....	16
7.2.35	MW-5 Large Hole Cover Plates for K West MCOs.....	16
7.2.36	MW-6 MCO Internal Gas Pressure Sending Units for K West MCOs	16
7.2.37	MW-7 Monitored MCO Original Blind Cover Plates for K West MCOs.....	17
7.2.38	MW-8 Blind Cover Plates for Number 1 Port of K West Basin Monitored MCOs .	17
7.2.39	MW-9 Low-Pressure Readout Units for K West Basin Monitored MCOs	17
7.2.40	MW-10 Shield Plug Process Tube for K West Basin MCOs	17
7.2.41	MW-11 MCO Top Decontamination Material for K West Basin MCOs.....	18
7.2.42	MW-12 MCO Top Decontamination Waste for K West Basin MCOs	18
7.2.43	MW-13 MCO Shield Plug Area Decontamination Material K West Basin MCOs .	18
7.2.44	MW-14 MCO Shield Plug Area Decontamination Waste for K West Basin MCOs	18
7.2.45	MW-15 Addition of MCO Locking and Lifting Ring to K West Basin MCOs	19
7.2.46	MW-16 Locking and Lifting Tightening Tool to Storage for K West Basin MCOs	19
7.2.47	MW-17 MCO Shield Plug Lift Handling Tool.....	19
8.0	RESULTS	19
9.0	CONCLUSIONS.....	19
10.0	REFERENCES	20
	APPENDIX A.....	A-1

LIST OF TABLES

TABLE 7.2.1	STREAM IC-104.....	4
TABLE 7.2.2	STREAM IC-105.....	5
TABLE 7.2.3	STREAM IC-106.....	6
TABLE 7.2.4	STREAM IC-107.....	7
TABLE 7.2.5	STREAM IC-196.....	9
TABLE 7.2.6	STREAM IC-197.....	10

LIST OF ACRONYMS

CSB	Canister Storage Building
CVD	Cold Vacuum Drying
FRS	Fuel Retrieval System
MCO	Multi-Canister Overpack
PFD	Process Flow Diagram
SNF	Spent Nuclear Fuel
SPR	Single Pass Reactor

Spent Nuclear Fuel Project Multi-Canister Overpack Process Flow Diagram Mass Balance Calculation

1.0 PURPOSE AND OBJECTIVE

The purpose of this calculation document is to develop the bases for the material balances of the Multi-Canister Overpack (MCO) Level 1 Process Flow Diagram (PFD). The attached mass balances support revision two of the PFD for the MCO and provide future reference.

2.0 SUMMARY OF FINAL RESULTS AND CONCLUSIONS

See Appendix A for a numerical summary of results. See drawing H-1-81169, Rev. 2 for the PFD.

3.0 ASSUMPTIONS

- Assume no material added or removed during MCO/Cask loading to the pit at the basins.
- Assume no material added or removed during receipt of the MCO/Cask at basin.
- Assume no material added or removed during placing of the shield plug on the MCO.
- Weight of MCO shell, MCO components and baskets not included in material balance except for input, output, and interface control streams.
- Number of scrap baskets for sludge removal based on 2 vol % of total floor and pit sludge.
- Assume decon material = 2.0 kg of solids (rags) per MCO per decontamination step.
- Assume decon material density = 0.6 kg/L before and after use.
- SPR fuel is not included in material balance and MCO total.

4.0 SOFTWARE APPLICATIONS

Calculations were performed on Excel 97 spreadsheets.

5.0 COMPUTER MODEL

N/A

6.0 INPUT DATA

Input data is described throughout the calculations.

7.0 CALCULATIONS

7.1 Background

The combined K Basins inventory of spent nuclear fuel (SNF) from the N Reactor, which total 2,103 metric tons uranium (Reilly 1998), is cleaned, re-racked, and loaded into 398 MCOs. The MCOs are transferred to the Cold Vacuum Drying (CVD) Facility for drying and then transferred to the Canister Storage Building (CSB) for installation and welding of a cover cap assembly before interim storage for up to 40 years. Following removal of an MCO from its transport cask at the CSB, the empty cask is loaded with a new, empty MCO and returned to the K Basins, completing one process cycle.

At the K Basins area, the shield plug is configured, tested, inserted, parts decontaminated, and mechanically sealed onto the loaded MCOs. The shield plug configuration consists of the process steps below:

- Remove port # 2 and # 4 blind cover plates, seals and bolts. Transport cover plates, seals and bolts to CVD Facility process bays for reinstallation after drying.
- Open # 2 port valve.
- Install large hole (1-inch opening) cover plate on ports # 2 and # 4. Large hole cover plates and bolts are recycled between CVD Facility and the MCO closure at K Basins.
- Remove # 1 port blind cover plate and install a high or low-pressure-sending unit. The low-pressure sending units are added to only the monitored MCOs.
- Reinstall # 1 port blind cover plate. A new blind cover plate is required for the monitored MCOs.
- Leak test # 1 port mechanical seal.
- Install low-pressure readout unit on # 1 port blind cover plate for monitored MCOs any time after CVD processes are complete.
- Install MCO shield plug lift handling tool.
- Install process tube on shield plug.
- Leak test process tube mechanical seal.

After shield plug configuration, the shield plug is added to the loaded MCO. The loaded MCO is closed and mechanically sealed. The mechanical sealing consists of the process steps below:

- Locate shield plug in the MCO and raise the MCO/cask out of the pit.
- Remove (immersion pail support structure) seal ring and funnel.
- Decontaminate the top of the MCO.
- Remove MCO shield plug lift handling tool.
- Decontaminate MCO shield plug area.
- Install MCO locking and lifting ring and tighten main seal.
- Remove MCO locking and lifting ring-tightening tool.

The loaded and mechanically sealed MCO is ready for transport to the CVD Facility.

7.2 Discussion of Stream Calculations

7.2.1 IC-087 New MCO Shells to CSB for Cask Loading

The MCO Sub-Project provides the new, empty MCOs to the CSB for loading into the transport cask. A total of 398 MCOs will be used. Weight of empty MCO is based on average weight and private communication with L. H. Goldmann of Fluor Hanford.

Total transfer weight of empty MCOs = $398 \text{ MCOs} \times 1942 \text{ lb/MCO} = 7.73\text{E}+05 \text{ lb} = 3.51\text{E}+05 \text{ kg}$.

7.2.2 IC-088 Empty MCO Fuel Baskets to K East Basin

MCO fuel baskets will be provided by the MCO Sub-Project to the Fuel Retrieval System (FRS) Sub-Project to support the re-racking of the SNF in K East basins. A nominal total of 845 fuel baskets will be sent to the K East basins based on Pajunen (1997). Weight of fuel baskets is based on Lorenz et al. (2000).

Total transfer weight of empty Mk IV fuel baskets = $845 \text{ baskets} \times 228 \text{ lb/basket} = 1.93\text{E}+05 \text{ lb} = 8.74\text{E}+04 \text{ kg}$

7.2.3 IC-089 Empty MCO Fuel Baskets to K West Basin

MCO fuel baskets will be provided by the MCO Sub-Project to the FRS Sub-Project to support the re-racking of SNF in K West Basin. A nominal total of 909 fuel baskets will be sent to the K West Basin based on Pajunen (1997). Weight of fuel baskets is based on Lorenz et al. (2000).

Transfer weight of empty Mk 1A fuel baskets = $684 \text{ baskets} \times 472 \text{ lb/basket} = 3.23\text{E}+05 \text{ lb} = 1.46\text{E}+05 \text{ kg}$

Transfer weight of empty Mk IV fuel baskets = $225 \text{ baskets} \times 228 \text{ lb/basket} = 5.13\text{E}+04 \text{ lb} = 2.33\text{E}+04 \text{ kg}$

Total transfer weight of empty K West Fuel Baskets = $1.46\text{E}+05 \text{ kg} + 2.33\text{E}+04 \text{ kg} = 1.70\text{E}+05 \text{ kg}$.

7.2.4 IC-104 K East Basin MCO/Cask Loaded with Baskets

This stream takes the K East Basin MCOs loaded with fuel and scrap baskets from the cask loading system to the MCO system for addition of the shield plug and mechanical closure of the MCO. The composition of stream IC-104 is listed in Table 7.2.1. It has the same composition as stream IC-106. There is no change in the mass balance from the addition of the shield plugs to the MCOs. Composition is based on Stream IC-106 in Section 7.2.12 and Appendix A in SNF-5046, Rev. 0.

Table 7.2.1 Stream IC-104

STREAM NUMBER	IC-104
DESCRIPTION	K EAST BASIN MCO/CASK LOADED WITH FUEL BASKETS
TRANSFER TYPE	BATCH
PHASE	S/L
NUMBER OF ITEMS	195
ITEM COUNT BASIS	MCO
VOLUME, m ³	-
DENSITY, g/cc	-
PRESSURE, TORR	962
TEMPERATURE, °C	10
COMPONENETS, KG	
FUEL	1.22E+06
URANIUM	1.14E+06
PLUTONIUM	2.19E+03
OTHER	7.60E+04
SLUDGE	1.33E+03
Al(OH) ₃	1.35E+02
Al ₂ O ₃	0.00E+00
Fe(OH) ₃	1.37E+01
UO ₂ (OH) ₂	4.72E+02
UO ₄ 4H ₂ O	5.21E+02
UO ₄ 2H ₂ O	0.00E+00
UO ₂	0.00E+00
UH ₃	1.85E+02
UO ₃	0.00E+00
OTHER SOLIDS	0.00E+00
OTHER	0/00E+00
ALUMINUM	0.00E+00
WATER	9.87E+04
AIR	4.84E+00
OTHER GASES	0.00E+00
ARGON	0.00E+00
HYDROGEN	0.00E+00
HELIUM	0.00E+00
NITROGEN	0.00E+00
Kr-85 (Ci)	0.00E+00
TOTAL MASS, kg	1.32E+06

7.2.5 IC-105 K West Basin MCO/Cask Loaded with Fuel Baskets

This stream takes the K West Basin MCOs loaded with fuel and sludge basket(s) from the cask loading system to the MCO system for addition of the shield plug and mechanical closure of the MCO. The composition of stream IC-105 is listed in Table 7.2.2. It has the same composition as stream IC-107. There is no change to the mass balance from addition of the shield plugs to the MCOs. Composition is based on Stream IC-107 in Section 7.2.13 and Appendix A in SNF-5046, Rev. 0.

Table 7.2.2 Stream IC-105

STREAM NUMBER	IC-105
DESCRIPTION	K WEST BASIN MCO/CASK LOADED WITH FUEL BASKETS
TRANSFER TYPE	BATCH
PHASE	S/L
NUMBER OF ITEMS	203
ITEM COUNT BASIS	MCO
VOLUME, m ³	-
DENSITY, g/cc	-
PRESSURE, TORR	962
TEMPERATURE, °C	10
COMPONENTS, KG	
FUEL	1.03E+06
URANIUM	9.48E+05
PLUTONIUM	1.91E+03
OTHER	8.46E+04
SLUDGE	1.38E+03
Al(OH) ₃	1.40E+02
Al ₂ O ₃	0.00E+00
Fe(OH) ₃	1.42E+01
UO ₂ (OH) ₂	4.91E+02
UO ₄ H ₂ O	5.42E+02
UO ₄ 2H ₂ O	0.00E+00
UO ₂	0.00E+00
UH ₃	1.93E+02
UO ₃	0.00E+00
OTHER SOLIDS	0.00E+00
STAINLESS STEEL	0.00E+00
OTHER	0.00E+00
ALUMINUM	0.00E+00
WATER	1.03E+05
AIR	5.04E+00
OTHER GASES	0.00E+00
ARGON	0.00E+00
HYDROGEN	0.00E+00
HELIUM	0.00E+00
NITROGEN	0.00E+00
Kr-85 (Ci)	0.00E+00
TOTAL MASS, kg	1.14E+06

7.2.6 IC-106 Loaded K East MCO/Cask with Shield Plug Installed

There is no material added or removed to the K East Basin MCOs during addition of the shield plugs. Mass of components is listed in Table 7.2.3. Composition is identical to Table 7.2.1 of this document.

Table 7.2.3 Stream IC-106

STREAM NUMBER	IC-106
DESCRIPTION	LOADED K EAST MCO/CASK WITH SHIELD PLUG INSTALLED
TRANSFER TYPE	BATCH
PHASE	S/L
NUMBER OF ITEMS	195
ITEM COUNT BASIS	MCO
VOLUME, m ³	-
DENSITY, g/cc	-
PRESSURE, TORR	962
TEMPERATURE, °C	10
COMPONENTS, KG	
FUEL	1.22E+06
URANIUM	1.14E+06
PLUTONIUM	2.19E+03
OTHER	7.60E+04
SLUDGE	1.33E+03
Al(OH) ₃	1.35E+02
Al ₂ O ₃	0.00E+00
Fe(OH) ₃	1.37E+01
UO ₂ (OH) ₂	4.72E+02
UO ₄ 4H ₂ O	5.21E+02
UO ₄ 2H ₂ O	0.00E+00
UO ₂	0.00E+00
UH ₃	1.85E+02
UO ₃	0.00E+00
OTHER SOLIDS	0.00E+00
STAINLESS STEEL	0.00E+00
OTHER	0.00E+00
ALUMINUM	0.00E+00
WATER	9.87E+04
AIR	4.84E+00
OTHER GASES	0.00E+00
ARGON	0.00E+00
HYDROGEN	0.00E+00
HELIUM	0.00E+00
NITROGEN	0.00E+00
Kr-85 (Ci)	0.00E+00
TOTAL MASS, kg	1.32E+06

7.2.7 IC-107 Loaded K West MCO/Cask with Shield Plug Installed

There is no material added or removed to the K West Basin MCOs during addition of the shield plugs. Mass of components is listed in Table 7.2.4. Composition is identical to Table 7.2.2 of this document.

Table 7.2.4 Stream IC-107

STREAM NUMBER	IC-107
DESCRIPTION	LOADED K WEST MCO/CASK WITH SHIELD PLUG INSTALLED
TRANSFER TYPE	BATCH
PHASE	S/L
NUMBER OF ITEMS	203
ITEM COUNT BASIS	MCO
VOLUME, m ³	-
DENSITY, g/cc	-
PRESSURE, TORR	962
TEMPERATURE, °C	10
COMPONENTS, KG	
FUEL	1.03E+06
URANIUM	9.48E+05
PLUTONIUM	1.91E+03
OTHER	8.46E+04
SLUDGE	1.38E+03
Al(OH) ₃	1.40E+02
Al ₂ O ₃	0.00E+00
Fe(OH) ₃	1.42E+01
UO ₂ (OH) ₂	4.91E+02
UO ₄ H ₂ O	5.42E+02
UO ₄ 2H ₂ O	0.00E+00
UO ₂	0.00E+00
UH ₃	1.93E+02
UO ₃	0.00E+00
OTHER SOLIDS	0.00E+00
STAINLESS STEEL	0.00E+00
OTHER	0.00E+00
ALUMINUM	0.00E+00
WATER	1.03E+05
AIR	5.04E+00
OTHER GASES	0.00E+00
ARGON	0.00E+00
HYDROGEN	0.00E+00
HELIUM	0.00E+00
NITROGEN	0.00E+00
Kr-85 (Ci)	0.00E+00
TOTAL MASS, kg	1.14E+06

7.2.8 IC-125 Empty Scrap Baskets to K East Basin for Fuel Retrieval

A nominal total of 133 scrap baskets will be sent to K East Basin based on Pajunen (1997). Weight of scrap baskets is based on Lorenz et al. (2000).

Total transfer weight empty Mk IV scrap baskets to K East Basin = 133 baskets x 432 lb/basket = 5.74E+04 lb. = 2.61 E+04 kg

7.2.9 IC-126 Empty Scrap Baskets to K East Basin for Sludge Removal

A nominal 50 scrap baskets (preliminary number and weight based on private communication with D. R. Precechtel of Fluor Hanford) are estimated for the debris pieces that will be retrieved from the K East Basin floor by the Sludge Removal System.

Transfer weight of empty scrap baskets for sludge at K East Basin = 50 baskets x 10.2 lb/basket = 5.10E+02 lb = 2.31 E+02 kg

7.2.10 IC-127 Empty Scrap Baskets to K West Basin for Fuel Retrieval

A nominal total of 244 scrap baskets will be sent to K West Basin based on Pajunen (1997). Weight of scrap baskets is based on Lorenz et al. (2000).

Transfer weight empty Mk 1A scrap baskets to K West Basin = 187 baskets x 625 lb/basket = 1.17E+05 lb = 5.30E+04 kg

Transfer weight empty Mk IV scrap baskets to K West Basin = 57 baskets x 432 lb/basket = 2.46E+04 lb = 1.12E+04 kg

Total transfer weight of scrap baskets to K West Basin = 5.30E+04 kg + 1.12E+04 kg = 6.42E+04 kg

7.2.11 IC-128 Empty Scrap Baskets to K West Basin for Sludge Removal

A nominal 6 scrap baskets (preliminary number and weight based on private communication with D. R. Precechtel of Fluor Hanford) are estimated for the debris pieces that will be retrieved from the K West Basin floor by the Sludge Removal System.

Transfer weight of empty scrap baskets for debris at K West Basin = 6 baskets x 10.2 lb/basket = 6.12E+01 lb = 2.78 E+01 kg

7.2.12 IC-196 K East Basin Fuel and Scrap Baskets Ready to Load into MCO

The K East Basin FRS cleans the fuel and places it into the MCO baskets in preparation for subsequent MCO loading. The Baskets Loading and Cask Loadout process loads fuel and scrap baskets into an MCO and prepares the MCO/Cask for transfer from the K East Basins to the CVD Facility. The material balance for stream IC-196 is listed in Table 7.2.5. It has the same composition as Table 7.2.1 of this document. Number of fuel and scrap baskets is based on Pajunen (1997).

Table 7.2.5 Stream IC-196

STREAM NUMBER	IC-196	
DESCRIPTION	FUEL AND SCRAP BASKETS READY TO LOAD IN MCO FOR K EAST BASIN	
TRANSFER TYPE	BATCH	
PHASE	S/L	
NUMBER OF ITEMS	978	
ITEM COUNT BASIS	BASKETS	
VOLUME, m ³	-	
DENSITY, g/cc	-	
PRESSURE, TORR	-	
TEMPERATURE, °C	AMBIENT	
COMPONENTS, KG		
FUEL	1.22E+06	
URANIUM		1.14E+06
PLUTONIUM		2.19E+03
OTHER		7.60E+04
SLUDGE	1.33E+03	
Al(OH) ₃		1.35E+02
Al ₂ O ₃		0.00E+00
Fe(OH) ₃		1.37E+01
UO ₂ (OH) ₂		4.72E+02
UO ₄ 4H ₂ O		5.21E+02
UO ₄ 2H ₂ O		0.00E+00
UO ₂		0.00E+00
UH ₃		1.85E+02
UO ₃		0.00E+00
OTHER SOLIDS	0.00E+00	
STAINLESS STEEL		0.00E+00
OTHER		0.00E+00
ALUMINUM		0.00E+00
WATER	9.87E+04	
AIR	4.84E+00	
OTHER GASES	0.00E+00	
ARGON		0.00E+00
HYDROGEN		0.00E+00
HELIUM		0.00E+00
NITROGEN		0.00E+00
Kr-85 (Ci)	0.00E+00	
TOTAL MASS, kg	1.32E+06	

7.2.13 IC-197 K West Basin Fuel and Scrap Baskets Ready to Load into MCO

The K West Basin FRS cleans the fuel and places it in MCO baskets in preparation for subsequent MCO loading. The Baskets Loading and Cask Loadout process loads fuel and scrap baskets in to an MCO and prepares the MCO/Cask for transfer from the K West Basins to the CVD Facility. Fuel and sludge constituents are listed in Table 7.2.6. It has the same composition as Table 7.2.2 in this document. Number of fuel and scrap baskets is based on Pajunen (1997).

Table 7.2.6 Stream IC-197

STREAM NUMBER	IC-197	
DESCRIPTION	FUEL AND SCRAP BASKETS READY TO LOAD IN MCO FOR K WEST BASIN	
TRANSFER TYPE	BATCH	
PHASE	S/L	
NUMBER OF ITEMS	1153	
ITEM COUNT BASIS	BASKETS	
VOLUME, m ³	-	
DENSITY, g/cc	-	
PRESSURE, TORR	-	
TEMPERATURE, °C	AMBIENT	
COMPONENTS, KG		
FUEL	1.03E+06	
URANIUM		9.48E+05
PLUTONIUM		1.91E+03
OTHER		8.46E+04
SLUDGE	1.38E+03	
Al(OH) ₃		1.40E+02
Al ₂ O ₃		0.00E+00
Fe(OH) ₃		1.42E+01
UO ₂ (OH) ₂		4.91E+02
UO ₄ H ₂ O		5.42E+02
UO ₄ 2H ₂ O		0.00E+00
UO ₂		0.00E+00
UH ₃		1.93E+02
UO ₃		0.00E+00
OTHER SOLIDS	0.00E+00	
STAINLESS STEEL		0.00E+00
OTHER		0.00E+00
ALUMINUM		0.00E+00
WATER	1.03E+05	
AIR	5.04E+00	
OTHER GASES	0.00E+00	
ARGON		0.00E+00
HYDROGEN		0.00E+00
HELIUM		0.00E+00
NITROGEN		0.00E+00
Kr-85 (Ci)	0.00E+00	
TOTAL MASS, kg	1.14E+06	

7.2.14 ME-1 MCO Shield Plug for K East Basin MCOs

The MCO shield plug is configured for addition to the loaded MCO. Weight is based on private communication with L. H. Goldmann of Fluor Hanford.

Total transfer weight of shield plugs for K East Basin MCOs = 195 MCOs x 1 shield plug/MCO x 1082 lb/shield plug = 2.11E+05 lb = 9.57E+04 kg

7.2.15 ME-2 Loaded MCO/Cask from K East Basin Loadout Pit

Stream ME-2 is the same as stream IC-104 (Table 7.2.1). Addition of the MCO shield plug, process tube and gas pressure sending/readout units before closing of the MCO does not change the material balance of the loaded MCOs.

7.2.16 ME-3 Port Number 2 and 4 Blind Cover Plates, Seals and Bolts for K East Basin MCOs

The port number 2 and 4 blind cover plates, seals and bolts are removed from the shield plug and stored at the CVD Facility for reinstallation after drying and before transportation of the MCO to the CSB. Weights of these components are based on Goldmann (2000) and private communication with L. H. Goldmann of Fluor Hanford.

Transfer weight of port number 2 and 4 blind cover plates for K East Basin MCOs = 5.8 lb/plate x 2 plates/MCO x 195 MCOs = 2.26E+03 lb = 1.03E+03 kg

Transfer weight of port number 2 and 4 seals for K East Basin MCOs = 2.87E-02 lb/seal x 2 seals/MCO x 195 MCOs = 1.12E+01 lb = 5.08E+00 kg

Transfer weights of port number 2 and 4 bolts for K East Basin MCOs = 0.25 lb/bolt x 4 bolts/plate x 2 plates/MCO x 195 MCOs = 3.90E+02 lb = 1.77E+02 kg

Total transfer weight = 1.03E+03 + 5.07E+00 + 1.77E+02 = 1.21E+03 kg.

7.2.17 ME-4 Main Seals for K East Basin MCOs

After process step ME-3, the main seal is added to the shield plug. Main seal weight is based on private communication with L. H. Goldmann of Fluor Hanford.

Transfer weight of main seals for K East Basin MCOs = 3.97E-01 lb/seal x 1 seal/MCO x 195 MCOs = 7.74E+01 lb = 3.51E+01 kg

7.2.18 ME-5 Large Hole Cover Plates for K East Basin MCOs

Large hole (1-inch diameter) cover plates and bolts are installed on port numbers 2 and 4 of the shield plug for protection of the process valve and rupture disc. Cover plate and bolt weights are based on Goldmann (2000) and private communication with L. H. Goldmann of Fluor Hanford.

Transfer weight of large hole plates = 5.5 lb/plate (estimate) x 2 plates/MCO x 195 MCOs =
2.14E+03 lb = 9.73E+02 kg

Transfer weight of bolts = 0.25 lb/bolt x 4 bolts/plate x 2 plates/MCO x 195 MCO = 3.90E+02 lb
=1.77E+02 kg

Total transfer weight = 9.73E+02 + 1.77E+02 = 1.15E+03 kg

7.2.19 ME-6 MCO Internal Gas Pressure Sending Units for K East Basin MCOs

The port number one blind cover plate is removed and a magnetically coupled high- or low-pressure sending unit is installed in the port. The high-pressure (600 psig) sending unit is installed in 193 of the 195 K East Basin MCOs and the low-pressure (100 psig) sending unit is installed in the remaining two K East Basin monitored MCOs based on Pajunen and Sexton (2000). The original blind cover plates are reinstalled on the 193 MCOs that contain high-pressure sending units and a monitored blind cover plate (Stream ME-8) is installed on the two monitored MCOs. Weight of the sending units is based on Klem and Pajunen (2000).

Transfer weight of low-pressure sending units for K East Basin monitored MCOs = 2.5 lb
sending unit/monitored MCO x 2 monitored MCOs = 5.0 lb = 2.27 kg

Transfer weight of high-pressure sending units for K East Basin baseline MCOs = 2.19 lb
sending unit/MCO x 193 MCOs = 4.23E+02 lb = 1.92E+02 kg

Total transfer weight of pressure sending units for K East Basin MCOs = 2.3E+00 lb +
1.92E+02 kg = 1.94E+02 kg.

7.2.20 ME-7 Monitored MCO Original Blind Cover Plates for K East Basin MCOs

The original blind cover plates from port number one of two monitored MCOs from K East Basin are transported to CSB for storage and reinstallation. The original blind cover plates are reinstalled after completion of the MCO monitoring program and replacement of the low-pressure sending units with high-pressure sending units. Weight of the original blind cover plate is based on Goldmann (2000).

Transfer weight of original port number 1 blind cover plates for K East Basin monitored MCOs
= 5.8 lb/plate x 1 plate/MCO x 2 MCOs = 1.16E+01 lb = 5.26E+00 kg

7.2.21 ME-8 Blind Cover Plates for Number One Port of K East Basin Monitored MCOs

A new monitoring blind cover plate for port number 1 is installed on the K East Basin monitored MCOs after installation of the low-pressure sending units. The new blind cover plate allows installation of a low-pressure readout unit on the outside surface of the cover plate. Weight of this plate is based on private communication with L. H. Goldmann of Fluor Hanford.

Transfer weight of new blind cover plates for KE Basin monitored MCOs = 7 lb/plate (estimate)
 $\times 1 \text{ plate/monitored MCO} \times 2 \text{ monitored MCOs} = 1.4\text{E}+01 \text{ lb} = 6.35\text{E}+00\text{kg}$

7.2.22 ME-9 Low-Pressure Readout Units for K East Basin Monitored MCOs

A magnetically coupled low-pressure readout unit is later installed on the exterior surface of port number 1 blind cover plate of the K East Basin monitored MCOs. The weight of the low-pressure readout unit is based on Klem and Pajunen (2000).

Transfer weight of low-pressure readout units for K East Basin monitored MCOs =
 $0.5 \text{ lb/readout unit} \times 1 \text{ readout unit/monitored MCO} \times 2 \text{ monitored MCOs} = 1.0 \text{ lb} =$
 $4.54\text{E}-01 \text{ kg}$

7.2.23 ME-10 Shield Plug Process Tube for K East Basin MCOs

A process tube is added to the shield plug of the K East Basin MCOs before lowering of the shield plug to the loaded MCO shell. Weight of the process tube is based on Lorenze et al (2000).

Transfer weight of process tubes for K East Basin MCOs = 45 lb/process tube $\times 1 \text{ process tube/MCO} \times 195 \text{ MCOs} = 8.78\text{E}+03 \text{ lb} = 3.98\text{E}+03 \text{ kg}$

7.2.24 ME-11 MCO Top Decontamination Material for K East Basin MCOs

Assume decontamination material of 2 kg/MCO and density of 0.6 kg/L. The estimated amount of material for decontamination of the top of the K East Basin MCOs is listed below. The decontamination material will consist of damp and dry rags.

Weight of K East Basin MCO top decon material = 2 kg/MCO $\times 195 \text{ MCOs} = 3.90\text{E}+02 \text{ kg}$

Volume of K East Basin MCO top decon material = 390 kg/0.6 kg/L = 6.50E+02 L (0.65 m³)

7.2.25 ME-12 MCO Top Decontamination Waste for K East Basin MCOs

Assume there is no change in the volume and weight of the decontamination material. See stream ME-11 for description.

7.2.26 ME-13 MCO Shield Plug Area Decontamination Material for K East Basin MCOs

Assume decontamination material of 2 kg/MCO and density of 0.6 kg/L. The estimated amount of material for decontamination of the shield plug area of the K East Basin MCOs is listed below. The decontamination material will consist of damp and dry rags.

Weight of K East Basin MCO shield plug area decon material = $2 \text{ kg/MCO} \times 195 \text{ MCOs} = 3.90\text{E}+02 \text{ kg}$

Volume of K East Basin shield plug area decon material = $390 \text{ kg}/0.6 \text{ kg} = 6.50\text{E}+02 \text{ L} (0.65 \text{ m}^3)$

7.2.27 ME-14 MCO Shield Plug Area Decontamination Waste for K East Basin MCOs

Assume there is no change in the volume and weight of the decontamination material. See stream ME-13 for description.

7.2.28 ME-15 Addition of MCO Locking and Lifting Ring to K East Basin MCOs

An MCO locking and lifting ring with attached tightening tool is installed on the K East Basin MCOs. The locking and lifting ring is installed on the MCOs and the main seal is tightened to specification before closure of the transport cask. Weight of the assembly is based on Lorenz et al (2000) and private communication with D. M. Chenault of Fluor Hanford.

Transfer weight of locking and lifting ring for K East Basin MCOs = $405 \text{ lb/locking and lifting ring} \times 1 \text{ locking and lifting ring/MCO} \times 195 \text{ MCOs} = 7.90\text{E}+04 \text{ lb} = 3.58\text{E}+04 \text{ kg}$

Transfer weight of tightening tool for K East Basin MCOs = $525 \text{ lb/tool} \times 1 \text{ attached tool/MCO} \times 195 \text{ MCOs} = 1.02\text{E}+05 \text{ lb} = 4.64\text{E}+04 \text{ kg}$

Total transfer weight of locking and lifting ring with attached tool for K East Basin MCOs = $3.58\text{E}+04 + 4.64\text{E}+04 = 8.22\text{E}+04 \text{ kg}$

7.2.29 ME-16 Locking and Lifting Tightening Tool to Storage for K East Basin MCOs

The locking and lifting tightening tool is removed from the MCO, placed on the closure tool cart/rack and moved to storage position at K East Basin. Weight of the locking and lifting tool is based on private communication with D. M. Chenault of Fluor Hanford.

Total transfer weight of tightening tool to storage for K East Basin MCOs = $525 \text{ lb/tool} \times 1 \text{ attached tool/MCO} \times 195 \text{ MCOs} = 1.02\text{E}+05 \text{ lb} = 4.64\text{E}+04 \text{ kg}$

7.2.30 ME-17 MCO Shield Plug Lift Handling Tool

The MCO shield plug-handling tool is removed from the MCO and moved to storage. The shield plug-handling tool is removed from storage and reinstalled on the MCO before installation of the process tube. Weight of the shield plug-handling tool is based on private communication with M. K. Martin of Holmes and Narver and drawing DESH 49-034A, Sheet 2.

Total transfer weight of shield plug-handling tool for K East Basin MCOs = 310 lb/tool x 1 attached tool/MCO x 195 MCOs = 6.04 E+04 lb = 2.74E+04kg

7.2.31 MW-1 Shield Plugs for K West Basin MCOs

The MCO shield plug is transferred from the multiple storage area and configured for addition to the loaded MCO at K West Basin. Weight is based on private communication with L. H. Goldmann of Fluor Hanford.

Total transfer weight of shield plug for K West Basin MCOs = 203 MCOs x 1 shield plug/MCO x 1082 lb/shield plug = 2.20E+05 lb = 9.96E+04 kg

7.2.32 MW-2 Loaded MCO/Cask from K West Loadout Pit

Stream MW-2 is the same as stream IC-105 (Table 7.2.2). Addition of the MCO shield plug, process tube, and gas pressure sending/readout units before closure of the MCO does not change the material balance of the loaded MCOs.

7.2.33 MW-3 Port Number 2 and 4 Blind Cover Plates, Seals and Bolts for K West MCOs

The port number 2 and 4 blind cover plates, seals and bolts are removed from the shield plug and stored at the CVD Facility for reinstallation after drying and before transportation of the MCO to the CSB. Weights of these components are based on Goldmann. (2000) and private communication with L. H. Goldmann of Fluor Hanford.

Transfer weight of port number 2 and 4 blind cover plates for K West Basin MCOs = 5.8 lb/plate x 2 plates/MCO x 203 MCOs = 2.35E+03 lb = 1.07E+03 kg

Transfer weight of port number 2 and 4 seals for K West Basin MCOs = 2.87E-02 lb/seal x 2 seals/MCO x 203 MCOs = 1.16E+01 lb = 5.28E+00 kg

Transfer weights of port number 2 and 4 bolts for K West Basin MCOs = 0.25 lb/bolt x 4 bolts/plate x 2 plates/MCO x 203 MCOs = 4.06E+02 lb = 1.84E+02 kg

Total transfer weight = 1.07E+03 + 5.28E+00 + 1.84E+02 = 1.26 E+03 kg

7.2.34 MW-4 Main Seals for K West MCOs

After process step MW-3, the main seal is added to the shield plug. Main seal weight is based on private communication with L. H. Goldmann of Fluor Hanford.

Transfer weight of main seals for K West Basin MCOs = $3.97\text{E-}01 \text{ lb/seal} \times 1 \text{ seal/MCO} \times 203 \text{ MCOs} = 8.06 \text{ E+}01 \text{ lb} = 3.66\text{E+}01 \text{ kg}$

7.2.35 MW-5 Large Hole Cover Plates for K West MCOs

Large hole (1-inch diameter) cover plates and bolts are installed on port numbers 2 and 4 of the shield plug for protection of the process valve and rupture disc. Cover plate and bolt weights are based on Goldmann (2000) and private communication with L. H. Goldmann of Fluor Hanford.

Transfer weight of large hole plates = $5.5 \text{ lb/plate (estimate)} \times 2 \text{ plates/MCO} \times 203 \text{ MCOs} = 2.23\text{E+}03 \text{ lb} = 1.01\text{E+}03 \text{ kg}$

Transfer weight of bolts = $0.25 \text{ lb/bolt} \times 4 \text{ bolts/plate} \times 2 \text{ plates/MCO} \times 203 \text{ MCO} = 4.06\text{E+}02 \text{ lb} = 1.84\text{E+}02 \text{ kg}$

Total transfer weight = $1.01\text{E+}03 + 1.84\text{E+}01 = 1.20\text{E+}03 \text{ kg}$

7.2.36 MW-6 MCO Internal Gas Pressure Sending Units for K West MCOs

The port number one blind cover plate is removed and a magnetically coupled high- or low-pressure sending unit is installed in the port. The high-pressure (600 psig) sending unit is installed in 199 of the 203 K West Basin MCOs and the low-pressure (100 psig) sending unit is installed in the four K West Basin monitored MCOs based on Pajunen and Sexton (2000). The original blind cover plates are reinstalled on the 199 MCOs that contain high-pressure sending units and a redesigned blind cover plate (Stream MW-8) is installed on the four monitored MCOs. Weight of the sending units is based on Klem and Pajunen (2000).

Transfer weight of low-pressure sending units for K West Basin monitored MCOs = $2.5 \text{ lb sending unit/monitored MCO} \times 4 \text{ monitored MCOs} = 1.0\text{E+}01 \text{ lb} = 4.54 \text{ kg}$

Transfer weight of high-pressure sending units for K West Basin baseline MCOs = $2.19 \text{ lb sending unit/MCO} \times 199 \text{ MCOs} = 4.36\text{E+}02 \text{ lb} = 1.98\text{E+}02 \text{ kg}$

Total transfer weight of pressure sending units for K West Basin MCOs = $4.5\text{E+}00 + 1.98\text{E+}02 = 2.02\text{E+}02 \text{ kg}$.

7.2.37 MW-7 Monitored MCO Original Blind Cover Plates for K West MCOs

The four original blind cover plates from port number 1 of the monitored MCOs from K West Basin are transported to CSB for storage and reinstallation. The original blind cover plates are reinstalled after completion of MCO monitoring program and replacement of the low-pressure sending units with high-pressure sending units. Weight of the original blind cover plate is based on Goldmann. (2000).

Transfer weight of original port number 1 blind cover plates for K West Basin monitored MCOs
 $= 5.8 \text{ lb/plate} \times 1 \text{ plate/MCO} \times 4 \text{ MCOs} = 2.32\text{E}+01 \text{ lb} = 1.05\text{E}+01 \text{ kg}$

7.2.38 MW-8 Blind Cover Plates for Number 1 Port of K West Basin Monitored MCOs

A new blind cover plate for port number 1 is installed on the K West Basin monitored MCOs after installation of the low-pressure sending units. The new blind cover plate allows installation of a low-pressure readout unit on the outside surface of the cover plate. Weight of this plate is based on private communication with L. H. Goldmann of Fluor Hanford.

Transfer weight of new blind cover plates for K West Basin monitored MCOs = 7.0 lb/plate (estimate) x 1 plate/monitored MCO x 4 monitored MCOs = 2.8E+01 lb = 1.27E+01 kg

7.2.39 MW-9 Low-Pressure Readout Units for K West Basin Monitored MCOs

A magnetically coupled low-pressure readout unit is installed on the exterior surface of port number 1 blind cover plate of the K West Basin monitored MCOs. The weight of the low-pressure readout unit is based on Klem and Pajunen (2000).

Transfer weight of low-pressure readout units for K West Basin monitored MCOs =
 $0.5 \text{ lb/readout unit} \times 1 \text{ readout unit/monitored MCO} \times 4 \text{ monitored MCOs} = 2.0 \text{ lb} = 9.07\text{E}-01 \text{ kg}$

7.2.40 MW-10 Shield Plug Process Tube for K West Basin MCOs

A process tube is added to the shield plug of the K West Basin MCOs before lowering of the shield plug to the loaded MCO shell. Weight of the process tube is based on Goldmann (2000).

Transfer weight of process tubes for K West Basin MCOs = 45 lb/process tube x 1 process tube/MCO x 203 MCOs = 9.13E+03 lb = 4.14E+03 kg

7.2.41 MW-11 MCO Top Decontamination Material for K West Basin MCOs

Assume decontamination material of 2 kg/MCO and density of 0.6 kg/L. The estimated amount of material for decontamination of the top of the K West Basin MCOs is listed below. The decontamination material will consist of damp and dry rags.

Weight of K West Basin MCO top decon material = 2 kg/MCO x 203 MCOs = 4.06E+02 kg

Volume of K West Basin MCO top decon material = 406 kg/0.6 kg/L = 6.77E+02 L (0.677 m³)

7.2.42 MW-12 MCO Top Decontamination Waste for K West Basin MCOs

Assume there is no change in the volume and weight of the decontamination material. See stream MW-11 for description.

7.2.43 MW-13 MCO Shield Plug Area Decontamination Material K West Basin MCOs

Assume decontamination material of 2 kg/MCO and density of 0.6 kg/L. The estimated amount of material for decontamination of the shield plug area of the K West Basin MCOs is listed below. The decontamination material will consist of damp and dry rags.

Weight of K West Basin MCO shield plug area decon material = 2 kg/MCO x 203 MCOs = 4.06E+02 kg

Volume of K West Basin shield plug area decon material = 406 kg/0.6 kg/L = 6.77E+02 L (0.677 m³)

7.2.44 MW-14 MCO Shield Plug Area Decontamination Waste for K West Basin MCOs

Assume there is no change in the volume and weight of the decontamination material. See stream MW-13 for description.

7.2.45 MW-15 Addition of MCO Locking and Lifting Ring to K West Basin MCOs

An MCO locking and lifting ring with attached tightening tool is installed on the K West Basin MCOs. The locking and lifting ring is installed on the MCOs and the main seal is tightened to specification before closure of the transport cask. Weight of the assembly is based on Lorenze et al (2000) and private communication with D. M. Chenault of Fluor Hanford.

Transfer weight of locking and lifting ring for K West Basin MCOs = 405 lb/locking and lifting ring x 1 locking and lifting ring/MCO x 203 MCOs = 8.22E+04 lb = 3.73E+04 kg

Transfer weight of tightening tool for K West Basin MCOs = 525 lb/tool x 1 attached tool/MCO x 203 MCOs = 1.06E+05lb = 4.83E+04 kg

Total transfer weight of locking and lifting ring with attached tool for K West Basin MCOs = 3.73E+04 + 4.83E+04 = 8.56E+04 kg

7.2.46 MW-16 Locking and Lifting Tightening Tool to Storage for K West Basin MCOs

The locking and lifting tightening tool is removed from the MCO, placed on the closure tool cart/rack and moved to storage position at K West Basin. Weight is based on private communication with D. M. Chenault of Fluor Hanford.

Total transfer weight of tightening tool to storage for K West Basin MCOs = 525 lb/tool x 1 attached tool/MCO x 203 MCOs = 1.06E+05lb = 4.83E+04 kg

7.2.47 MW-17 MCO Shield Plug Lift Handling Tool

The MCO shield plug-handling tool is removed from the MCO and moved to storage. The shield plug-handling tool is removed from storage and reinstalled on the MCO before installation of the process tube. Weight of the shield plug-handling tool is based on private communication with M. K. Martin of Holmes and Narver and drawing DESH 49-034A, Sheet 2.

Total transfer weight of shield plug-handling tool for K West Basin MCOs = 310 lb/tool x 1 attached tool/MCO x 203 MCOs = 6.29 E+04 lb = 2.85E+04kg

8.0 RESULTS

See Excel Spreadsheets for results in Appendix A.

9.0 CONCLUSIONS

Drawing H-1-81169, Rev. 2 reflects the average design capacity and current processing strategy.

10.0 REFERENCES

- Goldmann, L. H. 2000, *MCO Design Report*, HNF-SD-SNF-DR-003 Rev 3, Fluor Hanford, Richland, Washington
- Klem, M. J. and A. L Pajunen, 2000, *Spent Nuclear Fuel Project Canister Storage Building Process Flow Diagram Mass Balance Calculation*, HNF-5741 Rev 0, Fluor Hanford, Richland, Washington
- Klem, M. J., et al., 2000, *Spent Nuclear Fuel Project Cask Transportation Process Flow Diagram Mass Balance Calculations*, SNF-5046, Rev. 0, Fluor Hanford, Richland, Washington.
- Lorenz, B. D., et al., *Multi-Canister Overpack Topical Report*, HNF-SD-SNF-SARR-005 Rev 2, Fluor Hanford, Richland, Washington
- Pajunen, A. L., 1997, *Estimated Fuel Inventory Loaded In Final Fuel and Scrap Baskets*, HNF-SD-SNF-CN-012, Rev. 0, SGN Eurysis Services Corporation, Richland, Washington
- Reilly, M. A., 1998, *Spent Nuclear Fuel Project Technical Data Book*. HNF-SD-SNF-TI-015, Rev 6, Duke Engineering and Service Hanford Inc. Richland, Washington
- DESH 49-034A Shield Plug Handling Tool
- H-1-81156 Rev 1 SNF Project KE Basin Solid Waste and Support Level 1 PFD
- H-1-81162 Rev 1 SNF Project KW Basin Solid Waste and Support Level 1 PFD
- H-1-81168 Rev 3 SNF Project Cask/Transportation Level 1 PFD
- H-2-828048 Rev 4 MCO Process Port Cover Plates

APPENDIX A

**MS Excel Spread Sheet Calculations
For Development of
Drawing H-1-81169, Rev. 2**

STREAM NUMBER	IC-087	IC-088	IC-089	IC-104	IC-105	IC-106	IC-107
DESCRIPTION	NEW MCO SHELLS FOR CASK LOADING	EMPTY MCO FUEL BASKETS TO KE BASIN	EMPTY MCO FUEL BASKETS TO KW BASIN	KE BASIN MCO/CASK LOADED WITH FUEL BASKETS	KW BASIN MCO/CASK LOADED WITH FUEL BASKETS	LOADED KE MCO/CASK WITH SHIELD PLUG INSTALLED	LOADED KW MCO/CASK WITH SHIELD PLUG INSTALLED
TRANSFER TYPE	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
PHASE	S	S	S	S/L	S/L	S/L	S/L
NUMBER OF ITEMS	398	845	909	195	203	195	203
ITEM COUNT BASIS	MCO SHELL	BASKET	BASKET	MCO	MCO	MCO	MCO
VOLUME, CUBIC METERS	-	-	-	-	-	-	-
DENSITY, g/cc	-	-	-	-	-	-	-
PRESSURE, TORR	-	-	-	-	-	-	-
TEMPERATURE, °C	AMBIENT	AMBIENT	AMBIENT	10	962	10	962
COMPONENTS, KG							
FUEL							
URANIUM	0.00E+00	0.00E+00	0.00E+00	1.22E+06	1.03E+06	1.22E+06	1.03E+06
PLUTONIUM	0.00E+00	0.00E+00	0.00E+00	1.14E+06	9.48E+05	1.14E+06	9.48E+05
OTHER	0.00E+00	0.00E+00	0.00E+00	2.19E+03	1.91E+03	2.19E+03	1.91E+03
SLUDGE	0.00E+00	0.00E+00	0.00E+00	7.60E+04	8.46E+04	7.60E+04	8.46E+04
Al(OH) ₃	0.00E+00	0.00E+00	0.00E+00	1.33E+03	1.38E+03	1.33E+03	1.38E+03
Al ₂ O ₃	0.00E+00	0.00E+00	0.00E+00	1.35E+02	1.40E+02	1.35E+02	1.40E+02
Fe(OH) ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂ (OH) ₂	0.00E+00	0.00E+00	0.00E+00	1.37E+01	1.42E+01	1.37E+01	1.42E+01
UO ₄ H ₂ O	0.00E+00	0.00E+00	0.00E+00	4.72E+02	4.91E+02	4.72E+02	4.91E+02
UO ₂ H ₂ O	0.00E+00	0.00E+00	0.00E+00	5.21E+02	5.42E+02	5.21E+02	5.42E+02
UO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UH ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₃	0.00E+00	0.00E+00	0.00E+00	1.85E+02	1.93E+02	1.85E+02	1.93E+02
OTHER SOLIDS	3.51E+05	8.74E+04	1.70E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
STAINLESS STEEL				0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER	3.51E+05	8.74E+04	1.70E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ALUMINUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
WATER	0.00E+00	0.00E+00	0.00E+00	9.87E+04	1.03E+05	9.87E+04	1.03E+05
AIR	0.00E+00	0.00E+00	0.00E+00	4.84E+00	5.04E+00	4.84E+00	5.04E+00
OTHER GASES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ARGON	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HYDROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HELIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NITROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL MASS, kg	3.51E+05	8.74E+04	1.70E+05	1.32E+06	1.14E+06	1.32E+06	1.14E+06

ASSUMPTION:

1. ASSUME NO MATERIAL ADDED OR REMOVED DURING MCO/CASK LOADIN TO PIT
2. ASSUME NO MATERIAL ADDED OR REMOVED DURING RECEIPT OF MCO/CASK AT BASIN.
3. ASSUME NO MATERIAL ADDED OR REMOVED DURING PLACING OF THE SHIELD PLUG ON THE MCO.
4. WEIGHT OF MCO SHELL, MCO COMPONENTS AND BASKETS NOT INCLUDED IN MATERIAL BALANCE EXCEPT AS INPUT, OUTPUT AND INTERFACE CONTROL STREAMS.
5. NUMBER OF SCRAP BASKETS FOR SLUDGE RETRIEVAL BASED ON 2 VOL % OF TOTAL FLOOR AND PIT SLUDGE.
6. ASSUME DECON MATERIAL = 2.0 KG OF SOLIDS (RAGS) PER MCO PER DECON STEP.
7. ASSUME DECON MATERIAL DENSITY = 0.6 KG/L BEFORE AND AFTER USE.
8. SPR FUEL IS NOT INCLUDED IN MATERIAL BALANCE AND MCO TOTAL.
9. COMPONENT WEIGHTS ARE: 1082 LB/SHIELD PLUG, 5.8 LB/BLIND COVER PLATE, 2.87 E-02 LB/PORT SEAL, 0.25 LB/PORT COVER BOLT, 3.97 E-01 LB/MAIN SEAL, 5.5 LB/LARGE HOLD COVER PLATE, 2.5 LB/LOW PRESSURE SENDING UNIT, 2.19 LB/HIGH PRESSURE SENDING UNIT, 7.0 LB/NEW BLIND COVER PLATE FOR MONITORED MCOS, 0.5 LB/LOW PRESSURE READOUT UNIT, 4.5 LB/PROCESS TUBE, 10.2 LB/SCRAP BASKET FOR SLUDGE, 625 LB/MK1A SCRAP BASKET, 432 LB/MKIV SCRAP BASKET, 310 LB/SHIELD PLUG LIFT HANDLING TOOL, 405 LB/LOCKING AND LIFTING RING, AND 525 LB/LOCKING AND LIFTING RING TIGHTENING TOOL.

NOTE:

1. S = SOLID, L = LIQUID, G = GAS, AND MIXTURES INDICATED AS S/L = SOLID/LIQUID MIXTURE.
2. FUEL CONSISTS OF TOTAL MASS OF FUEL COMPONENTS, INCLUDING FUEL AND CLADDING, SLUDGE MASS IS REPORTED ON A WET BASIS. OTHER SOLIDS CONSIST OF A VARIETY OF MATERIALS, PRIMARILY METALS, EXCLUDING CONTAINER MATERIALS LIKE THE MCO, CASK, AND SOLID WASTE PACKAGING DRUMS.

STREAM NUMBER	IC-125	IC-126	IC-127	IC-128	IC-196	IC-197	ME-1
DESCRIPTION	EMPTY SCRAP BASKETS TO KE BASIN FUEL RETRIEVAL	EMPTY SCRAP BASKETS TO KE BASIN FOR SLUDGE REMOVAL	EMPTY SCRAPBASKETS TO KW BASIN FUEL RETRIEVAL	EMPTY SCRAP BASKETS TO KW BASIN FOR SLUDGE REMOVAL	FUEL AND SCRAP BASKETS READY TO LOAD IN MCO FOR KE BASIN	FUEL AND SCRAP BASKETS READY TO LOAD IN MCO FOR KW BASIN	MCO SHIELD PLUG FOR KE BASIN
TRANSFER TYPE	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
PHASE	S	S	S	S	S/L	S/L	S
NUMBER OF ITEMS	133	50	244	6	978	1153	195
ITEM COUNT BASIS	SCRAPBASKETS	SCRAPBASKETS	SCRAPBASKETS	SCRAPBASKETS	BASKETS	BASKETS	SHIELD PLUG
VOLUME, CUBIC METERS	-	-	-	-	-	-	-
DENSITY, g/cc	-	-	-	-	-	-	-
PRESSURE, TORR	-	-	-	-	-	-	-
TEMPERATURE, °C	-	-	-	-	-	-	-
COMPONENTS, KG	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT
FUEL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+06	1.03E+06	0.00E+00
URANIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E+06	9.48E+05	0.00E+00
PLUTONIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E+03	1.91E+03	0.00E+00
OTHER	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.60E+04	8.46E+04	0.00E+00
SLUDGE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E+03	1.38E+03	0.00E+00
Al(OH) ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E+02	1.40E+02	0.00E+00
Al ₂ O ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe(OH) ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E+01	1.42E+01	0.00E+00
UO ₂ (OH) ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.72E+02	4.91E+02	0.00E+00
UO ₄ H ₂ O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.21E+02	5.42E+02	0.00E+00
UO ₄ 2H ₂ O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UH ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E+02	1.93E+02	0.00E+00
UO ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER SOLIDS	2.61E+04	2.31E+02	6.42E+04	2.78E+01	0.00E+00	0.00E+00	9.57E+04
STAINLESS STEEL		2.32E+02	6.42E+04	2.78E+01	0.00E+00	0.00E+00	9.57E+04
OTHER	2.61E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ALUMINUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
WATER	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.87E+04	1.03E+05	0.00E+00
AIR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.84E+00	5.04E+00	0.00E+00
OTHER GASES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ARGON	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HYDROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HELIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NITROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL MASS, kg	2.61E+04	2.31E+02	6.42E+04	2.78E+01	1.32E+06	1.14E+06	9.57E+04

STREAM NUMBER	ME-2	ME-3	ME-4	ME-5	ME-6	ME-7
DESCRIPTION	LOADED MCO/CASK FROM KE LOADOUT PIT	BLIND COVER PLATES,SEALS AND BOLTS KE BASIN MCOS	MAIN SEALS KE BASIN MCOS	LARGE HOLE COVER PLATES FOR KE BASIN MCOS	INTERNAL GAS PRESSURE SENDING UNITS KE BASIN MCOS	ORIGINAL BLIND COVER PLATES PORT #1 KE BASIN MONITORED MCOS
TRANSFER TYPE	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
PHASE	S/L	S	S	S	S	S
NUMBER OF ITEMS	195	195	195	195	195	2
ITEM COUNT BASIS	MCO	MCO	MAIN SEALS	COVER PLATES	SENDING UNITS	COVER PLATES
VOLUME, CUBIC METERS	-	-	-	-	-	-
DENSITY, g/cc	-	-	-	-	-	-
PRESSURE, TORR	962	-	-	-	-	-
TEMPERATURE, °C	10	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT
COMPONENTS, KG						
FUEL	1.22E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
URANIUM	1.14E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PLUTONIUM	2.19E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER	7.60E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SLUDGE	1.33E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Al(OH) ₃	1.35E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Al ₂ O ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe(OH) ₃	1.37E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂ (OH) ₂	4.72E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₄ H ₂ O	5.21E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂ H ₂ O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UH ₃	1.85E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER SOLIDS	0.00E+00	1.21E+03	3.51E+01	1.15E+03	1.94E+02	5.26E+00
STAINLESS STEEL	0.00E+00	1.21E+03	3.51E+01	1.15E+03	1.94E+02	5.26E+00
OTHER	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ALUMINUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
WATER	9.87E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AIR	4.84E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER GASES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ARGON	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HYDROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HELIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NITROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL MASS, kg	1.32E+06	1.21E+03	3.51E+01	1.15E+03	1.94E+02	5.26E+00

STREAM NUMBER	ME-8	ME-9	ME-10	ME-11	ME-12	ME-13
DESCRIPTION	NEW BLIND COVER PLATES PORT#1 KE BASIN MONITORED MCOS	LOW PRESSURE READOUT UNITS KE BASIN MONITORED MCOS	SHIELD PLUG PROCESS TUBE KE BASIN MCOS	DECON MATERIAL TOP OF MCOS KE BASIN MCOS	DECON WASTE MATERIAL TOP OF MCOS KE BASIN MCOS	SHIELD PLUG AREA DECON MATERIAL KE BASIN MCOS
TRANSFER TYPE	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
PHASE	S	S	S	S	S	S
NUMBER OF ITEMS	2	2	195	195	195	195
ITEM COUNT BASIS	COVER PLATES	READOUT UNITS	PROCESS TUBES	MCO	MCO	MCO
VOLUME, CUBIC METERS	-	-	-	6.50E-01	6.50E-01	6.50E-01
DENSITY, g/cc	-	-	-	0.6	0.6	0.6
PRESSURE, TORR	-	-	-	-	-	-
TEMPERATURE, °C	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT
COMPONENTS, KG						
FUEL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
URANIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PLUTONIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SLUDGE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Al(OH) ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Al ₂ O ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe(OH) ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂ (OH) ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₄ H ₂ O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₄ 2H ₂ O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UH ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER SOLIDS	6.35E+00	4.54E-01	3.98E+03	3.90E+02	3.90E+02	3.90E+02
STAINLESS STEEL	6.35E+00	4.54E-01	3.98E+03	0.00E+00	0.00E+00	0.00E+00
OTHER	0.00E+00	0.00E+00	0.00E+00	3.90E+02	3.90E+02	3.90E+02
ALUMINUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
WATER	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AIR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER GASES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ARGON	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HYDROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HELIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NITROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL MASS, kg	6.35E+00	4.54E-01	3.98E+03	3.90E+02	3.90E+02	3.90E+02

STREAM NUMBER	ME-14	ME-15	ME-16	ME-17	MW-1	MW-2
DESCRIPTION	SHIELD PLUG AREA DECON WASTE MATERIAL KE BASIN MCOS	LOCKING AND LIFTING RING WITH TIGHTENING TOOL KE BASIN MCOS	LOCKING AND LIFTING TIGHTENING TOOL KE BASIN MCOS	MCO SHIELD PLUG LIFT HANDLING TOOL FOR KE BASIN MCOS	MCO SHIELD PLUGS FOR KW BASIN	LOADED MCO/CASK FROM KW LOADOUT PIT
TRANSFER TYPE	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
PHASE	S	S	S	S	S	S/L
NUMBER OF ITEMS	195	195	195	195	203	203
ITEM COUNT BASIS	MCO	MCO	MCO	MCO	SHIELD PLUG	MCO
VOLUME, CUBIC METERS	6.50E-01	-	-	-	-	-
DENSITY, g/cc	0.6	-	-	-	-	-
PRESSURE, TORR	-	-	-	-	-	-
TEMPERATURE, °C	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	962
COMPONENTS, KG						10
FUEL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E+06
URANIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.48E+05
PLUTONIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.91E+03
OTHER	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.46E+04
SLUDGE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E+03
Al(OH) ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.40E+02
Al ₂ O ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe(OH) ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E+01
UO ₂ (OH) ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.91E+02
UO ₄ H ₂ O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.42E+02
UO ₂ H ₂ O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UH ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E+02
UO ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER SOLIDS	3.90E+02	8.22E+04	4.64E+04	2.74E+04	9.96E+04	0.00E+00
STAINLESS STEEL	0.00E+00	8.22E+04	4.64E+04	2.74E+04	9.96E+04	0.00E+00
OTHER	3.90E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ALUMINUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
WATER	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E+05
AIR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.04E+00
OTHER GASES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ARGON	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HYDROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HELIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NITROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL MASS, kg	3.90E+02	8.22E+04	4.64E+04	2.74E+04	9.96E+04	1.14E+06

STREAM NUMBER	MW-3	MW-4	MW-5	MW-6	MW-7	ME-8
DESCRIPTION	BLIND COVER PLATES, SEALS AND BOLTS KW BASIN MCOS	MAIN SEALS KW BASIN MCOS	LARGE HOLE COVER PLATES FOR KW BASIN MCOS	INTERNAL GAS PRESSURE SENDING UNITS KW BASIN MCOS	ORIGINAL BLIND COVER PLATES PORT #1 KW BASIN MONITORED MCOS	NEW BLIND COVER PLATES PORT#1 KW BASIN MONITORED MCOS
TRANSFER TYPE	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
PHASE	S	S	S	S	S	S
NUMBER OF ITEMS	203	203	203	203	4	4
ITEM COUNT BASIS	MCO	MAIN SEALS	COVER PLATES	SENDING UNITS	COVER PLATES	COVER PLATES
VOLUME, CUBIC METERS	-	-	-	-	-	-
DENSITY, g/cc	-	-	-	-	-	-
PRESSURE, TORR	-	-	-	-	-	-
TEMPERATURE, °C	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT
COMPONENTS, KG						
FUEL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
URANIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PLUTONIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SLUDGE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Al(OH) ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Al ₂ O ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe(OH) ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂ (OH) ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₄ H ₂ O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂ H ₂ O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UH ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER SOLIDS	1.26E+03	3.66E+01	1.20E+03	2.02E+02	1.05E+01	1.27E+01
STAINLESS STEEL	1.26E+03	3.66E+01	1.20E+03	2.02E+02	1.05E+01	1.27E+01
OTHER	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ALUMINUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
WATER	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AIR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER GASES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ARGON	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HYDROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HELIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NITROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL MASS, kg	1.26E+03	3.66E+01	1.20E+03	2.02E+02	1.05E+01	1.27E+01

STREAM NUMBER DESCRIPTION	MW-9 LOW PRESSURE READOUT UNITS KW BASIN MONITORED MCOS	MW-10 SHIELD PLUG PROCESS TUBE KW BASIN MCOS	MW-11 DECON MATERIAL TOP OF MCOS KW BASIN MCOS	MW-12 DECON WASTE MATERIAL TOP OF MCOS KW BASIN MCOS	MW-13 SHIELD PLUG AREA DECON MATERIAL KW BASIN MCOS	MW-14 SHIELD PLUG AREA DECON WASTE MATERIAL KW BASIN MCOS
TRANSFER TYPE	BATCH	BATCH	BATCH	BATCH	BATCH	BATCH
PHASE	S	S	S	S	S	S
NUMBER OF ITEMS	4	203	203	203	203	203
ITEM COUNT BASIS	READOUT UNITS	PROCESS TUBES	MCO	MCO	MCO	MCO
VOLUME, CUBIC METERS	-	-	6.77E-01	6.77E-01	6.77E-01	6.77E-01
DENSITY, g/cc	-	-	0.6	0.6	0.6	0.6
PRESSURE, TORR	-	-	-	-	-	-
TEMPERATURE, °C	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT
COMPONENTS, KG						
FUEL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
URANIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PLUTONIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SLUDGE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Al(OH) ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Al ₂ O ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe(OH) ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂ (OH) ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₄ H ₂ O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂ H ₂ O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UH ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
UO ₃	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER SOLIDS	9.07E-01	4.14E+03	4.06E+02	4.06E+02	4.06E+02	4.06E+02
STAINLESS STEEL	9.07E-01	4.14E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER	0.00E+00	0.00E+00	4.06E+02	4.06E+02	4.06E+02	4.06E+02
ALUMINUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
WATER	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AIR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OTHER GASES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ARGON	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HYDROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HELIUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NITROGEN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL MASS, kg	9.07E-01	4.14E+03	4.06E+02	4.06E+02	4.06E+02	4.06E+02

STREAM NUMBER	MW-15	MW-16	MW-17
DESCRIPTION	LOCKING AND LIFTING RING WITH TIGHTENING TOOL KW BASIN MCOS	LOCKING AND LIFTING TIGHTENING TOOL KW BASIN MCOS	MCO SHIELD PLUG LIFT HANDLING TOOL FOR KW BASIN MCOS
TRANSFER TYPE	BATCH	BATCH	BATCH
PHASE	S	S	S
NUMBER OF ITEMS	203	203	203
ITEM COUNT BASIS	MCO	MCO	MCO
VOLUME, CUBIC METERS	-	-	-
DENSITY, g/cc	-	-	-
PRESSURE, TORR	-	-	-
TEMPERATURE, °C	AMBIENT	AMBIENT	AMBIENT
COMPONENTS, KG			
FUEL	0.00E+00	0.00E+00	0.00E+00
URANIUM	0.00E+00	0.00E+00	0.00E+00
PLUTONIUM	0.00E+00	0.00E+00	0.00E+00
OTHER	0.00E+00	0.00E+00	0.00E+00
SLUDGE			0.00E+00
Al(OH) ₃	0.00E+00	0.00E+00	0.00E+00
Al ₂ O ₃	0.00E+00	0.00E+00	0.00E+00
Fe(OH) ₃	0.00E+00	0.00E+00	0.00E+00
UO ₂ (OH) ₂	0.00E+00	0.00E+00	0.00E+00
UO ₄ H ₂ O	0.00E+00	0.00E+00	0.00E+00
UO ₄ H ₂ O	0.00E+00	0.00E+00	0.00E+00
UO ₂	0.00E+00	0.00E+00	0.00E+00
UH ₃	0.00E+00	0.00E+00	0.00E+00
UO ₃	0.00E+00	0.00E+00	0.00E+00
OTHER SOLIDS	8.56E+04	4.83E+04	2.85E+04
STAINLESS STEEL	8.56E+04	4.83E+04	2.85E+04
OTHER	0.00E+00	0.00E+00	0.00E+00
ALUMINUM	0.00E+00	0.00E+00	0.00E+00
WATER	0.00E+00	0.00E+00	0.00E+00
AIR	0.00E+00	0.00E+00	0.00E+00
OTHER GASES	0.00E+00	0.00E+00	0.00E+00
ARGON	0.00E+00	0.00E+00	0.00E+00
HYDROGEN	0.00E+00	0.00E+00	0.00E+00
HELIUM	0.00E+00	0.00E+00	0.00E+00
NITROGEN	0.00E+00	0.00E+00	0.00E+00
Kr-85 (Ci)	0.00E+00	0.00E+00	0.00E+00
TOTAL MASS, kg	8.56E+04	4.83E+04	2.85E+04