

13 STA 4
AUG 27 1992

ENGINEERING DATA TRANSMITTAL

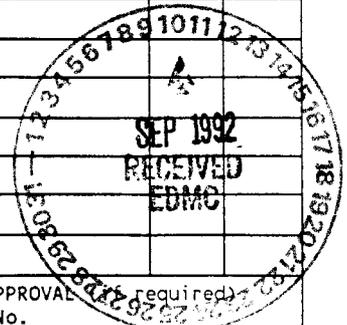
Page 1 of 1
1. EDT 157906

2. To: (Receiving Organization) Process Safety Support ^{EMM} DECOMMISSIONING SUPPORT _{8/18/92}		3. From: (Originating Organization) Criticality Engineering Analysis		4. Related EDT No.: N/A	
5. Proj./Prog./Dept./Div.: 29210		6. Cog. Engr.: E. M. Miller		7. Purchase Order No.: N/A	
8. Originator Remarks: CSER 92-003: Classification of the Hot Semiworks Waste Tank CX-72 as a Limited Control Facility.				9. Equip./Component No.:	
				10. System/Bldg./Facility: CX-72	
11. Receiver Remarks:				12. Major Assm. Dwg. No.: N/A	
				13. Permit/Permit Application No.: N/A	
				14. Required Response Date:	

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Impact Level	Reason for Trans- mittal	Origi- nator Dispo- sition	Receiv- er Dispo- sition
1	WHC-SD-SQA-CSA 20351		0	CSER 92-003: Classification of Hot Semiworks Waste Tank CX-72 as a Limited Control Facility	250	1,2		

16. KEY		
Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
1, 2, 3, or 4 (see MRP 5.43)	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 Impact Level for required signatures)											
(G)	(H)	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	Reason	Disp.
1	1	Cog. Eng. E. M. Miller	<i>Edward M. Miller</i>	8/18/92	R3-01						
1	1	Cog. Mgr. P. C. Doto	<i>P. C. Doto</i>	8/20/92	R3-01						
1	1	QA <i>[Signature]</i>	<i>[Signature]</i>	8-25-92							
1	2	Safety <i>[Signature]</i>	<i>[Signature]</i>	8/25/92							
		Env.									
1	1	Peer Review S. J. Altschuler	<i>[Signature]</i>	8/18/92	R3-01						



18. Signature of EDT Originator <i>Edward M. Miller</i> Date: 8/17/92		19. Authorized Representative for Receiving Organization <i>P. C. Doto</i> Date: 8/26/92		20. Cognizant/Project Engineer's Manager <i>[Signature]</i> Date: 8/24/92		21. DOE APPROVAL Ltr. No. <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/comments <input type="checkbox"/> Disapproved w/comments	
---	--	--	--	---	--	---	--

SUPPORTING DOCUMENT

1. Total Pages 4

<p>2. Title CSER 92-003: Classification of the Hot Semiworks Waste Tank CX-72 as a Limited Control Facility</p>	<p>3. Number WHC-SD-SQA-CSA-20351</p>	<p>4. Rev No. 0</p>
<p>5. Key Words Limited Control Facility, CX-72, Pu 239, Hot Semiworks</p>	<p>6. Author Name: E. M. Miller <i>Edward M. Miller</i> Signature Organization/Charge Code 29210/UE3EE</p>	
<p>7. Abstract This document contains CSER 92-003, which addresses the classification of the Hot Semiworks Waste Tank CX-72 as a limited control area.</p>		
<p>8. PURPOSE AND USE OF DOCUMENT - This document was prepared for use within the U.S. Department of Energy and its contractors. It is to be used only to perform, direct, or integrate work under U.S. Department of Energy contracts. This document is not approved for public release until reviewed.</p> <p>PATENT STATUS - This document copy, since it is transmitted in advance of patent clearance, is made available in confidence solely for use in performance of work under contracts with the U.S. Department of Energy. This document is not to be published nor its contents otherwise disseminated or used for purposes other than specified above before patent approval for such release or use has been secured, upon request, from the Patent Counsel, U.S. Department of Energy Field Office, Richland, WA.</p> <p>DISCLAIMER - This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. 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. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.</p>	<p>10. RELEASE STAMP</p> <div data-bbox="1047 766 1502 1008" style="border: 1px solid black; padding: 5px;"> <p>OFFICIAL RELEASE EMITTED  DATE AUG 27 1992 STAH</p> </div>	
<p>9. Impact Level 2 SQ</p>		

CSER 92-003

Classification of the Hot Semiworks Waste Tank CX-72
As A Limited Control Facility

Prepared by: Edward M. Miller Date: Aug 20, 1992
Engineer, Criticality Engineering Analysis (CEA)

Reviewed by: Sidney J. Altshuler Date: 8/20/92
Engineer, Criticality Engineering Analysis

Approved by: [Signature] Date: 8/20/92
Manager, Criticality Engineering Analysis

Approved by: [Signature] Date: 24 Aug 92
Manager, Nuclear Facility Safety

CONCLUSION AND SUMMARY

The Hot Semiworks waste tank 241-CX-72 is classified as a LIMITED CONTROL FACILITY on the basis of the form of the fissionable material. The fissionable material is diluted and confined in a dry solid matrix. The definition in the Nuclear Criticality Safety Manual, WHC-CM-4-29, says that "a limited control facility may contain more than one third of a MCM (minimum critical mass) of fissionable material, however, the form and distribution of the material ensures that a safe mass (considering the form and distribution) cannot be exceeded." To limit the probability of increasing the reactivity of this material in the tank, the following restrictions are imposed on any activity at the CX-72 facility.

- No addition of fissionable material
- Work plans shall include provisions to prevent introduction of significant amounts of moderator (i.e. rain, water, oil, grout, plastic, or other hydrogen bearing material) into the tank or into the space between the tank and the caisson.
- Work plans shall include provisions to prevent significant displacement of TRU waste and to prevent introduction of significant amounts of liquid into the tank that could permeate or dissolve the TRU waste.
- Work plans and procedures for operations at CX-72 shall be reviewed and approved by the Manager, Criticality Engineering Analysis.

These restrictions are specified to control reactivity in CX-72 before and during programs to remove the grout covering the TRU waste and when characterizing the TRU waste. Revisions to this CSER will be required to control removal of any significant amount of the TRU waste.

SYSTEM DESCRIPTION

WHC-SD-CP-TI-148, Revision 0, analyzed the state of the contents of the Hot Semiworks underground waste tank 241-CX-72. The waste is under approximately 20 feet of grout and cannot be easily sampled until the grout is removed. A 3-inch diameter drywell running to the bottom of the tank along the inside edge gave access for analysis of the radioactive material in the tank by insertion of detectors and neutron absorbing foils.

The vertically oriented tank is a cylinder 36 feet long and 40 inches in diameter inside a 6 foot diameter caisson.

METHODS OF ANALYSIS AND RESULTS

The tank was filled with waste from pilot studies of the Plutonium and Uranium Recovery by Extraction (PUREX) process. Boiling has concentrated the waste and reduced its volume by a factor of about five. This waste, which may include fluoride bearing fluids from decontamination of the Hot Semiworks, has dried out to occupy the bottom 11 feet of the tank. Measurements with neutron absorbing foils show that the neutron spectrum is more than 90 percent epithermal. The relative absence of thermal neutrons indicates the waste is dry (although an epithermal spectrum can also be caused by relatively strong absorption of thermal neutrons). However, based on this and other historical data, the report concludes that the waste is solid and dry.

The report also concludes that the plutonium content of the waste can only be determined by analysis of representative samples because estimates based on the measured neutron flux depend on the isotopic composition of the fissionable material and its chemical form. Neither can be measured without samples. Using a realistic and reasonable value of 1 percent plutonium in the waste and the presence of fluorides from the decontamination fluids used at the Hot Semiworks, the report gives a conservative estimate of 150 to 200 grams of plutonium. This amount is orders of magnitude less than a critical mass in a dry matrix of fission products and process chemicals. However, although considered highly unlikely, if the plutonium were in an oxide form with no fluorides, the report gives a plutonium mass in the tank of 150 kg for the most conservatively assumed isotropic composition. This amount is sufficient to cause concern, especially if moderation were present. Other combinations of compositions allow estimates between these values. Although the higher values are considered unlikely, since waste steams with concentrations of plutonium greater than 1 percent would not be thrown away, they are possible and only an analysis of samples can confirm the plutonium content.

To maintain the 241-CX-72 tank in its present state, reactivity disturbances are to be minimized. No fissile material is to be added to tank 241-CX-72.

Activities at the tank should be conducted to prevent a significant amount of moderator from getting between the waste tank and caisson where it could act as a reflector. Moderators would include rain, water, oil, plastics, graphite, concrete, or other hydrogen bearing materials. Liquids that could act as a moderator or dissolve material in the TRU waste are to be restricted from entry into the waste tank by work plans. Samples may be removed, but both grout removal and sample removal are to be controlled by work plans which minimize displacement of the waste. The caisson around and the grout in the tank provide a second barrier to mechanical disturbance and to the addition of moderator, solvent, or fissile material. Review of work plans for removal of the grout covering the waste in the tank or other activities are to be reviewed and approved by Criticality Engineering Analysis to give another check of these restrictions.

REVIEWERS COMMENTS

S. J. Altschuler of the Criticality Engineering Analysis group did the technical review. All his comments were resolved. He concurs with the restrictions, and classification of the Hot Semiworks Waste Tank 241-CX-72.

8/27/92

Complete for all Types of Release

<table border="0" style="width:100%;"> <tr> <td style="width:50%; vertical-align: top;"> <input type="checkbox"/> Speech or Presentation <input type="checkbox"/> Full Paper <input type="checkbox"/> Summary <input type="checkbox"/> Abstract <input type="checkbox"/> Visual Aid <input type="checkbox"/> Speakers Bureau <input type="checkbox"/> Poster Session <input type="checkbox"/> Videotape </td> <td style="width:5%; text-align: center; vertical-align: middle;">(Check only one suffix)</td> <td style="width:45%; vertical-align: top;"> <input type="checkbox"/> Reference <input checked="" type="checkbox"/> Technical Report <input type="checkbox"/> Thesis or Dissertation <input type="checkbox"/> Manual <input type="checkbox"/> Brochure/Flier <input type="checkbox"/> Software/Database <input type="checkbox"/> Controlled Document <input type="checkbox"/> Other </td> </tr> </table>	<input type="checkbox"/> Speech or Presentation <input type="checkbox"/> Full Paper <input type="checkbox"/> Summary <input type="checkbox"/> Abstract <input type="checkbox"/> Visual Aid <input type="checkbox"/> Speakers Bureau <input type="checkbox"/> Poster Session <input type="checkbox"/> Videotape	(Check only one suffix)	<input type="checkbox"/> Reference <input checked="" type="checkbox"/> Technical Report <input type="checkbox"/> Thesis or Dissertation <input type="checkbox"/> Manual <input type="checkbox"/> Brochure/Flier <input type="checkbox"/> Software/Database <input type="checkbox"/> Controlled Document <input type="checkbox"/> Other	ID Number (include revision, volume, etc.) WHC-SD-SQA-CSA-20351, Rev. 0 List attachments. N/A Date Release Required
<input type="checkbox"/> Speech or Presentation <input type="checkbox"/> Full Paper <input type="checkbox"/> Summary <input type="checkbox"/> Abstract <input type="checkbox"/> Visual Aid <input type="checkbox"/> Speakers Bureau <input type="checkbox"/> Poster Session <input type="checkbox"/> Videotape	(Check only one suffix)	<input type="checkbox"/> Reference <input checked="" type="checkbox"/> Technical Report <input type="checkbox"/> Thesis or Dissertation <input type="checkbox"/> Manual <input type="checkbox"/> Brochure/Flier <input type="checkbox"/> Software/Database <input type="checkbox"/> Controlled Document <input type="checkbox"/> Other		

Title CSER 92-003: The Classification of the Hot Semiworks Waste Tank CX-72 as a Limited Control Facility	Unclassified Category UC-	Impact Level 2SQ
--	-------------------------------------	----------------------------

New or novel (patentable) subject matter? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If "Yes", has disclosure been submitted by WHC or other company? <input type="checkbox"/> No <input type="checkbox"/> Yes Disclosure No(s).	Information received from others in confidence, such as proprietary data, trade secrets, and/or inventions? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (Identify)
---	---

Copyrights? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If "Yes", has written permission been granted? <input type="checkbox"/> No <input type="checkbox"/> Yes (Attach Permission)	Trademarks? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (Identify)
---	---

Complete for Speech or Presentation

Title of Conference or Meeting	Group or Society Sponsoring
Date(s) of Conference or Meeting	City/State
Will proceedings be published? <input type="checkbox"/> Yes <input type="checkbox"/> No Will material be handed out? <input type="checkbox"/> Yes <input type="checkbox"/> No	

Title of Journal

CHECKLIST FOR SIGNATORIES

Review Required per WHC-CM-3-4	Yes	No	Reviewer - Signature Indicates Approval
			Name (printed) Signature Date
Classification/Uncontrolled	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Nuclear Information	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Patent - General Counsel	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Legal - General Counsel	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Applied Technology/Export Controlled Information or International Program	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
WHC Program/Project	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Communications	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
RL Program/Project	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Publication Services	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Other Program/Project	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Information conforms to all applicable requirements. The above information is certified to be correct.

<table border="0" style="width:100%;"> <tr> <td style="width:30%;">References Available to Intended Audience</td> <td style="width:10%;">Yes <input checked="" type="checkbox"/></td> <td style="width:10%;">No <input type="checkbox"/></td> </tr> <tr> <td>Transmit to DOE-HQ/Office of Scientific and Technical Information</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>Author/Requestor (Printed/Signature)</td> <td colspan="2">Date</td> </tr> <tr> <td colspan="3">E. M. Miller <i>Edward M. Miller</i> 8/18/92</td> </tr> <tr> <td>Intended Audience</td> <td colspan="2"> <input type="checkbox"/> Internal <input checked="" type="checkbox"/> Sponsor <input type="checkbox"/> External </td> </tr> <tr> <td>Responsible Manager (Printed/Signature)</td> <td colspan="2">Date</td> </tr> <tr> <td colspan="3">P. C. Doto <i>P. C. Doto</i> 8/20/92</td> </tr> </table>	References Available to Intended Audience	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Transmit to DOE-HQ/Office of Scientific and Technical Information	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Author/Requestor (Printed/Signature)	Date		E. M. Miller <i>Edward M. Miller</i> 8/18/92			Intended Audience	<input type="checkbox"/> Internal <input checked="" type="checkbox"/> Sponsor <input type="checkbox"/> External		Responsible Manager (Printed/Signature)	Date		P. C. Doto <i>P. C. Doto</i> 8/20/92			<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">INFORMATION RELEASE ADMINISTRATION APPROVAL STAMP</th> </tr> <tr> <td colspan="2" style="text-align: center;">Stamp is required before release. Release is contingent upon resolution of mandatory comments.</td> </tr> <tr> <td style="width:50%;">Date Cancelled</td> <td style="width:50%;">Date Disapproved</td> </tr> </table>	INFORMATION RELEASE ADMINISTRATION APPROVAL STAMP		Stamp is required before release. Release is contingent upon resolution of mandatory comments.		Date Cancelled	Date Disapproved
References Available to Intended Audience	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>																										
Transmit to DOE-HQ/Office of Scientific and Technical Information	<input type="checkbox"/>	<input checked="" type="checkbox"/>																										
Author/Requestor (Printed/Signature)	Date																											
E. M. Miller <i>Edward M. Miller</i> 8/18/92																												
Intended Audience	<input type="checkbox"/> Internal <input checked="" type="checkbox"/> Sponsor <input type="checkbox"/> External																											
Responsible Manager (Printed/Signature)	Date																											
P. C. Doto <i>P. C. Doto</i> 8/20/92																												
INFORMATION RELEASE ADMINISTRATION APPROVAL STAMP																												
Stamp is required before release. Release is contingent upon resolution of mandatory comments.																												
Date Cancelled	Date Disapproved																											

DISTRIBUTION SHEET

To: Distribution From: Criticality Engineering Analysis Date: August 26, 1992

Project Title/Work Order:

CSER 92-003: The Classification of the the Hot Semiworks Waste Tank CX-72 as a Limited Control Facility

EDT No.: 157906

ECN No.: N/A

Name	MSIN	With Attachment	EDT/ECN & Comment	EDT/ECN Only
SJ Altschuler	R3-01	X		
SL Bhatia	R3-01	X		
Dee Bristol (4 copies)	R3-01	X		
Teri Demitruk	A3-11	X		
PC Doto	R3-01	X		
DE Friar	R3-01	X		
AL Hess	R3-01	X		
MC Hughes	R2-81	X		
DG Kachele	S4-67	X		
SG Marske	R2-77	X		
EM Miller	R3-01	X		
MR Morton	R2-77	X		
CA Rogers	R3-01	X		
RG Shuck	S4-67	X		
DB Tollis	L6-57	X		
Central Files (Orig. + 2 copies)	L8-04	X		

EDMC

H4-22