ST. 37-78

3

MAD 04 1000 ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 621900

2. To: (Receiving Organization) Packaging Engineering		3. From: (Originating Organization) Packaging Engineering		4. Related EDT No.: NA	
5. Proj./Prog./Dept./Div.: 03E00		6. Design Authority/ Design Agent/Cog. Engr.: B. D. Flanagan		7. Purchase Order No.: NA	
8. Originator Remarks: For approval.				9. Equip./Component No.: NA	
				10. System/Bldg./Facility: NA	
11. Receiver Remarks:		11A. Design Baseline Document? ☐ Yes ☒ No		12. Major Assm. Dwg. No.: NA	
ENGINEERING DATA TRANSMITTAL				13. Permit/Permit Application No.: NA	
				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	Approval Designator	Reason for Transmittal	Originator Disposition
1	HNF-2269	NA	0	Test Report for the Sample Transfer Canister System	SQ	1	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	4. Review	1. Approved	4. Reviewed no/comment
		2. Release	5. Post-Review	2. Approved w/comment	5. Reviewed w/comment
		3. Information	6. Dist. (Receipt Acknow. Required)	3. Disapproved 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	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
		Design Authority				1	1	NP Willis	<i>[Signature]</i>	3/4/98	T4-52
		Design Agent				1	1	RJ Smith	<i>[Signature]</i>	3/4/98	H1-15
1	/	Cog. Eng.: BD Flanagan	<i>[Signature]</i>	3/3/98	H1-15						
1	/	Cog. Mgr.: JG Field	<i>[Signature]</i>	3/4/98	H1-15						
1	/	QA: T Romano	<i>[Signature]</i>	3-4-98	H1-15						
1	/	Safety: T Romano	<i>[Signature]</i>	3-4-98	H1-15						
		Env.									

18. B. D. Flanagan <i>[Signature]</i> 3/3/98 Signature of EDT Originator		19. Authorized Representative Date for Receiving Organization		20. J. G. Field <i>[Signature]</i> 3/4/98 Design Authority/ Cognizant Manager		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
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Test Report for the Sample Transfer Canister System

B. D. Flanagan

Waste Management Federal Services, Inc., Northwest Operations,
Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: EDT 621900

UC: 513

Org Code: 03E00

Charge Code: MDF3A

B&R Code: YN010000

Total Pages: 36

Key Words: test report, Sample Transfer Canister

Abstract: The Sample Transfer Canister will be used by the Waste Receiving and Processing Facility (WRAP) for the transport of small quantity liquid samples that meet the definition of a limited quantity radioactive material, and may also be corrosive and/or flammable. These samples will be 49 CFR 173.4, "Exception for small quantities."

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V. L. Burkland 3/4/98
Release Approval Date

Approved for Public Release

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TEST REPORT FOR THE SAMPLE TRANSFER CANISTER SYSTEM

1.0 INTRODUCTION

The Sample Transfer Canister System will be used by the Waste Receiving and Processing (WRAP) Facility for the transportation of small quantity liquid samples that meet the definition of a limited quantity radioactive material, and may also be corrosive and/or flammable. Transport of the system will typically be north of the Wye Barricade between WRAP and the 222-S Laboratory.

The samples are intended to conform to the U.S. Department of Transportation (DOT) regulation 49 CFR 173.4, "Exceptions for small quantities." The regulations require prototype testing of the package in 49 CFR 173.4(a)(6) to demonstrate the effectiveness of the packaging system. The test procedure consisted of one 24-hour compression test and five (5) drop tests of various orientations onto an unyielding drop pad.

The testing of the Sample Transfer Canister System was performed between February 16, 1998 and February 25, 1998 by the Engineering Business Unit of Waste Management Federal Services, Inc., Northwest Operations (WMNW). The results of the testing concluded that the Sample Transfer Canister System successfully met the testing requirements with certain modifications to the original system. The modifications included replacing the original eight flange screws which were cold rolled 316 stainless steel with greater strength grade 8 high carbon-carbon steel screws, replacing the initial two glass receptacles with a better performing single glass receptacle which proved not to leak during testing, and adding more bubble wrap as extra padding.

2.0 PACKAGING SYSTEM

The final Sample Transfer Canister System, which sufficiently passed all testing requirements, consisted of the following:

- The stainless steel Sample Transfer Canister with eight, grade 8 high carbon-carbon steel screws.
- One 41.91 cm (16.5 in.) x 50.8 cm (20 in.) absorbent pad.
- Four sheets of "bubble wrap" (29.2 cm [11.5 in.] x 30.5 cm [12 in.]) each folded twice into a square and placed at the bottom and top of the canister.
- One 8 oz/250 mL glass receptacle, 6.35 cm (2.5 in.) diameter by 11.43 cm (4.5 in.) high with a 4.45 cm (1.75 in.) diameter Teflon¹-lined plastic cap. See the appendix for more information on the jar.
- One sheet of "bubble wrap" (29.2 cm [11.5 in.] x 61 cm [24 in.]) wrapped around receptacle.
- 125 mL of water and red dye as the payload simulant.

¹Teflon is a trademark of E. I. du Pont de Nemours and Company.

3.0 DESCRIPTION OF TEST AND TEST METHOD

3.1 ACCEPTANCE CRITERIA

The package must sustain free drops from a height of 1.8 m (5.9 ft) directly onto a solid unyielding surface without breakage or leakage from any inner receptacle and without a substantial reduction in the effectiveness of the package. The following are the free drops which should be performed: (a) one drop flat on bottom; (b) one drop flat on top; (c) one drop flat on the long side; (d) one drop flat on the short side; and (e) one drop on a corner at the junction of the three intersecting edges. The package must also pass a compressive load test, as specified in 49 CFR 178.606(c), where the test sample may not show any deterioration which could adversely affect safety or performance.

3.2 TEST SEQUENCE

The packaging was assembled and tested according to the test plan, HNF-2268, Rev. 0. The overall implementation of the procedure and test sequence are as follows.

- The canister and payload were cleaned, inspected, and prepared for the test.
- The package was weighed on a calibrated scale.
- The 24-hour compression test was performed with lead bricks stacked on top of the canister.
- Five, 1.8 m (5.9 ft) drop tests on various sides of the canister were performed. Listed in the appendix are all data sheets used during testing. Each data sheet describes the test and any damage to the package.
- Following testing the canister was inspected for failure and the glass receptacle inspected for leakage.
- Photographs were taken before and after all testing. The photographs are on file for future reference together with this document with the Engineering Business Unit files in 345 Hills Street.

4.0 TEST RESULTS

The Sample Transfer Canister System passed all testing requirements but modifications were needed due to a few failures. The drop test sequence was repeated three times due to failure of the flange bolts and the glass receptacle.

4.1 COMPRESSION TEST

To meet the testing requirements the canister and contents were weighed and determined to be 7.3 kg (16.1 lb). The equivalent of 3.05 m (10 ft) of stacked canisters equated to be approximately 83.9 kg (185 lb). To be conservative, 96.8 kg (213.5 lb) was stacked on top of the canister. The canister rested on a concrete floor.

After 24 hours, there was no indication of any damage or deterioration of the packaging.

Due to the orientation of one of the glass receptacles being on its side the receptacle leaked. The horizontal position of a receptacle is unacceptable for the shipment of liquids. The glass jar which leaked was an I-Chem clear 250 mL glass jar that is approximately 6.99 cm (2.75 in.) in diameter and 8.9 cm (3.5 in.) tall. The plastic Teflon-lined lid used was the same diameter as the body of the jar.

The final glass receptacle used was changed from the clear jar listed above to the better performing amber jar with the smaller lid. When packaged in the final configuration, the compression test would have had no effect on the contents.

4.2 DROP TESTS

To meet the testing requirements the canister and contents were dropped from a height greater than 1.8 m (5.9 ft) in five orientations. The order of the drops were flat on bottom, flat on top, flat drop on side, second flat drop on side new impact location, and corner drop on the lid.

4.2.1 First Series - Failed

The contents of the package included one absorbent pad, and two I-Chem clear 250 mL glass jars each wrapped in a 29.2 cm (11.5 in.) x 61 cm (24 in.) roll of bubble wrap. The gross weight of the package was 7.30 kg (16.1 lb).

During the fourth drop (second flat side drop), the bolts securing the flange to the top of the canister sheared off causing the lid to separate from the canister and one of the bubble wrapped receptacles to roll onto the drop pad. This was a clear failure of the canister.

Inspection of the receptacles showed that the red dye simulant was found on the outside of the jar threads and on the inside of the securing tape placed around the lid. This was a clear failure of the I-Chem clear 250 mL glass jars used.

4.2.2 Second Series - Failed

To improve the packaging new high strength carbon steel screws were used to secure the flange. The new screws are Grade 8 High Carbon Steel 10-32 socket head cap screws, the old screws were cold rolled 316 Stainless Steel. Also the glass receptacles were replaced with an I-Chem amber 250 mL jar with a smaller lid. A copy of the manufacturers label is provided in the appendix. The new jar seemed to perform better with the smaller lid during attempts to promote leakage.

The contents of the package included one absorbent pad, and two of the new I-Chem amber 250 mL glass jars each wrapped in a 29.2 cm (11.5 in.) x 61 cm (24 in.) roll of bubble wrap. Each receptacle contained 125 mL of red simulant. The gross weight of the package was 7.17 kg (15.8 lb).

The canister withstood each drop test without any failures. Following the drop tests, inspection of the receptacles showed that the corner of each lid (both jars) had been cracked and there was a fair amount of the simulant within the bubble wrap. This was a clear failure of the receptacles.

The jars were to tall to stack vertically on top of each other. Therefore they were stacked parallel to one another at an angle of approximately 20° from vertical. The cracked lids indicated that they had broke when the canister impacted on its side causing the weight of the jar to concentrate on the corner of the plastic lid.

4.2.3 Third Series - Passed

It was decided to use only one of the I-Chem amber 250 mL glass jars within the canister with more bubble wrap placed around the receptacle.

The contents of the package included one absorbent pad, one I-Chem amber 250 mL jar wrapped in a 29.2 cm (11.5 in.) x 61 cm (24 in.) roll of bubble wrap. Four 29.2 cm (11.5 in.) x 30.5 cm (12 in.) pieces of bubble wrap each folded twice into a square. Two pieces were placed on the bottom and two were placed at the top of the receptacle. The receptacle contained 125 mL of red simulant. The gross weight of the package was 7.00 kg (15.44 lb).

The canister withstood each drop test. On the fourth drop, one of the eight flange screws sheared off due to the impact of the drop occurring right at the location of the screw. There appeared to be no damage to any of the other seven screws. The loss of one screw at the impact location is not a substantial reduction in the effectiveness of the package.

After the drop tests the contents were inspected. There were no traces of the red simulant on the outside of the receptacle, under the securing tape, or by the threads. This shows that the receptacle withstood the effects of the tests when package as described above.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The acceptance criteria for the testing is that there is no substantial reduction in the effectiveness of the package and there is no breakage or leakage from any inner receptacle. As noted above in Section 3.0, in the final configuration, there were no substantial reductions in the package and the inner receptacle did not leak.

The Sample Transfer Canister System is sufficient to use in its modified configuration. Modifications include:

- The use of Grade 8 High Carbon Steel screws on the flange.
- The use of only one receptacle.
- The use of I-Chem 250 mL amber jars with a Teflon-lined lid diameter of 3.8 cm (1.5 in.).
- Four sheets of "bubble wrap" (29.2 cm [11.5 in.] x 30.5 cm [12 in.]) each folded twice into a square and placed two at the bottom and two at the top of the canister.

Items which are not allowed when shipping small quantity liquid samples are the I-Chem clear 250 mL glass jars that are approximately 6.99 cm (2.75 in.) in diameter by 8.9 cm (3.5 in.) tall, and the original cold rolled 316 stainless steel screws on the flange. When transporting liquids, it is recommended that the contents be kept upright at all times to prevent accidental leakage of the receptacles.

6.0 DISPOSITION OF TEST ITEMS

The Sample Transfer Canister System, consisting of the canister, glass jars, absorbent, and bubble wrap, is currently being stored by WRAP on location. The custodian is N. P. Willis. These items will be stored until June 1998, at which time they will be properly disposed of. All testing has been completed.

7.0 REFERENCES

- 49 CFR 173.4, 1996, "Exceptions for small quantities," *Code of Federal Regulations*, as amended.
- 49 CFR 178.606, 1996, "Stacking Test," *Code of Federal Regulations*, as amended.
- Flanagan, B. D., 1998, *Test Plan for the Sample Transfer Canister System*, HNF-2268, Rev. 0, Waste Management Federal Services, Inc., Northwest Operations, Richland, Washington.

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APPENDIX A. COMPRESSION.

Pre-Test Checklist

Pre-Test Checklist for <u>Compression</u> test(s).	Initial
<ol style="list-style-type: none"> 1. Hold a pre-test meeting with all personnel involved with the testing. The Cognizant Engineer shall review the test procedures and discuss potential hazards involved with the tests. 2. Identify safety zones to test personnel and observers. 3. Remove dirt and debris from testing area. 4. Set up photographic equipment and verify operation. 5. Inspect and verify all equipment needed is available and operational. 6. Visually inspect Sample Transfer Canister for any damage. Note any marks which could be mistakenly listed as damage after testing. <p><u>No large marks or dents in canister</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	BF
Cognizant Engineer: <u>B. J. [Signature]</u>	Date: <u>2/16/98</u>
QA Representative: <u>Tina Perrone</u>	Date: <u>2/16/98</u>

Compression Test Data Sheet

Date/Time Started: <u>2/6/98 - 10:35 am</u>		Date/Time Ended: <u>2/17/98 - 10:40 am</u>	Initials																								
1. Prepare inner glass receptacles with water and red dye mixture. Secure lid with masking tape. Amount of simulant added per receptacle: <u>125</u> mL. <u>125</u> mL			RF																								
2. Load canister with absorbent, bubble wrap, and inner glass receptacles			RF																								
3. Verify lid is securely closed.			RF																								
4. Weigh test article on scale. Weight: <u>16.1</u> lb Scale calibration #: <u>347-66-01-001</u> Expiration date: <u>2/28/98</u>			RF																								
5. Record weight of stacked items using above scale:			RF																								
<table border="0"> <thead> <tr> <th>Brick</th> <th>Weight</th> <th>Brick</th> <th>Weight</th> </tr> </thead> <tbody> <tr> <td>1 -</td> <td>26.4 lb</td> <td>5 -</td> <td>26.1 lb</td> </tr> <tr> <td>2 -</td> <td>25.8</td> <td>6 -</td> <td>26.25</td> </tr> <tr> <td>3 -</td> <td>26.2</td> <td>7 -</td> <td>26.5</td> </tr> <tr> <td>4 -</td> <td>26.2</td> <td>8 -</td> <td>26.5</td> </tr> <tr> <td colspan="4">Board - 3.5 lb</td> </tr> </tbody> </table>			Brick	Weight	Brick	Weight	1 -	26.4 lb	5 -	26.1 lb	2 -	25.8	6 -	26.25	3 -	26.2	7 -	26.5	4 -	26.2	8 -	26.5	Board - 3.5 lb				
Brick	Weight	Brick	Weight																								
1 -	26.4 lb	5 -	26.1 lb																								
2 -	25.8	6 -	26.25																								
3 -	26.2	7 -	26.5																								
4 -	26.2	8 -	26.5																								
Board - 3.5 lb																											
6. Place test article in testing area. Secure testing area with caution tape.			RF																								
7. Minimum amount of weight to be stacked on test article is 11.5 x weight = <u>185.2</u> lb (11.5 = number of canisters needed to reach 10 ft in height)			RF																								
8. Amount of weight stacked on test article = <u>213.5</u> lb			RF																								
9. Allow a minimum of 24 hours to pass with the weight stacked on the canister.			RF																								
10. Upon arriving to test site after 24 hours, confirm test site has not been disturbed. Yes: ☒ Other: _____			RF																								
11. Record any damage to test article: <u>No damage</u>			RF																								
Data sheet has been completed.																											
Cognizant Engineer: <u>B. Fly</u>		Date: <u>2/17/98</u>																									
QA Representative: <u>Tina Korman</u>		Date: <u>2/17/98</u>																									

APPENDIX B. DROP TEST - FIRST SERIES.

Pre-Test Checklist

Pre-Test Checklist for <u>Drop</u> test(s).	Initial
<ol style="list-style-type: none"> 1. Hold a pre-test meeting with all personnel involved with the testing. The Cognizant Engineer shall review the test procedures and discuss potential hazards involved with the tests. 2. Identify safety zones to test personnel and observers. 3. Remove dirt and debris from testing area. 4. Set up photographic equipment and verify operation. 5. Inspect and verify all equipment needed is available and operational. 6. Visually inspect Sample Transfer Canister for any damage. Note any marks which could be mistakenly listed as damage after testing. <p><u>No damage</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>DF</p>
<p>Cognizant Engineer: <u>B. J. [Signature]</u></p> <p>QA Representative: <u>Tina [Signature]</u></p>	<p>Date: <u>2/17/98</u></p> <p>Date: <u>2/17/98</u></p>

Drop Test Data Sheet

Drop # <u>1</u> of 5	Date/Time: <u>2/17/98 - 2:15 pm</u>	Initials
1. Location of test: <u>370 Area PNNL Drop Pad</u>		<u>BF</u>
2. Drop Configuration: <u>Flat Bottom</u>		<u>BF</u>
3. Weight of canister and payload: <u>1621</u> lb Scale calibration #: <u>347-66-01-001</u> Expiration date: <u>2/28/98</u>		<u>BF</u>
4. Actual drop height of drop (71 in. minimum): <u>72.0</u> in.		<u>BF</u>
5. Record comments and damage to the canister: <u>Canister did not land square on the bottom. Corner was dented approximately .80 in. deep and 4.58 in. long.</u>		<u>BF</u>
6. Record damaged areas with the camera.		<u>BF</u>
Data sheet has been completed.		
Cognizant Engineer: <u>[Signature]</u>	Date: <u>2/17/98</u>	
QA Representative: <u>[Signature]</u>	Date: <u>2/17/98</u>	

Drop Test Data Sheet

Drop # <u>2</u> of 5	Date/Time: <u>2/17/98 - 2:20 pm</u>	Initials
1. Location of test: <u>300 Area PNNL Drop Pad</u>		BF
2. Drop Configuration: <u>Flat Top</u>		BF
3. Weight of canister and payload: <u>16.1</u> lb Scale calibration #: <u>347-66-01-001</u> Expiration date: <u>2/23/98</u>		BF
4. Actual drop height of drop (71 in. minimum): <u>72.0</u> in.		BF
5. Record comments and damage to the canister: <u>Canister did not land square on the top but quickly</u> <u>glipped one side then the other. Damage included small</u> <u>deformations on the outside tabs less than .04 in.</u>		BF
6. Record damaged areas with the camera.		BF
Data sheet has been completed.		
Cognizant Engineer: <u>RB, JH</u>	Date: <u>2/17/98</u>	
QA Representative: <u>Tina Harrison</u>	Date: <u>2/17/98</u>	

Drop Test Data Sheet

Drop # <u>3</u> of 5		Date/Time: <u>2/17/98 - 2:25 pm</u>	Initials
1.	Location of test: <u>300 Area PNHU Drop Pod</u>		BF
2.	Drop Configuration: <u>Flat drop on side on exposed guide pins</u>		BF
3.	Weight of canister and payload: <u>16.1</u> lb Scale calibration #: <u>247-66-b1-00</u> Expiration date: <u>2/28/98</u>		BF
4.	Actual drop height of drop (71 in. minimum): <u>22.0</u> in.		BF
5.	Record comments and damage to the canister: <u>Guide pin depressed approximately .05 in and bent laterally .08 in. A small dent in the bottom of the canister is .11 in deep and .654 in long.</u>		BF
6.	Record damaged areas with the camera.		BF
Data sheet has been completed.			
Cognizant Engineer: <u>EB, JH</u>		Date: <u>2/17/98</u>	
QA Representative: <u>Tam M. M. M.</u>		Date: <u>2/17/98</u>	

Drop Test Data Sheet

Drop # <u>4</u> of 5	Date/Time: <u>2/17/98 - 2:30 pm</u>	Initials
1. Location of test: <u>300 Area PNNL Drop Pad</u>		RF
2. Drop Configuration: <u>Flat drop on side at location other than guide pins.</u>		RF
3. Weight of canister and payload: <u>16.1</u> lb Scale calibration #: <u>347-66-DI-001</u> Expiration date: <u>2/28/98</u>		RF
4. Actual drop height of drop (71 in. minimum): <u>72.0</u> in.		RF
5. Record comments and damage to the canister: <u>Top flange of canister FAILED. Eight securing screws failed in shear. There was also a small dent in the bottom corner of the package, .29 in deep and 2.38 long.</u> <u>One glass bottle fell onto the test pad (still in bubble wrap) as the lid and top flange sheared from the canister.</u> <u>A picture was taken immediately following the drop.</u>		RF
6. Record damaged areas with the camera.		RF
Data sheet has been completed.		
Cognizant Engineer: <u>[Signature]</u>	Date: <u>2/17/98</u>	
QA Representative: <u>[Signature]</u>	Date: <u>2/17/98</u>	

Drop Test Data Sheet

Drop # <u>5</u> of 5	Date/Time: <u>Did not last on 2/16/98</u>	Initials
1. Location of test: _____ _____	<u>2/17/98</u>	
2. Drop Configuration: _____ _____		
3. Weight of canister and payload: _____ lb Scale calibration #: _____ Expiration date: _____		
4. Actual drop height of drop (71 in. minimum): _____ in.		
5. Record comments and damage to the canister: <u>Canister failed from the 4th drop.</u> <u>Drop #5 was not performed.</u> _____ _____ _____		
6. Record damaged areas with the camera.		
Data sheet has been completed. Cognizant Engineer: <u>B. J. [Signature]</u> Date: <u>2/17/98</u> QA Representative: <u>[Signature]</u> Date: <u>2/17/98</u>		

APPENDIX C. DROP TEST - SECOND SERIES.

Pre-Test Checklist

Pre-Test Checklist for <u>Drop</u> test(s). <u>2/20/98</u>	Initial
<ol style="list-style-type: none"> 1. Hold a pre-test meeting with all personnel involved with the testing. The Cognizant Engineer shall review the test procedures and discuss potential hazards involved with the tests. 2. Identify safety zones to test personnel and observers. 3. Remove dirt and debris from testing area. 4. Set up photographic equipment and verify operation. 5. Inspect and verify all equipment needed is available and operational. 6. Visually inspect Sample Transfer Canister for any damage. Note any marks which could be mistakenly listed as damage after testing. <p><u>Same canister used as in the first 4 drops.</u></p> <p><u>All damage marked with a permanent marking pen</u></p>	<p>AS</p>
Cognizant Engineer: <u>BS, JG</u>	Date: <u>2/24/98</u>
QA Representative: <u>Tim Roman</u>	Date: <u>2/29/98</u>

Drop Test Data Sheet

Drop # <u>1</u> of 5	Date/Time: <u>2/20/98 - 1:35 pm</u>	Initials
1. Location of test: <u>300 Area PNNL Drop Pad</u>		BOF
2. Drop Configuration: <u>Flat bottom</u>		BOF
3. Weight of canister and payload: <u>15 1/2</u> lb Scale calibration #: <u>347-66-DI-001</u> Expiration date: <u>2/28/98</u>		BOF
4. Actual drop height of drop (71 in. minimum): <u>72.0</u> in.		BOF
5. Record comments and damage to the canister: <u>Canister landed flat. Height is now 10 3/4 tall</u> <u>Buckling around bottom</u>		BOF
6. Record damaged areas with the camera.		BOF
Data sheet has been completed.		
Cognizant Engineer: <u>EB 70</u>	Date: <u>2/20/98</u>	
QA Representative: <u>Tim Roman</u>	Date: <u>2/20/98</u>	

Drop Test Data Sheet

Drop # <u>2</u> of 5		Date/Time: <u>2/20/98 - 1:44 pm</u>	Initials
1.	Location of test: <u>300 Area PNNL Drop Pool</u>		<u>RF</u>
2.	Drop Configuration: <u>Flat Top</u>		<u>RF</u>
3.	Weight of canister and payload: <u>15 7/16</u> lb Scale calibration #: <u>347-66-b1-001</u> Expiration date: <u>2/28/98</u>		<u>RF</u>
4.	Actual drop height of drop (71 in. minimum): <u>72.0</u> in.		<u>RF</u>
5.	Record comments and damage to the canister: <u>Canister slapped a little bit. Small scratches on two opposite sides of flange. No marks on actual lid.</u> <u>Scratches are not significant. There is no significant deformation either.</u>		<u>RF</u>
6.	Record damaged areas with the camera.		<u>RF</u>
Data sheet has been completed.			
Cognizant Engineer: <u>E. J. [Signature]</u>		Date: <u>2/20/98</u>	
QA Representative: <u>Tina Romano</u>		Date: <u>2/20/98</u>	

Drop Test Data Sheet

Drop # <u>3</u> of 5	Date/Time: <u>2/20/98- 1:49 pm</u>	Initials
1. Location of test: <u>30D Area PNNL Drop Pad</u>		<u>RF</u>
2. Drop Configuration: <u>Side Drop on pin</u>		<u>RF</u>
3. Weight of canister and payload: <u>15 8/16</u> lb Scale calibration #: <u>347-66-01-001</u> Expiration date: <u>2/28/98</u>		<u>RF</u>
4. Actual drop height of drop (71 in. minimum): <u>72.0</u> in.		<u>RF</u>
5. Record comments and damage to the canister: <u>Good flat drop (hit square) on side. Impact was on pin and bottom edge.</u> <u>Pin bent up .10 in. Dent on bottom is .29 in. deep by 2.40 in. long.</u>		<u>RF</u>
6. Record damaged areas with the camera.		<u>RF</u>
Data sheet has been completed.		
Cognizant Engineer: <u>[Signature]</u>	Date: <u>2/24/98</u>	
QA Representative: <u>Tina Romane</u>	Date: <u>2/24/98</u>	

Drop Test Data Sheet

Drop # <u>4</u> of 5	Date/Time: <u>2/20/98 1:55 pm</u>	Initials
1. Location of test: <u>300 Area PNNL Drop Dnd</u>		<u>BCF</u>
2. Drop Configuration: <u>Side Drop on flange top</u>		<u>BCF</u>
3. Weight of canister and payload: <u>15 1/6</u> lb Scale calibration #: <u>247-66-01-001</u> Expiration date: <u>2/23/98</u>		<u>BCF</u>
4. Actual drop height of drop (71 in. minimum): <u>72.0</u> in.		<u>BCF</u>
5. Record comments and damage to the canister: <u>Small dent on bottom</u> <u>Small impact marks on flange</u> <u>At top flange there are two impact dents. At top of flange dent is .41 in long and at bottom of flange dent is .86 in long.</u> <u>At bottom of canister dent is .13 in deep by 2.49 in long.</u>		<u>BCF</u>
6. Record damaged areas with the camera.		<u>BCF</u>
Data sheet has been completed.		
Cognizant Engineer: <u>BCF</u>	Date: <u>2/20/98</u>	
QA Representative: <u>Tamara Berman</u>	Date: <u>2/20/98</u>	

Drop Test Data Sheet

Drop # <u>5</u> of 5	Date/Time: <u>2/20/98 - 2:00 PM</u>	Initials
1. Location of test: <u>300 Area PNNL Drop Pad</u>		DF
2. Drop Configuration: <u>Top edge drop</u>		DF
3. Weight of canister and payload: <u>15 1/6</u> lb Scale calibration #: <u>347-66-01-001</u> Expiration date: <u>2/23/98</u>		DF
4. Actual drop height of drop (71 in. minimum): <u>72.0</u> in.		DF
5. Record comments and damage to the canister: <u>Canister landed cleanly on top edge.</u> <u>Package stopped down indicating the CG was not</u> <u>directly above the impact point.</u> <u>Slight impact scratches on top flange</u>		DF
6. Record damaged areas with the camera.		DF
Data sheet has been completed.		
Cognizant Engineer: <u>[Signature]</u>	Date: <u>2/20/98</u>	
QA Representative: <u>Lane Romane</u>	Date: <u>2/20/98</u>	

Post Test Data Sheet

Date/Time: <u>2/20/98-2:04</u>	Initials
1. Verify all testing has been completed and all data sheets have been signed.	RF
2. Open canister and evaluate the condition of the contents: _____ <u>Red dye thoroughly covering bubble wrap</u> <u>Lids on both receptacles cracked and leaked.</u> _____ _____ _____ _____	RF
3. Record any damage to the contents with the camera.	RF
Post Data sheet has been completed. Cognizant Engineer: <u>RF</u> Date: <u>2/20/98</u> QA Representative: <u>Tina Parnace</u> Date: <u>2/20/98</u>	

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APPENDIX D. DROP TEST - THIRD SERIES.

Pre-Test Checklist

Pre-Test Checklist for <u>Drop</u> test(s). <u>3rd set</u>	Initial
<ol style="list-style-type: none"> 1. Hold a pre-test meeting with all personnel involved with the testing. The Cognizant Engineer shall review the test procedures and discuss potential hazards involved with the tests. 2. Identify safety zones to test personnel and observers. 3. Remove dirt and debris from testing area. 4. Set up photographic equipment and verify operation. 5. Inspect and verify all equipment needed is available and operational. 6. Visually inspect Sample Transfer Canister for any damage. Note any marks which could be mistakenly listed as damage after testing. <p><u>No canister - No damage</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
Cognizant Engineer: <u>B. J. [Signature]</u>	Date: <u>2/25/88</u>
QA Representative: <u>Tina Romano</u>	Date: <u>2/25/88</u>

Drop Test Data Sheet

Drop # <u>1</u> of 5	Date/Time: <u>2/25/78 - 10:00 Am</u>	Initials
1. Location of test: <u>300 Area PNNL Drop Pad</u>		RF
2. Drop Configuration: <u>Flat bottom</u>		RF
3. Weight of canister and payload: <u>15 7/8</u> lb Scale calibration #: <u>347-66-N-001</u> Expiration date: <u>2/28/98</u>		RF
4. Actual drop height of drop (71 in. minimum): <u>72.0</u> in.		RF
5. Record comments and damage to the canister: <u>Did not land completely flat. Dent on bottom edge.</u> <u>Dent is approximately .35 in deep and 5.15 in wide</u>		RF
6. Record damaged areas with the camera.		RF
Data sheet has been completed. Cognizant Engineer: <u>B. J. [Signature]</u> Date: <u>2/25/78</u> QA Representative: <u>Tim [Signature]</u> Date: <u>2/25/78</u>		

Drop Test Data Sheet

Drop # <u>2</u> of 5	Date/Time: <u>2/25/98 - 10:25 am</u>	Initials
1. Location of test: <u>300 Area PNNL Drop Pad</u>		<u>RAF</u>
2. Drop Configuration: <u>Flat top on top</u>		<u>RAF</u>
3. Weight of canister and payload: <u>15 3/6</u> lb Scale calibration #: <u>292-66-01-001</u> Expiration date: <u>2/28/98</u>		<u>RAF</u>
4. Actual drop height of drop (71 in. minimum): <u>22.0</u> in.		<u>RAF</u>
5. Record comments and damage to the canister: <u>Canister landed flat on top. Impact marks on</u> <u>two opposite flange tabs.</u> <u>Negligible damage, just scratches</u>		<u>RAF</u>
6. Record damaged areas with the camera.		<u>RAF</u>
Data sheet has been completed. Cognizant Engineer: <u>B. Zyl</u> Date: <u>2/25/98</u> QA Representative: <u>Tania Romanov</u> Date: <u>2/25/98</u>		

Drop Test Data Sheet

Drop # <u>3</u> of 5	Date/Time: <u>2/25/98 - 10:10 am</u>	Initials
1. Location of test: <u>30D Area PNNL Drop Pad</u>		<u>RF</u>
2. Drop Configuration: <u>Flat drop on side, on pin</u>		<u>RF</u>
3. Weight of canister and payload: <u>15 7/6</u> lb Scale calibration #: <u>347-66-01-001</u> Expiration date: <u>2/28/98</u>		<u>RF</u>
4. Actual drop height of drop (71 in. minimum): <u>72.0</u> in.		<u>RF</u>
5. Record comments and damage to the canister: <u>Canister landed on top flange. Impact marks on top</u> <u>and pins. No dent at bottom</u> <u>Dent on top tab is .84 in long. Pin is just scratched</u>		<u>RF</u>
6. Record damaged areas with the camera.		<u>RF</u>
Data sheet has been completed. Cognizant Engineer: <u>B. J. Flynn</u> Date: <u>2/25/98</u> QA Representative: <u>Tina Purnomo</u> Date: <u>2/25/98</u>		

Drop Test Data Sheet

Drop # <u>4</u> of 5	Date/Time: <u>2/25/98 - 10:15 am</u>	Initials
1. Location of test: <u>300 Area PNNL Drop Pad</u>		BEF
2. Drop Configuration: <u>Flat drop on side - on flange tab</u>		BEF
3. Weight of canister and payload: <u>15 7/8</u> lb Scale calibration #: <u>347-66-01-001</u> Expiration date: <u>2/28/98</u>		BEF
4. Actual drop height of drop (71 in. minimum): <u>22.0</u> in.		BEF
5. Record comments and damage to the canister: <u>Canister landed square on flange. Nearest bolt sheared off.</u> <u>No mark on bottom of canister.</u> <u>2</u> <u>to point of impact.</u> <u>Dent on flange is .25 in. long.</u>		BEF
6. Record damaged areas with the camera.		BEF
Data sheet has been completed.		
Cognizant Engineer: <u>EBZ</u>	Date: <u>2/25/98</u>	
QA Representative: <u>Tim Homan</u>	Date: <u>2/25/98</u>	

Drop Test Data Sheet

Drop # <u>5</u> of 5	Date/Time: <u>2/25/98 - 10:25 am</u>	Initials
1. Location of test: <u>JOD Area PNNL Drop Pad</u>		<u>BF</u>
2. Drop Configuration: <u>Top Corner drop</u>		<u>BF</u>
3. Weight of canister and payload: <u>15 7/16</u> lb Scale calibration #: <u>347-66-01-021</u> Expiration date: <u>2/28/98</u>		<u>BF</u>
4. Actual drop height of drop (71 in. minimum): <u>72.0</u> in.		<u>BF</u>
5. Record comments and damage to the canister: <u>Canister landed cleanly on top edge then slipped down to other side. Small dent on bottom (side of first impact)</u> <u>Just scratches on top of flange. Small dent at bottom is 1/16 in deep by 1/26 in long.</u>		<u>BF</u>
6. Record damaged areas with the camera.		<u>BF</u>
<p>Data sheet has been completed.</p> <p>Cognizant Engineer: <u>[Signature]</u> Date: <u>2/25/98</u></p> <p>QA Representative: <u>[Signature]</u> Date: <u>2/25/98</u></p>		

Post Test Data Sheet

Date/Time: <u>2/25/98</u>	Initials
1. Verify all testing has been completed and all data sheets have been signed.	RF
2. Open canister and evaluate the condition of the contents: <u>lid moved slightly forward tightening position.</u> <u>lid was difficult to take off.</u> <u>No trace of simulant within canister, around jar, or</u> <u>by the threads of the jar.</u> <u>Marks on lid caused by attempts to open it.</u>	RF
3. Record any damage to the contents with the camera.	RF
Post Data sheet has been completed.	
Cognizant Engineer: <u>B. J. [Signature]</u>	Date: <u>2/25/98</u>
QA Representative: <u>Toni [Signature]</u>	Date: <u>2/25/98</u>

DISTRIBUTION SHEET

To	From	Page 1 of 1			
Distribution	Packaging Engineering	Date 03/02/98			
Project Title/Work Order		EDT No. 621900			
Test Report for the Sample Transfer Canister System (HNF-2269)		ECN No. NA			
Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
J. G. Field	H1-15	X			
B. D. Flanagan	H1-15	X			
T. Romano	H1-15	X			
R. J. Smith	H1-15	X			
N. P. Willis	T4-52	X			
HNF-2269 File	H1-15	X			