

*Sheet 2*  
**JAN 06 2000**

**ENGINEERING DATA TRANSMITTAL**

1 EDT **628503**

2 To (Receiving Organization) Documentation and Records Mgmt		3 From (Originating Organization) Technical Integration (FSA 13300)		4 Related EDT No EDT 628503	
5 Proj /Prog /Dept /Div Spent Nuclear Fuel Project		6 Design Authority/Design Agent/Cog Engr D M Chenault		7 Purchase Order No 00003170	
8 Originator Remarks Project filing of the Fuel Basket Handling Grapple Design Development Report and the Fuel Basket Handling Grapple Acceptance Test Report (Production Grapples) Two Reports by MCE Engineering <i>WSP SCHEDULE EXCLUDED PER B CARPENTER (CATEGORICAL EXCLUSION F)</i>				9 Equip /Component No DES-12-1 (001 to009)	
				10 System/Bldg /Facility SNF/KE & KW/100K	
11 Receiver Remarks 11A Design Baseline Document? <input type="radio"/> Yes <input checked="" type="radio"/> No Design Development report verifies the design adcequacy per tested verification of required safety factors The acceptance test report verifies each production grapple has been proof tested as required				12 Major Assm Dwg No Vendor MCE DES-12-1	
				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	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	SNF-5567	N/A	0	SNF Storage Projects Fuel Basket Handling Grapple Design Development Test Report	N/A	2	1	1
2	SNF-5568	N/A	0	MCE Engineering Test Rept Fuel Basket Handling Grapple Acceptance Test	N/A	2	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 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	(G) Reason	(H) Disp	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	1	Design Authority D M	<i>D M Chenault</i>	<i>12-14-99</i>	R3-86	3		J Weamer			X3-85
		Design Agent				3		J M Henderson			X3-88
		Cog Eng				3		J D Mathews			X3-65
1	1	Cog Mgr D W	<i>D W Medford</i>	<i>01-03-00</i>	R3-86	3		T J Ruane			X3-72
		QA									
		Safety						<i>SNF file</i>			<i>R3-11</i>
		Env									

18 <i>Douglas M Chenault</i> D M Chenault <i>12-14-99</i> Signature of EDT Originator Date		19 _____ Authorized Representative for Receiving Organization Date		20 <i>D W Medford 01-03-00</i> D W Medford Design Authority/Cognizant Manager Date		21 DOE APPROVAL (if required) Ctrl No _____ <input type="radio"/> Approved <input type="radio"/> Approved w/comments <input type="radio"/> Disapproved w/comments	
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# MCO ENGINEERING TEST REPORT FUEL BASKET HANDLING GRAPPLE ACCEPTANCE TEST

D M Chenault  
Fluor Hanford Incorporated Richland WA 99352  
U S Department of Energy Contract DE AC06 96RL13200


EDT/ECN 628503 UC 510  
Org Code YA300 Charge Code 105528/DA00  
B&R Code EW7040000 Total Pages 28

Key Words Grapple Proof Test Basket Lift Fuel

Abstract Acceptance testing of the production SNF Fuel Basket lift grapples to the required 150 percent maximum lift load is documented herein The report shows the results affirming the proof test passage

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Release Approval Date 01/05/00

DATE  
STA A  
JAN 06 2008  
HANFORD  
RELEASE  
ID 2  
Release Stamp

**Approved for Public Release**

SNF-5568, new 0



May 10 1999

Mr Ron L Butler  
DE&S Hanford  
PO Box 350  
Richland WA 99352

Subject **CONTRACT 00003170 SUBMITTALS AND NOTICE OF  
COMPLETION**

Dear Mr Butler

Mid-Columbia Engineering, Inc (MCE Engineering) is notifying you of our completion of the grapple repair per the terms of contract 00003170. At this time we are enclosing our load test documentation for your records. The repaired grapple assemblies have been delivered to the buyer's technical representative Doug Chenault per the terms of the contract.

I have instructed our Back Office to prepare invoicing for \$10,983.00 per the firm fixed price terms of the contract.

Please feel free to contact me at (509) 943-6706 Ext 234 with any items requiring clarification.

Sincerely  
**Mid-Columbia Engineering, Inc**

A handwritten signature in black ink, appearing to read "Eric Straalsund". The signature is fluid and cursive, written over a white background.

Eric Straalsund  
General Manager

EKS/jmp 063L-99-EKS

MCE Engineering Test Report  
Fuel Basket Handling Grapple

Acceptance Test

Job No P O 3170

Prepared by	<u>Eric Stumpf</u> Engineering	<u>5/10/99</u> Date
Concurred by	<u>Walter L. Bohn</u> Manager Manufacturing	<u>5/10/99</u> Date
Approved by	<u>C. Stumpf</u> General Manager Engineering	<u>5/10/99</u> Date

## 1 0 Introduction

This report provides the results of an acceptance test that was completed on nine grapple assemblies for handling MCO fuel baskets for the SNF Project. These grapple assemblies were fabricated to MCE Drawing Number DES 12 1 REV 1. Specifically testing was formed to evaluate the load acceptance of a new material (Inconel 718) being used on the actuator shaft and engagement balls. This report summarizes the results of the test and provides an initial evaluation of the test results. NDE testing which was performed following completion of the load test is also described along with the results of this test.

## 2 0 Test Objective

The primary objective of this test was to confirm the load rating of the grapple per applicable requirements of ANSI 14 6 American National Standard For Radioactive Materials Special Lifting Devices for Shipping Containers Weighing 10 000 pounds (4500kg) or More. The above Standard requires a load test of 150% of the design load which must be held for a minimum of 10 minutes followed by a Liquid Penetrant or Magnetic Particle examination of critical areas and welds in accordance with the ANSI/ASME Boiler and Pressure Vessel Code 1989 Section III Division 1 section NF 5350.

## 3 0 Basis for Testing

The test was to be conducted using Test Procedure EP#9 Rev 0. The completed Test Procedure along with data sheets for each grapple tested is included as Appendix A to this report. The design load specified for this grapple is 3200 pounds. The required test load is thus  $(3200)(1.5) = 4800$  pounds.

## 4 0 Test Description

The test was performed using the test setup described in Appendix A. The test hardware was the prototype grapple which had been designed and fabricated by MCE Engineering based on a detailed design provided by the client. The test fixture consists of a load reacting cylinder mechanism which transfer load from a hydraulic cylinder through the grapple to a lower plate which is fastened to the mating portion of the grapple. The loading device is a 0 to 10 000 psig double acting Enerpac hydraulic cylinder. Loading was monitored by a calibrated 0 to 10 000 psig Ashcroft gage. Prior to the test the Ashcroft gage was calibrated by Bellhaven. Calibration of the Ashcroft gauge found the gauge to read in error by nominally 25% low. The five point calibration curve was used to correct readings taken from the gauge to actual pressure and corresponding load. However during testing the correction calculation was incorrectly applied and the test pressure and loads were significantly over applied. This resulted in testing each of the test articles at loads much greater than the target load of 4800 pounds. See Table 4 1 for actual test loads. Appendix B of this report includes copies of the Ashcroft calibration data and calculations.

The test was conducted at MCE Engineering's fabrication division G&M Manufacturing. The test was witnessed by the client engineering and quality assurance representatives.

Table 4 1 Summary of Test Conditions

Grapple ID	Displayed Pressure	Corrected Pressure	Calculated Load	Comments
H 1 82864 010 001 Backbone Design	1650	2360 90	11119 85	Held load 10 Minutes
H 1 82864 010 002	1700	2425 42	11423 72	Held load Minutes
DES 12 1 010 004	1650	2360 90	11119 85	Held load 10 minutes
DES 12 1 010 005	1650	2360 90	11119 85	Held load 10 minutes
DES 12 1 010 006	1650	2360 90	11119 85	Held load 10 minutes
DES 12 1 010 007	1600	2296 39	10815 98	Held load 10 minutes
DES 12 1 010 008	1650	2360 90	11119 85	Held load 10 minutes
DES 12 1 010 009	1700	2425 42	11423 72	Held load 10 minutes
H 1 82864 010 001 Retaining Wire Design	2807	3853 81	18151 43	Load Tested to 3X and 5X Load per MCE EP 11

### 5 0 Test Results

Following completion of the loading sequence the each test unit was disassembled and visually inspected for any damage. Local deformation of the fuel basket receptacle interface lip was observed at the contact point with the detent balls. Minor deformation of the actuator shaft/detent ball interface was also observed. This local deformation of the fuel basket receptacle and actuator shaft was well within expected limits. There was no deformation noted at the grapple housing/detent ball interface.

Following testing each actuator shaft (item 7) was liquid penetrant inspected per ASME Section III Division 1 1989 and accepted per requirements of NF 5350. This examination was performed to insure that no cracking had occurred. The test indicated that no cracking had occurred. The examination reports are included as Appendix C to this document.

### 6 0 Conclusions

Testing of the MCO Basket grapple prototype at nominally 350% of expected design load indicated that the unit functioned as planned with only the expected local deformation at contact points. Testing indicates that the load capability of the grapple assembly has not been compromised as a result of changing the actuator shaft and engagement ball materials to Inconel 718.

From this test it is concluded that the design configuration meets or exceeds the requirements specified in ANSI N 14 6 for Special Lifting Devices for Shipping Containers Weighing 10 000 Pounds (4500 kg) or More.

**Appendix A**

**MCE Engineering Procedure #9 Rev 0**

**Fuel Basket Handling Grapple**

**Load Test Procedure and Data Sheets**



ENGINEERING

Issue Date 7/2/97

MCE Engineering Engineering Procedure #9  
FUEL BASKET HANDLING GRAPPLE LOAD  
TEST PROCEDURE

JOB NO P O M 414379, Task 18

Revision 0

Prepared by	<u>[Signature]</u> Engineering	<u>6/25/97</u> Date
Concurred by	<u>[Signature] FOR VICE PRESIDENT GORVAIN</u> Manager, Manufacturing	<u>6-25-97</u> Date
Concurred by	<u>[Signature]</u> QA Manager	<u>7/2/97</u> Date
Approved by	<u>[Signature]</u> Vice President, Engineering	<u>6/25/97</u> Date
Concurred by	<u>[Signature]</u> Client Authorized Engineering Rep	<u>6-25-97</u> Date





## **1 0 INTRODUCTION**

This document details load test requirements for a new grapple fixture for handling MCO fuel baskets. This grapple is documented in a released MCE Engineering Drawing DES-1-1 Sheet 1, Rev 1, and DES 1-1 Sheet 2, Rev 0. Specifically, this document defines the test objectives, acceptance criteria, and test responsibilities.

## **2 0 TEST OBJECTIVES**

The primary objective of this testing is to confirm load rating of the grapple per applicable requirements of ANSI 14.6, "American National Standard for radioactive materials - special lifting devices for shipping containers weighing 10,000 pounds (4500g) or more." ANSI N14.6 requires a load test of 150% design load, held for a minimum of 10 minutes, followed by a Liquid Penetrant or Magnetic Particle examination in accordance with the ANSI/ASME Boiler and Pressure Code, 1989, Section III, Division 1.

## **3 0 TEST RESPONSIBILITIES**

### **3 1 MCE Engineering (MCE)**

MCE Engineering's Engineering staff shall prepare the test procedure and conduct load testing. Upon completion of the load test, MCE's Engineering staff shall document the test results in a letter report to be included with the Grapple Fabrication Data Package. The Test Procedure and Test Report shall be reviewed and concurred by MCE's Quality Assurance Staff. QA will NOT be required to witness testing.

### **3 2 Duke Engineering Services Hanford (DESH)**

Duke Engineering Services is the end user of the grapple. DESH shall review and concur the test procedure, provide an optional witness of test activities - if desired, and review and concur the final test report. Duke Engineering Services shall also provide the required Fuel Basket Receptacle Interface.



#### **4 3 Measurement Ranges and Accuracy**

The test loads specified in this procedure are nominal. The test performer shall apply the nominal load and record the actual load in the data sheet. The minimum increment for the pressure gauge is 100 psi. It is reasonable that the pressure can be recorded to the nearest 50 psi. However, to ensure results are conservative, all readings shall be rounded down. Data shall be recorded in accordance with the tolerances specified on the forms in Appendices A, B, C, D, and E. Loads applied to the test fixture are derived by dividing the applied pressure by the specified effective cylinder area in retraction. For the Enerpac RRH-307 cylinder used for this test the effective cylinder area in retraction is specified to be 4.71 square inches. Thus, the corresponding pressure for a 4800 (3200 \* 150%) pound load is 1020 psig. For this test, minimum pressure will be set to 1100 psig or a corresponding load of not less than 5181 pounds.

#### **4 4 Instrument/Equipment Calibration**

The measuring devices and the pressure gauge shall be calibrated, and documentation provided with the test report as a record.

### **5 0 TEST REPORT**

A report shall be prepared presenting the recorded data and observations using completed data sheets generated during conduct of this test procedure. The report shall include a summary of the testing performed and the results of the evaluations during testing. *A copy of all required Non Destructive Examinations shall be included with the report.*

### **6 0 CONFIGURATION CONTROL**

Prior to initiating formal test activities this test procedure shall be approved and released into MCE Engineering's document control system. At the test director's and client's mutual agreement MINOR procedure changes can be implemented using red-line control. Red-line mark-ups to the test procedure shall be initialed by the MCE Test Director AND the Authorized Client Engineering Representative. MINOR procedure changes are changes that streamline test conduct or alter the sequence of test activities. MAJOR procedure changes that alter the scope or intent of testing requires signature approval commensurate with original document release and requires a direct revision to this procedure.

### **7 0 TEST PROCEDURE**

The associated data sheets are listed in Sections 7.1 through 7.4 of this procedure.

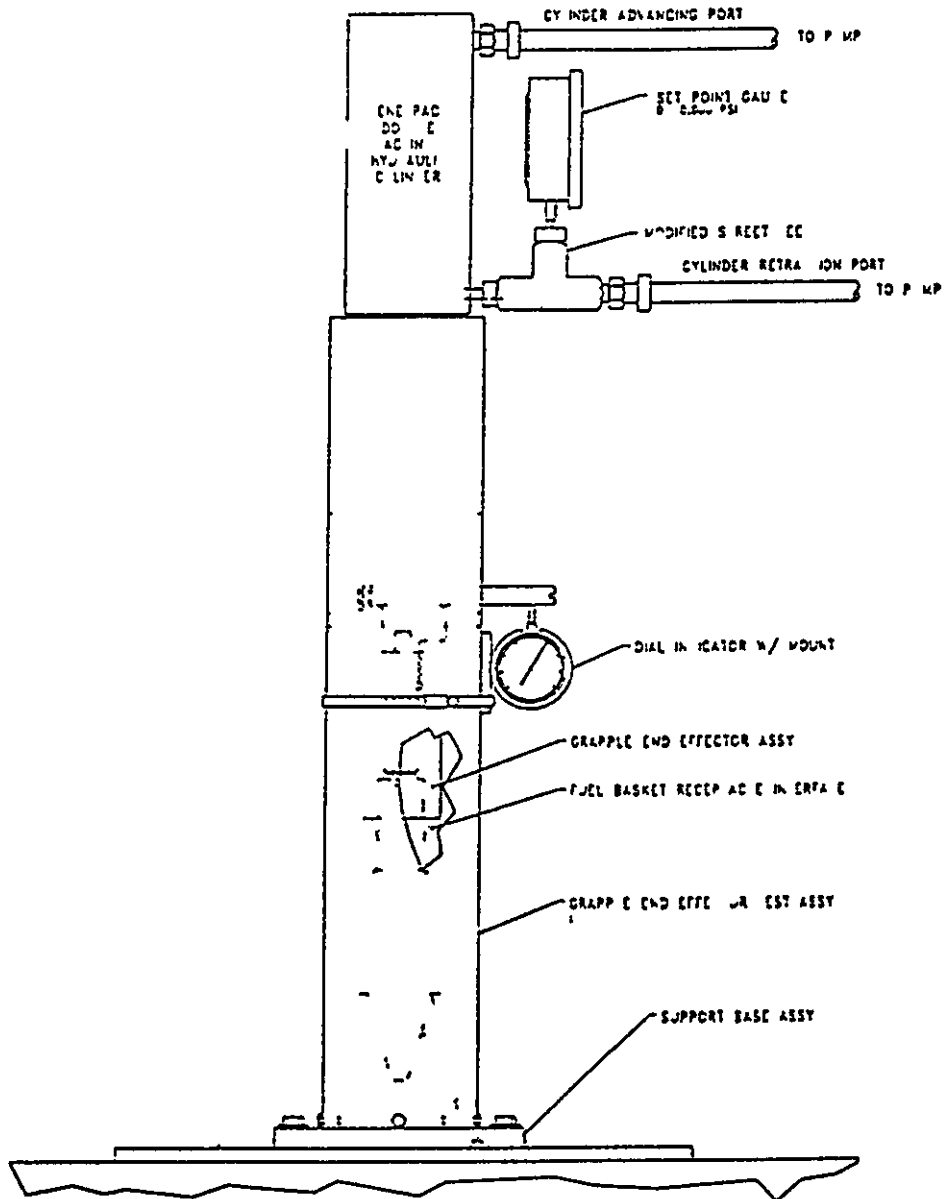


Figure 1 Test Apparatus Assembly

PROCEDURE TITLE SNF Storage Projects Fuel Basket Handling Grapple Design Development Test Procedure  
 Revision B (Final Review -Revision A Comments Incorporated)

JOB NO P O M-414379, Task 11

APPENDIX F- TEST REVIEW SHEETS

7.1 PRE TEST ACTIVITIES

- 1) Identify Test Participants and sign data sheet.

Title	Name	Signature	Initials
MCE Test Director	<del>Eric</del> ERIC STUBBS	<i>[Signature]</i>	EKS
MCE Test Performer	ERIC STUBBS	<i>[Signature]</i>	EKS
Authorized Client Engineering Representative	LESLIE CHESTER	<i>[Signature]</i>	DLK
Authorized Client QA Representative	<i>[Signature]</i>	<i>[Signature]</i>	GR
Other (Identify)			
Other (Identify)			

- 2) Verify fabrication traveler for the grapple assembly  
 Verified by EKS N/A RPAR

- 3) Record information for measurement and test equipment As a minimum record model number serial number and calibration data for the Pressure Gauge and dimensional measurement gauges (Blocks micrometer gauges etc )

Description - Model	Serial Number	Calibration Data	Verified By
Aschcroft	8451	CAL - 48-15 5/21/99	EKS 5/3/99

PROCEDURE TITLE SNF Storage Projects Fuel Basket Handling - Multiple Design Development Test Procedure  
 Revision B (Final Review -Revision A Comments Incorporated)

JOB NO P O M-414379, Task 11 H-1-82864-010-001  
 BACK BOARD

APPENDIX F- TEST REVIEW SHEETS

7 2 APPLY 5181-POUND TEST LOAD

Apply pressure in nominal 100 psig increments until 1100 psig is obtained Note the pressure gauge is marked in 100 pound increments record actual pressure measurements to the degree practical typically within 50 pounds

PSIG (Nominal)	PSIG (Displayed)	CALCULATED LOAD (PSIG/4 71)	START TIME	END TIME	NOTES	RECORDED BY
1100	1650	512 1/2	8:11 AM	8:21 AM	Maintain Load for Minimum of 10 Minutes	Due
0				10:00 PM		

5-4-91

7 3 Remove Grapple from Test Chamber and Inspect

Remove Grapple from Test Chamber and visually inspect the grapple body and actuator rod for any physical damage or local yielding beyond expected deformations Record Observations Below

No deformations beyond expected

7 4 Conduct Non Destructive Examinations

Send unit for Non Destructive Examinations Liquid Penetrant Or Magnetic Particle performed using personnel and procedures qualified in accordance with ANSI/ASME Boiler and Pressure Vessel Code 1989, Section V Articles 1 6 7 24, and 25 Acceptance standards shall be as indicated in paragraphs NF 5350 and NF-5340 of the ANSI/ASME Boiler and Pressure Vessel Code 1989 Section III Division 1 Affix copies of NDE Procedure and Personnel Qualifications to the Test Report

471 (1.50 - 922 - 001) = 512 1/2 for needed proof load of 1.5 - 22.4 x 10^6

PROJECT TITLE: SNF Storage Projects Fuel Basket Handling - Apple Design Development Test Procedure  
 Revision: B (Final Review - Revision A Comments Incorporated)

JOB NO: P O M-414379, Task 11

17-1-82864 - 01D - 002  
 SWAGGED PROTOTYPE

**APPENDIX F- TEST REVIEW SHEETS**

**7.2 APPLY 5181-POUND TEST LOAD**

Apply pressure in nominal 100 psig increments until 1100 psig is obtained. Note the pressure gauge is marked in 100 pound increments. record actual pressure measurements to the degree practical typically within 50 pounds

PSIG (Nominal)	PSIG (Displayed)	CALCULATED LOAD (PSIG/4.71)	START TIME	END TIME	NOTES	RECORDED BY
1100	1100		4:17 PM	4:27 PM	Maintain Load for Minimum of 10 Minutes	DMC
0						

b3 49

**7.3 Remove Grapple from Test Chamber and Inspect**

Remove Grapple from Test Chamber and visually inspect the grapple body and actuator rod for any physical damage or local yielding beyond expected deformations. Record Observations Below

Test Acceptable - No indications beyond expected

**7.4 Conduct Non Destructive Examinations**

Send unit for Non Destructive Examinations. Liquid Penetrant Or Magnetic Particle performed using personnel and procedures qualified in accordance with ANSI/ASME Boiler and Pressure Vessel Code 1989 Section V Articles 1 6 7 24 and 25. Acceptance standards shall be as indicated in paragraphs NF 5350 and NF 5340 of the ANSI/ASME Boiler and Pressure Vessel Code 1989 Section III Division 1. Affix copies of NDE Procedure and Personnel Qualifications to the Test Report

PROCEDURE TITLE SNF Storage Projects Fuel Basket Handling Grapple Design Development Test Procedure  
 Revision B (Final Review -Revision A Comments Incorporated)

JOB NO P O M-414379, Task 11

DES-12-1-010-004

APPENDIX F- TEST REVIEW SHEETS

7.2 APPLY 5181-POUND TEST LOAD

Apply pressure in nominal 100 psig increments until 1100 psig is obtained Note the pressure gauge is marked in 100 pound increments record actual pressure measurements to the degree practical, typically within 50 pounds

PSIG (Nominal)	PSIG (Displayed)	CALCULATED LOAD (PSIG/4.71)	START TIME	END TIME	NOTES	RECORDED BY
H00-1019	1650	4927#	1:03	4:13	Maintain Load for Minimum of 10 Minutes	JML
0				1600		

5-3-49

7.3 Remove Grapple from Test Chamber and Inspect

Remove Grapple from Test Chamber and visually inspect the grapple body and actuator rod for any physical damage or local yielding beyond expected deformations Record Observations Below

Test successful - No indications beyond expected

7.4 Conduct Non Destructive Examinations

Send unit for Non Destructive Examinations - Liquid Penetrant Or Magnetic Particle performed using personnel and procedures qualified in accordance with ANSI/ASME Boiler and Pressure Vessel Code 1989 Section V Articles 1,6 7 24 and 25 Acceptance standards shall be as indicated in paragraphs NF 5350 and NF-5340 of the ANSI/ASME Boiler and Pressure Vessel Code 1989 Section III Division 1 Affix copies of NDE Procedure and Personnel Qualifications to the Test Report

PROCEDURE TITLE SNF Storage Projects Fuel Basket Handling Grapple Design Development Test Procedure  
 REVISION B (Final Review -Revision A Comments Incorporated)

JOB NO P O M-414379, Task 11

DES -12-1-010-005

7 2 APPLY 5181-POUND TEST LOAD APPENDIX F- TEST REVIEW SHEETS

Apply pressure in nominal 100 psig increments until 1100 psig is obtained Note the pressure gauge is marked in 100 pound increments record actual pressure measurements to the degree practical typically within 50 pounds

PSIG (Nominal)	PSIG (Displayed)	CALCULATED LOAD (PSIG/4 71)	START TIME	END TIME	NOTES	RECORDED BY
1100 109	1050	4 12 #	3 47 PM	3 57	Maintain Load for Minimum of 10 Minutes	Pme
0						

5-3 '11

7.3 Remove Grapple from Test Chamber and Inspect

Remove Grapple from Test Chamber and visually inspect the grapple body and actuator rod for any physical damage or local yielding beyond expected deformations Record Observations Below

*Test successful - No indicators beyond expected*

7 4 Conduct Non Destructive Examinations

Send unit for Non Destructive Examinations - Liquid Penetrant Or Magnetic Particle performed using personnel and procedures qualified in accordance with ANSI/ASME Boiler and Pressure Vessel Code 1989 Section V Articles 1 6 7 24 and 25 Acceptance standards shall be as indicated in paragraphs NF 5350 and NF 5340 of the ANSI/ASME Boiler and Pressure Vessel Code 1989 Section III Division 1 Affix copies of NDE Procedure and Personnel Qualifications to the Test Report.



PROCEDURE TITLE SNF Storage Projects Fuel Basket Handling Grapple Design Development Test Procedure  
 REVISION B (Final Review -Revision A Comments Incorporated)

JOB NO P O M-414379, Task 11

DES-12-1-000-006

APPENDIX F- TEST REVIEW SHEETS

7.2 APPLY 5181-POUND TEST LOAD

Apply pressure in nominal 100 psig increments until 1100 psig is obtained Note the pressure gauge is marked in 100 pound increments, record actual pressure measurements to the degree practical typically within 50 pounds

PSIG (Nominal)	PSIG (Displayed)	CALCULATED LOAD (PSIG/4 71)	START TIME	END TIME	NOTES	RECORDED BY
100	165	4927#	3:30 PM	3:42 PM	Maintain Load for Minimum of 10 Minutes	JMA
0				1:00 PM		

5-3-99

7.3 Remove Grapple from Test Chamber and Inspect

Remove Grapple from Test Chamber and visually inspect the grapple body and actuator rod for any physical damage or local yielding beyond expected deformations Record Observations Below

Test successful No indications beyond expected.

7.4 Conduct Non Destructive Examinations

Send unit for Non Destructive Examinations - Liquid Penetrant Or Magnetic Particle performed using personnel and procedures qualified in accordance with ANSI/ASME Boiler and Pressure Vessel Code 1989 Section V Articles 1 6 7 24 and 25 Acceptance standards shall be as indicated in paragraphs NF 5350 and NF-5340 of the ANSI/ASME Boiler and Pressure Vessel Code 1989 Section III Division 1 Affix copies of NDE Procedure and Personnel Qualifications to the Test Report

PROCEDURE TITLE SNF Storage Projects Fuel Basket Handling Grapple Design Development Test Procedure  
 Revision B (Final Review -Revision A Comments Incorporated)

JOB NO P O M-414379, Task 11

72 APPLY 5181-POUND TEST LOAD DES-12-1-010-007

Apply pressure in nominal 100 psig increments until 1100 psig is obtained Note the pressure gauge is marked in 100 pound increments record actual pressure measurements to the degree practical typically within 50 pounds

PSIG (Nominal)	PSIG (Displayed)	CALCULATED LOAD (PSIG/4 71)	START TIME	END TIME	NOTES	RECORDED BY
1100	1600	4927*	3 15 PM	3 25	Maintain Load for Minimum of 10 Minutes	DME

5/19/99

7.3 Remove Grapple from Test Chamber and Inspect

Remove Grapple from Test Chamber and visually inspect the grapple body and actuator rod for any physical damage or local yielding beyond expected deformations Record Observations Below

*Test Successful No indications beyond expected*

7.4 Conduct Non Destructive Examinations

Send unit for Non Destructive Examinations - Liquid Penetrant Or Magnetic Particle performed using personnel and procedures qualified in accordance with ANSI/ASME Boiler and Pressure Vessel Code 1989, Section V Articles 1 6,7,24 and 25 Acceptance standards shall be as indicated in paragraphs NF 5350 and NF-5340 of the ANSI/ASME Boiler and Pressure Vessel Code 1989, Section III Division 1 Affix copies of NDE Procedure and Personnel Qualifications to the Test Report.

4 71 (1600 [822] - 209) = 4927 \*

PROCEDURE TITLE: SNF Storage Projects Fuel Basket Handling Grapple Design Development Test Procedure  
 REVISION: B (Final Review -Revision A Comments Incorporated)

JOB NO: P O M-414379, Task 11

APPENDIX F- TEST REVIEW SHEETS DES-12-1-010-008

7.2 APPLY 5181-POUND TEST LOAD

Apply pressure in nominal 100 psig increments until 1100 psig is obtained Note the pressure gauge is marked in 100 pound increments record actual pressure measurements to the degree practical typically within 50 pounds

PSIG (Nominal)	PSIG (Displayed)	CALCULATED LOAD (PSIG/4.71)	START TIME	END TIME	NOTES	RECORDED BY
1000	1019	51	2:40:24	3:00:24	Maintain Load for Minimum of 10 Minutes	True
0	0	0		1:00:24		

7.3 Remove Grapple from Test Chamber and Inspect

Remove Grapple from Test Chamber and visually inspect the grapple body and actuator rod for any physical damage or local yielding beyond expected deformations Record Observations Below

Displayed pressure adjusts for 33% calibration change in gauge (see graph of pressures)  
 Test successful No indications beyond expected

7.4 Conduct Non Destructive Examinations

Send unit for Non Destructive Examinations Liquid Penetrant Or Magnetic Particle performed using personnel and procedures qualified in accordance with ANSI/ASME Boiler and Pressure Vessel Code 1989 Section V Articles 1 6 7 24 and 25 Acceptance standards shall be as indicated in paragraphs NF 5350 and NF-5340 of the ANSI/ASME Boiler and Pressure Vessel Code, 1989, Section III Division 1 Affix copies of NDE Procedure and Personnel Qualifications to the Test Report

A 71 (16 35 [022] - 269) 5/21/84

PROCEDURE TITLE SNF Storage Projects Fuel Basket Handling - apply Design Development Test Procedure  
 Revision B (Final Review -Revision A Comments Incorporated)

JOB NO P O M-414379, Task 11

72 APPLY 5181-POUND TEST LOAD APPENDIX F- TEST REVIEW SHEETS DES-12-1-010-019

Apply pressure in nominal 100 psig increments until 1100 psig is obtained Note the pressure gauge is marked in 100 pound increments record actual pressure measurements to the degree practical typically within 50 pounds

PSIG (Nominal)	PSIG (Displayed)	CALCULATED LOAD (PSIG/4.71)	START TIME	END TIME	NOTES	RECORDED BY
1100	1700	see calc below	2 28	2 41	Maintain Load for Minimum of 10 Minutes	ZLS
0						

7.3 Remove Grapple from Test Chamber and Inspect

Remove Grapple from Test Chamber and visually inspect the grapple body and actuator rod for any physical damage or local yielding beyond expected deformations Record Observations Below

*Test successful No indications beyond expected*

7.4 Conduct Non Destructive Examinations

Send unit for Non Destructive Examinations - Liquid Penetrant Or Magnetic Particle performed using personnel and procedures qualified in accordance with ANSI/ASME Boiler and Pressure Vessel Code, 1989, Section V Articles 1 6, 7 24 and 25 Acceptance standards shall be as indicated in paragraphs NF 5350 and NF-5340 of the ANSI/ASME Boiler and Pressure Vessel Code 1989 Section III Division 1 Affix copies or NDE Procedure and Personnel Qualifications to the Test Report

471 (1700 [92] - 2091 - 5315 #

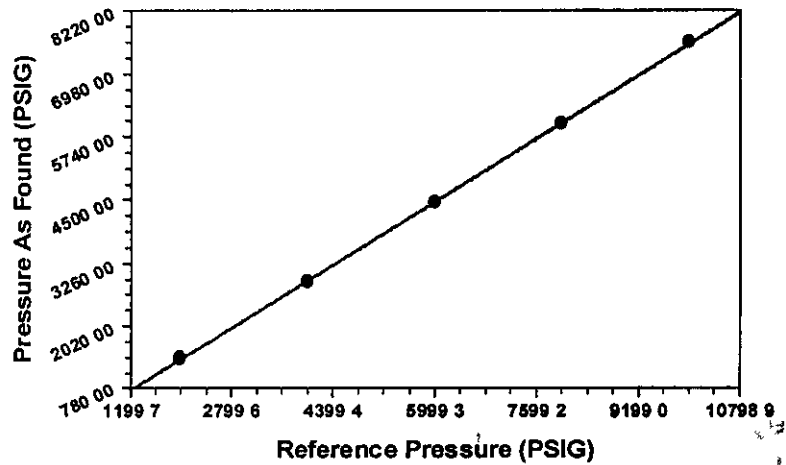
**Appendix B**  
**Ashcroft Pressure Gauge Calibration**  
**Serial Number Q 8451**

Ashcroft Calibration Data TAG NO BEL99 251 Expires 5/5/2000

Reference Pressure Ashcroft Displayed

1999 629	1400
3999 188	2900
5999 123	4450
7999 107	6000
9998 968	7600

S = 31 54483539  
r = 0 99993788



Pressure As Found = 179.7 + 775(Actual Pressure)  
or  
Actual Pressure = (As Found Pressure + 179.7) / 775

Test Load = Actual Pressure Area of Cylinder  
Where Area of Cylinder = 4.71 Square Inches


Test Load = ((Ashcroft Pressure + 179.7) / 775) 4.71

Ashcroft Pressure	Actual Pressure	Test Load	Overload
1650	2360.90	11119.85	3.474954
1700	2425.42	11423.73	3.569914
1650	2360.90	11119.85	3.474954
1650	2360.90	11119.85	3.474954
1650	2360.90	11119.85	3.474954
1600	2296.39	10815.98	3.379995
1650	2360.90	11119.85	3.474954
1700	2425.42	11423.73	3.569914
2807	3853.81	18151.43	5.672321

Tag No BEL99-251  
 Instrument Type Pressure Gauge  
 Manufacturer Ashcroft  
 Serial No  
 Model  
 Cal Due Date 5/5/2000  
 System  
 Special Instructions LIMITED CALIBRATION This guage does not meet mfg tolerances The gauge is certified to have an accuracy of +/- 25% FS (2500 PSI)

		Cal Point	As Found	As Left	% Full Scale Accuracy
Units	PSI	1999 629	1400	1400	-5 9963
- S Accuracy	25%	3999 188	2900	2900	-10 9919
S Accuracy		5999 123	4450	4450	-15 4912
Full Scale	10000	7999 107	6000	6000	-19 9911
Permitted Variation	2500 0000 PSI	9998 968	7600	7600	-23 9897
Cal Temp	68 F				

Test Equipment Ametek Deadweight Tester S/N 16132

Calibration Performed By 

Date 5-5-1999

**ORIGINAL**

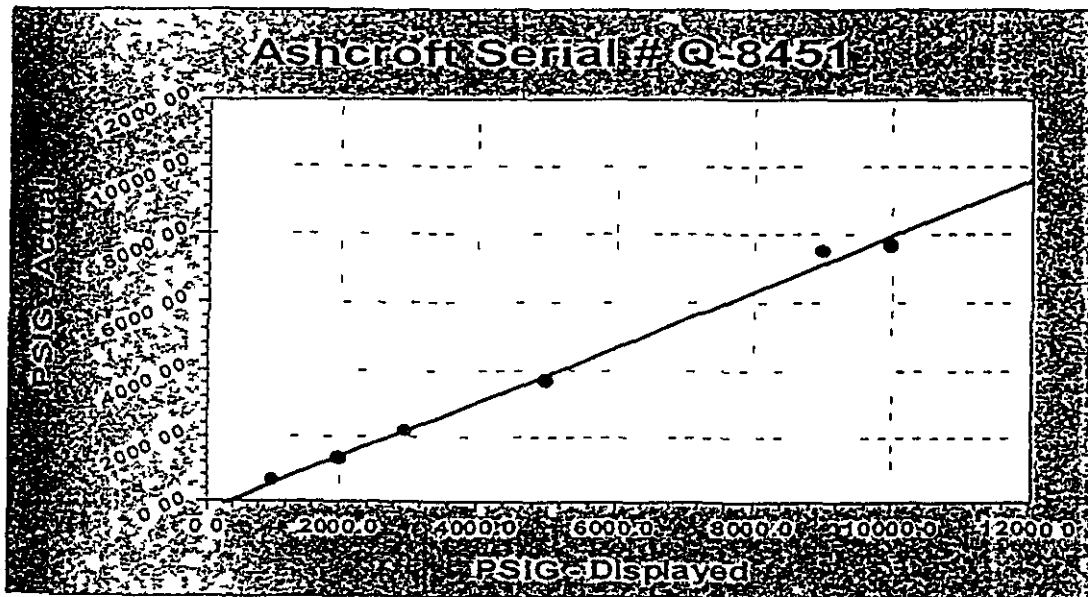
## Internal Memo

To Dick Nelson, QA  
 From Eric Straalsund, Engineering  
 Subject Ashcroft Pressure Gauge Calibration  
 Date 5/22/98

On 5/21/98 I sent the Ashcroft Pressure Gauge Serial # Q-8451 to Bellhaven Instruments for its annual calibration. The Gauge received a 'LIMITED' calibration as it was reading approximately 25% lower than expected values.

Bellhaven provided MCE Engineering with the calibration curve and I have in turn plotted the data and calculated the best fit linear equation. Copies of the calibration data and best fit equation are provided with this memo.

For the upcoming Grapple Load Test (QA Class General Service), I propose using the Ashcroft Gauge and normalizing the resultant data with the calibration data.



Linear Fit  $y=a+bx$   
 Coefficient Data  
 $a = -269.04762$   
 $b = 0.82214286$

Desired Test Pressure is 1100 PSI. Solve for Display Pressure from above linear equation.

$$1100 = -269.04 + (0.822)x \text{ or } X = 1665 \text{ Lbs}$$



Tag No CAL98 95 DS Number BEL98-160  
 Instrument Type Pressure Gauge 0 10K psi Serial No Q-8451  
 Manufacturer Ashcroft Model 0 10K  
 Tolerances 35 %  Manufacturer  Data Only  
 Calibration Due Date 5/21/99 System

Special Instructions

Proc Step No	Function Tested	Required Values PSI	As Found PSI	As Left PSI	% Out of Tol
		1000 psi	650 psi	650 psi	-35 00%
		2000 psi	1350 psi	1350 psi	-32 50%
		3000 psi	2150 psi	2150 psi	-28 33%
		5000 psi	3700 psi	3700 psi	-26 00%
		9000 psi	7500 psi	7500 psi	-16 67%
		10000 psi	7700 psi	7700 psi	-23 00%

**Test Equipment** Transcat Digital Pressure Gauge, S/N 590765, Cal Due Date 7/23/98  
 TAR of Gauge 25% Full Scale (10K psi)

Ametek Dead Weight Tester, S/N 16132, Cal Due Date 1/22/99

Calibrated By *J. Cadwell* Date 5-21-98

Checked By \_\_\_\_\_ Date \_\_\_\_\_

Approved By \_\_\_\_\_ Date \_\_\_\_\_

Belhaven

I&amp;C Division

# Certificate of Calibration

Tag CAL98-95 Model 0-10K Manufacturer Ashcroft

Instrument Pressure Gauge 0-10K psi Serial No Q-8451

Calibration traceable to the National Institute of Standards and Technology in accordance with ANSI- Z540 1 has been accomplished on the above-named instrument by comparison with standards maintained by Belhaven. The accuracy and stability of all standards maintained by Belhaven are traceable to national standards maintained by the National Institute of Standards and Technology in Washington, D C and Boulder, Colorado

Temperature at Calibration 70 F

Accuracy of Instrument Limited Calibration See Data sheet

Calibrated Range 1000 - 10000 psi

Calibration Report No BEL98 160

Date Due 5/21/99

## Test Equipment

Transcat Digital Pressure Gauge, S/N 590765, Cal Due Date 7/23/98  
TAR of Gauge 25% Full Scale (10K psi)

Ametek Dead Weight Tester, S/N 16132, Cal Due Date 1/22/99

Calibrated by *J. Coombs* 5-21-98

Certified by *J. Coombs* 5-21-98

Quality Assurance Manager

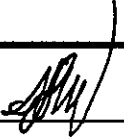
**Appendix C**

**Liquid Penetrant Examination Reports**

**Inspection Service, Inc**  
 430 W Deschutes  
 Kennewick, Wa. 99336

**Liquid Penetrant  
 Examination Report**

<b>Examined For</b> G & M Machine		<b>Project or Location</b> G & M Shop		<b>Date</b> 5-3 99
<b>Procedure No</b> NDE 03		<b>Examination Std</b> ASME Sec V	<b>Acceptance Std</b> AWS D1 1	
<b>Item</b> Actuator Shaft (before test)		<b>Dwg</b> Des 12 1	<b>Material</b> <u>Inconel</u> C/S S/S ALUM	
<b>Cleaner</b> DublChek 60		<b>Penetrant</b> DublChek 40		<b>Developer</b> DublChek 100
Area	Accept	Reject	Comments	
Surface of Shaft # <sup>203 #1/4"</sup> 5, 8	XXX		No indication noted	

Examined by Sam Wellenbrock  Level II Date 5-3-99

Inspection Service, Inc  
430 W Deschutes  
Kennewick Wa 99336

## Liquid Penetrant Examination Report

Examined For <b>G &amp; M Machine</b>		Project or Location <b>G &amp; M Shop</b>		Date <b>5 4 99</b>
Procedure No <b>NDE 03</b>		Examination Std <b>ASME Sec V</b>		Acceptance Std <b>AWS D1 1</b>
Item <b>Actuator Shaft (after test)</b>		Dwg <b>Des 12 1</b>		Material <b>Inconel</b> C/S S/S ALUM
Cleaner <b>DublChek 60</b>		Penetrant <b>DublChek 40</b>		Developer <b>DublChek 100</b>

Area	Accept	Reject	Comments
Surface of Shaft #1, 2, 4,	XXX		No indications noted
<i>car of 127</i> 3, 6, 7	XXX		No indications noted

Examined by Sam Wellenbrock *SW* Level II Date 5-4 99