TRANSMITTAL and release of the supporting document which compiles the documentation for the first annual testing and inspections of Beneficial Uses Shipping System (BUSS) Cask. Comments have been incorporated.

<table>
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<th>Sheet No.</th>
<th>Rev. No.</th>
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<th>Impact Level</th>
<th>Reason for Transmittal</th>
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**KEY**

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

**SIGNATURE/DISTRIBUTION**

(See Impact Level for required signatures)

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**DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED**

EDT 157699

Page 1 of 1

AUG 23 1994

(See Impact Level for required signatures)

1. Approved
2. Approved w/comment
3. Disapproved w/comment

Approved

Approved w/comments

Disapproved w/comments
# RELEASE AUTHORIZATION

<table>
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<th><strong>Document Number:</strong></th>
<th>DOCUMENTATION FOR FIRST ANNUAL TESTING AND INSPECTIONS OF BENIFICIAL USES SHIPPING SYSTEM (BUSS) CASK.</th>
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<tr>
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<td>WHC-SD-WM-TI-659     REVISION 0</td>
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<td><strong>Release Date:</strong></td>
<td>08-22-94</td>
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This document was reviewed following the procedures described in WHC-CM-3-4 and is:

**APPROVED FOR PUBLIC RELEASE**

---

WHC Information Release Administration Specialist:

Kará Broz

(Signature) 08-23-94 (Date)
DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.
The purpose of this report is to compile data generated during the first annual tests and inspections of the Beneficial Uses Shipping System (BUSS) Cask. In addition, this report will verify that the testing criteria identified in chapter 8 of the BUSS Cask Safety Analysis Report for Packaging (SARP) was met.

Section 8.2 "Maintenance and Periodic Inspection Program" of the BUSS Cask SARP requires that the following tests and inspections be performed on an annual basis:

- Hydrostatic pressure test
- Helium leak test
- Dye penetrant test on the trunnions and lifting lugs
- Torque test on all bolts
- Impact limiter inspection and weight test

The first annual inspections and testing of the BUSS Cask were completed on May 5, 1994, and met the SARP criteria.
**Table of Contents**

1.0 Introduction ......................................... 1
2.0 Discussion/Summary ................................. 1
4.0 References ........................................... 3
Periodic Inspection Table ............................... 4
Appendix A: Hydrostatic pressure test ................. Ai
Appendix B: Helium leak test ............................. Bi
Appendix C: Dye penetrant test on the trunnions and lifting lugs ....... Ci
Appendix D: Torque test on all bolts .................. Di
Appendix E: Impact limiter inspection and weight test ....... Ei
1.0 Introduction

The purpose of this report is to compile data generated during the first annual tests and inspections of the Beneficial Uses Shipping System (BUSS) Cask. In addition, this report will verify that the testing criteria identified in section 8.2 of the BUSS Cask Safety Analysis Report for Packaging (SARP), Reference 4.1, was met.

The BUSS Cask Model R-1 is a type B shipping container used for shipment of radioactive cesium-137 and strontium-90 capsules to Waste Encapsulation and Storage Facility (WESF). The BUSS Cask body and lid are each one-piece forgings fabricated from ASTM A473, Type 304 stainless steel. The primary purpose of the BUSS Cask is to provide shielding and confinement as well as impact, puncture, and thermal protection for the capsules under both normal and accident conditions.

Section 8.2 "Maintenance and Periodic Inspection Program" of the BUSS Cask SARP requires that the following tests and inspections be performed on an annual basis:

- Hydrostatic pressure test
- Helium leak test
- Dye penetrant test on the trunnions and lifting lugs
- Torque test on all bolts
- Impact limiter inspection and weight test

Attached is a table naming the test or inspection, the frequency the test must be performed, the completion date, and the next due date. All testing was performed by Westinghouse Hanford Company (WHC).

2.0 Discussion/Summary

The BUSS Cask hydrostatic testing was completed on October 29, 1993. Appendix A consists of the results of this testing. Included in Appendix A are Engineering Work Instruction EWI-2C-93-014 "BUSS Cask Annual Hydrostatic Testing" and a WHC Inspection Plan for verifying calibration on the instruments used for testing.

SARP Requirements: There shall be no visible leakage. In addition, WHC used the criteria from Section 8.1.3 of the initial testing of the cask: There shall be no pressure decrease greater than 1/2 psig.

Test Results: The cask cavity was pressurized for 30 minutes. The pressure decay over that time was -0.75 psig. The results of this test met the SARP criteria.
The leak testing was completed on October 26, 1993. Appendix B consists of the results of this testing. Included in Appendix B is the Non Destructive Examination (NDE) Leak Test Procedure and Test Report.

**SARP Requirements:** The cask assembly shall have a leak rate of less than 1.0E-5 atm-cm²/s.

**Test Results:** The containment boundary, lid seal, upper port cover, and lower port cover were tested and no detectable leaks were found within the sensitivity of the leak detector (8.1E-11). The results of this test met the SARP criteria.

The dye penetrant test of the trunnions and lifting lugs was completed on January 6, 1994. Appendix C consists of the results of this testing. Included in Appendix C is the NDE Penetrant Procedure and Test Report. Also included are the J-7 Work Change Notice and WHC Inspection Plan which provide support for the testing.

**SARP Requirements:** There shall be no cracks detected on the trunnions or lifting lugs.

**Test Results:** There were no cracks detected on the trunnions or lifting lugs. The results of this test met the SARP requirements.

The bolt torque testing was completed on May 5, 1994. Appendix D consists of the results of this testing. Appendix D includes a list of torquing requirements based on the bolt design values and the Work Plan "BUSS Cask Annual Torque Verification."

**SARP Requirements:** All permanent bolts shall be torqued to their design values.

**Test Results:** All the bolts were torqued to their design values.

The impact limiter inspection and weight test was completed on December 28, 1993. Appendix E consists of the results of this testing. Appendix E includes the J-4 for the BUSS Cask Impact Limiter Annual Inspection.

**SARP Requirements:** The impact limiters shall pass a visual inspection and the weight of each limiter shall not change from its original value more than -1% or +3% of the foam weight.
Test Results:

No damage was found during the visual inspection. Impact limiter S48929-001 weighed 3045 lbs, which is 1.3% more than its original weight of 3006 lbs. Impact limiter S48929-002 weighed 3035 lbs, which is 1.4% more than its original weight of 2994 lbs. The results of this testing met the SARP criteria.

In conclusion, the results of the first annual testing of the BUSS Cask met the SARP criteria defined in Section 8.2.

4.0 References

### Periodic Inspection and Testing Data

<table>
<thead>
<tr>
<th>Test or Inspection</th>
<th>Frequency</th>
<th>Completion Date</th>
<th>Due Date</th>
</tr>
</thead>
</table>
Appendix A: Hydrostatic pressure test
ENGINEERING WORK INSTRUCTIONS

Activity: Buss Cask Annual Hydrostatic Testing

Issue Date: October 27, 1993  Issue Time: 10:00 am

Expiration Date: January 1, 1994

Engineering Instructions:

The engineering work instructions are to be initiated after the millwrights have removed the Buss cask lid per the PTP-2-995-00011 in work package 28-93-00697. The basket should not be installed during this test.

1. Record date of test and the Buss cask serial number on attached data sheet.

2. Add approximately 35 gallons of demineralized water to the Buss cask cavity. Fill the level of demineralized water to the middle of the upper port. Record on attached data sheet the cavity was filled with water.

The notes below are addressed in the J-7 to the work package and are added for clarity:

NOTE: Allow the millwrights to install and torque the lid to the required limits per work package 28-93-00697.

NOTE: Blow water out of the closure area on the cask lid and body grooves with the gas (nitrogen or helium) used to pressurize the water in the Buss cask.

NOTE: Allow the pipefitters to install the hydrostatic test fixture and connect the gas bottle to the fixture. Pressurize the regulator to approximately 50 psig.

3. Open the valve on the hydrostatic test fixture to pressurize system to 50 psig. Look for leaks around the lid, upper port and lower port quick disconnect valve.

NOTE: Slowly increase pressure from the regulator until pressure reaches 70 psig on the indicator.

4. Allow cask to set for 2 hours to allow water temperature to stabilize. Record on attached data sheet that water set for two hours.

NOTE: Slowly increase pressure from the regulator until pressure reaches 75 psig on the indicator.
5. Close the valve on the hydrostatic test fixture. Record the start pressure and time on the attached data sheet. Request QC to verify the start time and pressure. Wait 30 minutes and record the end time and pressure. Request QC to verify the end time and pressure.

NOTE: The pressure can not drop more than 1.0 psig in the 30 minute time period.

6. Contact engineering if the cask fails the hydrostatic testing.

7. Review and complete the information on the attached data sheet.

NOTE: Relieve the pressure from the system and drain the water to the ground.

Operations Comments/Results of Work:

Issuance Approvals:

Engineer:  [Signature]
Home Phone 546-2778
Work Phone 222-5271

Engineering Management: [Signature]

Operations Supervisor: [Signature]

Work Completion Approvals:

Work Performed By: [Signature]
Date/Shift 8/11/94
Engineer Verification: [Signature]
HYDROSTATIC TEST DATA SHEET

Test Date: 10/28/93

Cask Serial Number: USA/8511/B(U). Model #: R1

Hydro Pump Type: ☒ Manual ☐ N/A Power Operated

Hydro pump Mfg. Handemar Model #: 15

Pressure Indicator (PI) Identification Number: 230763

PI Calibration Date: 10/28/93

PI Resolution: 0-100

Cavity filled with demineralized water: ☒ (Initials)

Lid Bolts properly torqued: ☒

Water at thermal equilibrium (min 2 hour holding period): ☒

Cavity pressure start of test: 155.4 psig (min test pressure. 75 psig)

QC verify start pressure: 75 psig

Test start time: 1:58:46  QC verify: ☒

Test pressure held for 30 minutes: ☒

Test end time: 2:28:46  QC verify: ☒

Cavity pressure at end of test: 75.75 psig

QC verify end pressure: ☒

Pressure decay (start pressure minus end pressure): 0.75 psig

Final disposition (pressure decay less than 0.5 psig):

Accepted: ☒  Rejected: ☐

Conducted by: Paul Leppanen  10/28/93  Date

Witnessed by: ☒ Date

Appendix A
Page 3
WHC-SD-WM-TI-659  Rev. 0
AHC INSPECTION PLAN

JCS NO. 28-93-00697

PAGE 1 of 1

WHC INSPECTION PLAN

Location: WESP Crane Pad

Initiated by: D.O. McAfee

Date: 1/26/93

Cog. Engineer: P.T. Saueressig

Date: 1/26/93

NOTE: Notify QC prior to start of work for each HOLD or WITNESS point.

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<th>Inspection Step</th>
<th>H/W/V</th>
<th>NCR</th>
<th>OC Sign/Stamp</th>
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<td>Verify that the resolution of the pressure indicator on the hydrostatic test fixture is at least 1.0 psig increments.</td>
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<td>Verify that the BUSS cask lid bolts are torqued to a final torquing value of 1250 ft-lbs and that the upper port cover is bolted to a final torquing value of 60 ft-lbs.</td>
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**Appendix A**

Page 5

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---

**Remarks**

PREVIOUS REMARKS:

INSTRUCTIONS:

REVISION REQUIRED (Y/N)  CAL/PROCEDURE  DATA SHEET
Appendix B: Helium leak test
See Attached for Method Set-Up
PLASTIC BAG

11CFM ROUGH PUMP

ROUGH PUMP

PLASTIC BAG

BUSS CASK

CONTAINMENT BOUNDARY TEST
(EVACUATED C^VITY)

0-30
PSIA GAGE
584-31-03-006

UHP HELIUM

2.1x10^4
ATM-CC/SE
STD.

APPENDIX B
Page 2
NRC-5D-MM-TI-659
A.E. 0

MSLD
BUSS CASK

UPPER PORT SEAL
(HELIUM BACKFILLED)
Appendix C: Dye penetrant test on the trunnions and lifting lugs
**NDE PENETRANT procedure and test report**

**Non Destructive Examination**

**306 Bldg., 300 Area - Tel. 376-5401**

**Job No.**

**93-204**

**Requestor (client):**

**Walter C. Milliron**

**Company:**

**WHC**

**Project/System/Work Package/Traveler No.:**

**USA/9511/B(U).**

**Work Order No.:**

**KBO1N**

**Acceptance Std.**

**DOE-RL 92-36**

**Section**

**11**

**Para.**

**1-1993**

**Date**

**T83109**

**Dwg. No.**

**SST**

**Material**

**NA**

**NCR**

**Appendix A Rev. 1**

**Area to be inspected**

**Full inspection: 100% of Area Requested**

**Other**

**Appendix A Rev. 1**

**Manufacturer**

**Sherwin-Williams**

**Dye**

**Color Contrast**

**Special PT Technique No.**

**NA**

**Cleaning**

**Pre:**

**Post:**

**Developer Application**

**Spray**

**Light Level**

**> 100**

**Foot Candles**

** penetrant**

**DP-40**

**Batch No.**

**015-F1**

**Time (min.)**

**10**

**Cleaner**

**DR-50**

**Batch No.**

**14-FL**

**Time (min.)**

**5**

**Emulsion**

**D-100**

**Batch No.**

**216G6**

**Time (min.)**

**7**

**Weld No., Part No., or Serial No.**

**Lug T83109-000-01**

**X**

**One rounded indication. 1/32" in diameter.**

**Lug T83109-000-02**

**X**

**Trunnion No. S51171-000-1**

**X**

**Trunnion No. S51171-000-2**

**X**

**Appendix C**

**Page 1**

**WHC-SD-WM-TI-659 Rev. O**

**Signature:**

**Walter C. Milliron**

**Date of Examination:**

**Jan. 5, 1994**

1. LOOSEN THE FOUR SCREWS HOLDING THE TRUNNION AND BRASS RING IN PLACE. REMOVE THE TRUNNION, SCREWS AND BRASS RING FROM THE CASK. PLACE IN DESIGNATED STORAGE AREA. REPEAT FOR SECOND TRUNNION.

ENGINEERING WILL PROVIDE DIRECTION FOR PERFORMING STEPS 2 AND 3 BECAUSE ONLY A PORTION OR ALL OF THE STEPS MAY BE REQUIRED.

2. LOOSEN THE SIXTEEN BOLTS ON THE SOUTH SIDE OF THE BUSS CASK. REMOVE THIRTEEN BOLTS AND LEAVE THREE EVENLY SPACED BOLTS THAT ARE HAND TIGHT. STORE THE REMOVED TRUNNION BOLTS IN THE DESIGNATED AREA UNTIL REINSTALLATION IS REQUIRED.

3. LOOSEN THE SIXTEEN BOLTS ON THE NORTH SIDE OF THE BUSS CASK. REMOVE THIRTEEN BOLTS AND LEAVE THREE EVENLY SPACED BOLTS THAT ARE HAND TIGHT. STORE THE REMOVED TRUNNION BOLTS IN THE DESIGNATED AREA UNTIL REINSTALLATION IS REQUIRED.

NOTE: CARE MUST BE TAKEN WHEN REMOVING THE BOLTS FROM THE LIFT LUGS, SO THAT THE LIFT LUGS ARE NOT DROPPED AND DAMAGED WHEN DISENGAGED FROM THE BUSS CASK.

4. LOOSEN AND REMOVE THE EIGHT BOLTS FROM THE BUSS CASK LIFT LUGS. STORE THE EIGHT LIFT LUG BOLTS IN A DESIGNATED AREA UNTIL REINSTALLATION IS REQUIRED.

5. REMOVE TORQUE PAINT AND NEOLUBE FROM TRUNNION AND LIFT LUG
6. REQUEST QC TO WITNESS AND VERIFY AS DEFINED IN THE ATTACHED INSPECTION PLAN.

STEPS 7 AND 8 MAY BE REVERSED BY ENGINEERING.

QC HOLD

7. INSTALL THE FOUR SCREWS, BRASS RING AND TRUNNION. TORQUE THE FOUR SCREWS TO 20 FT-LBS. REPEAT FOR SECOND TRUNNION.

QC HOLD

3. REINSTALL ONE SET OF THE TRUNNION BOLTS HAND TIGHT. TORQUE THE TRUNNION BOLTS IN A CROSSING PATTERN TO 250 FT-LBS USING A CERTIFIED TORQUE WRENCH. WHEN THE TORQUE VALUE IS ACHIEVED BACK THE BOLTS OFF A QUARTER TURN THEN RETORQUE. REPEAT FOR THE SECOND TRUNNION.

QC HOLD

9. INSTALL THE 3 LIFT LUG BOLTS AND TORQUE USING A CALIBRATED TORQUE WRENCH. TORQUE BOLTS USING A CROSSING PATTERN. WHEN 250 FT-LBS TORQUE IS ACHIEVED, BACK THE BOLTS OFF A QUARTER TURN AND RETORQUE TO 250 FT-LBS.

QC HOLD


5. Reason for Change

ANNUAL REQUIREMENT TO NOE THE TRUNNIONS AND LIFT LUGS.

6. Impact Level of Change/Approval Requirements 3-0

7. Approval Signatures

Cognizant Engineer Signature Date
SAUERESSIG PT 31/05/94

Appendix C
Page 3
WHC-SD-WM-TI-659 Rev.0
1. Document Number 2B-93-00697/W  GENERIC WORK ITEM
   Work Item Title SUPPORT FOR BUSS CASK DRY RUNS AND TESTING
   
   Cognizant Manager  ROBBINS, ED  01/05/94
   Environmental Assurance
   Health/Safety Assurance
   Quality Assurance
   Operations
   PIC
   Other
   
   2. Incorporated By
   Signature: [Signature]  Date: 1/5/94  Telephone No.: 2230323

Appendix C
Page 4
WHC-SD-WM-TI-659  Rev.0
## WHC INSPECTION PLAN

### JCS NO. 2B-93-00697

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### Location

- WESF Crane Pad

### Initiated by:

D.D. McAfee

### Cog. Engineer Date

P. T. Saueressig 11/11/94

### QC Sign/Stamp

N/A

---

**NOTE:** Notify QC prior to start of work for each HOLD or WITNESS point.

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<th>Inspection Step</th>
<th>H/W/V</th>
<th>NCR</th>
<th>QC Sign/Stamp</th>
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<td>1</td>
<td>Quality Control (QC) inspector shall verify the serial number and expiration date of the torque wrench used to install the trunnion bolts/screws. Serial Number: 7/15-79-01-01/7 Expiration Date: 12-29-94</td>
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<td>2</td>
<td>QC inspector shall verify the serial number and expiration date of the multiplier used to install the trunnion and/or lift lug bolts. Serial Number: N/A Expiration Date:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>QC shall witness the installation of the trunnion bolts and the final torquing value 250 ft-lbs.</td>
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<tr>
<td>4</td>
<td>QC inspector shall verify the serial number and the expiration date of the torque wrench used to install the cask lift lug bolts. Serial Number: 7/15-79-01-07 Expiration Date:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** QC will place N/A if data is not required.

---

Appendix C
Page 5
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<table>
<thead>
<tr>
<th>No.</th>
<th>Inspection Step</th>
<th>H/W/Y</th>
<th>NCR</th>
<th>QC Sign/Stamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>QC shall witness the installation of the four trunnion screws and the final torquing value of 20 ft-lbs. Torque Wrench ID: 796-69-01-176 Data Calibrated: 4-2-93 Expiration Date: 3-94</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>QC shall witness the installation of the lift lug bolts and the final torquing value of 250 ft-lbs.</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>QC shall witness the installation of the upper port shield plug and the final torquing value of 30 ft-lbs.</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>QC shall witness and/or install the torque paint on the lift lug and trunnion bolts.</td>
<td>W</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Notify QC prior to start of work for each HOLD or WITNESS point!

Note: QC will place N/A if data is not required.
Appendix D: Torque test on all bolts
PERMANENT BOLTS IDENTIFIED IN TABLE 8.2-1

**BUSS CASSE BOLT TORQUING REQUIREMENTS**

- Trunnion to cask body bolts (16 each) 250 ft-lbs
- Cask body trunnion washer (brass ring) (4 each) 20 ft-lbs
- Lift lug to cask body bolts (4 each) 250 ft-lbs
- Drain plug handle to drain plug cover (2 each) 5 ft-lbs
- Impact limiter key to cask body screws (2 each) 30 ft-lbs

**BASKET BOLT TORQUING REQUIREMENTS**

- Basket handle to basket bolts (4 each) 25 ft-lbs

**IMPACT LIMITER (MISCELLANEOUS) BOLT TORQUING REQUIREMENTS**

- Foam fill port to impact limiter screws (4 each) 5 ft-lbs
- Impact limiter outer end lifting bolts (3 each) 20 ft-lbs

**TRANSPORTATION SKID (ASSEMBLY) TORQUING REQUIREMENTS**

- Wear strip to mounting block screws (10 total) 50 ft-lbs
- Hexagonal base to skid (2 total) 10 ft-lbs
- Personnel barrier to skid (18 total) 20 ft-lbs
- Skid to trailer bolts (8 total) 290 ft-lbs

**NOTE:** x indicates items identified in the BUSS cask Safety Analysis Report for Packaging (SARP) requiring torque verification.
WORK PLAN

BENEFICIAL USES SHIPPING SYSTEM (BUSS) CASK

Annual Torque Verification

Impact Level: Q

Paul T. Saueressig  4/18/94
Cognizant Engineer (P. T. Saueressig)/Date

E. D. Robbins  4/18/94
Cognizant Engineer Manager (E. D. Robbins)/Date

C. A. Coivin  4/18/94
Quality Assurance (C. A. Coivin)/Date
WORK PLAN

Activity: BUSS Cask Annual Torque Verification

Issue Date: April 15, 1994

1.0 Purpose:

This plan provides the instructions for the initial verification of design torque values on BUSS Cask bolts. The items requiring annual torque verification are identified in the BUSS Cask Safety Analysis Report For Packaging (SARP), per Chapter 8 Table 8.2-1. Design torque values were obtained from the BUSS Cask Maintenance Manual, Ref. CVI # 22542. The bracketed numbers in each step refer to the applicable section within the Maintenance Manual where required torque values are specified.

NOTE: Unless otherwise specified torque values are ±5% of the specified value. In all cases bolts shall be completely loosened prior to torquing.

2.0 BASKET HANDLE

[2.6.5]

Remove basket from BUSS Cask cavity and place it in the designated area. Using a calibrated torque wrench, torque the (4) basket handle bolts to 25 ft-lbs. See attachment, Figure 2.5 for basket handle bolt locations.

QC shall witness and record the following information.

TORQUED TO 25 FT-LBS

QC STAMP Date

Wrench ID. / Serial No.

Calibration Date

WHC QC. Signature Date

WHC Engineer Date

3.0 BUSS CASK BORE PLUG INSTALLATION & TORQUE

Comply with written instructions per the attached letter from Sandia National Laboratories (SNL) Dated January 5, 1994. The letter provides detailed instructions as to the correct orientation of the plug and required torque value. QC shall witness and record the following information.

TORQUED TO 35 FT-LBS

QC STAMP Date

Wrench ID. / Serial No.

Calibration Date

WHC QC. Signature Date

WHC Engineer Date
4.0 TRUNKION BOLTS
[2.3.4]

Remove all existing torque seal prior to torque verification. Using a calibrated torque wrench and multiplier if required, torque the (32) trunnion bolts to 250 ft-lbs in a crossing pattern. QC shall witness, apply new torque seal, and record the following information.

TORQUED TO 250 FT-LBS 1/21/94
QC STAMP Date

Wrench ID. / Serial No.        Calibration Date
WHC 02 5617/60041-1

Multiplier ID. / Serial No.     Calibration Date

WHC QC. Signature Date
WHC Engineer Date

5.0 TRUNKION BRASS WASHER
[2.3.4]

Using a calibrated torque wrench, torque the (8) trunnion brass washer screws to 20 ft-lbs in a crossing pattern. QC shall witness and record the following information.

TORQUED TO 20 FT-LBS 1/21/94
QC STAMP Date

Wrench ID. / Serial No.        Calibration Date
WHC 03 - 5764

WHC QC. Signature Date
WHC Engineer Date

6.0 LIFTING LUGS
[2.3.3]

Remove all existing torque seal prior to torque verification. Using a calibrated torque wrench and multiplier if required, torque the (8) lifting lug bolts to 250 ft-lbs in a crossing pattern. QC shall witness, apply new torque seal, and record the following information.

TORQUED TO 250 FT-LBS 1/21/94
QC STAMP Date

Wrench ID. / Serial No.        Calibration Date
WHC 02 5617/60546115N

Multiplier ID. / Serial No.     Calibration Date

WHC QC. Signature Date
WHC Engineer Date

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7.0 UPPER/LOWER PORT COVER HANDLE

[TORQUE REQUIREMENT TO BE INCORPORATED INTO THE MAINTENANCE MANUAL BY SNL UPON NEXT REVISION]

Remove both upper and lower port covers from the BUSS Cask body. Using a calibrated torque wrench, torque the (4) handle screws to 5 ft-lbs. Store the upper and lower port covers in the designated tool box. QC shall witness and record the following information.

TORQUED TO 5 FT-LBS  
QC STAMP: 1/21/94

Wrench ID. / Serial No.  WC-03 5576  
Date: 2/2/94

Calibration Date: 2/2/94

WHC QC. Signature: 1/21/94

WHC Engineer: 1/21/94

8.0 KEYS TO CASK BODY

[2.2.19]

Using a calibrated torque wrench, torque the (4) Key mounting screws to 30 ft-lbs. QC shall witness and record the following information.

TORQUED TO 30 FT-LBS  
QC STAMP: 1/21/94

Wrench ID. / Serial No.  WC-03 5576  
Date: 2/2/95

Calibration Date: 2/2/95

WHC QC. Signature: 1/21/94

WHC Engineer: 1/21/94

9.0 LOWER IMPACT LIMITER FILL COVERS

[6.4.3]

Using a calibrated torque wrench, torque the (16) fill cover screws to 5 ft-lbs in a crossing pattern. QC shall witness and record the following information.

TORQUED TO 5 FT-LBS  
QC STAMP: 1/21/94

Wrench ID. / Serial No.  WC-03 5576  
Date: 2/2/95

Calibration Date: 2/2/95

WHC QC. Signature: 1/21/94

WHC Engineer: 1/21/94

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10.0 LOWER IMPACT LIMITER OUTER END SCREWS

Using a calibrated torque wrench, torque the (3) outer end cap screws to 20 ft-lbs. Bolts are located on the side of the Impact Limiter. QC shall witness and record the following information.

TORQUED TO 20 FT-LBS 1/4/21/94
QC STAMP Date

Wrench ID. / Serial No. QC STAMP Date

WHC 03 - 5576

QC STAMP Date

Wrench ID. / Serial No. Date

WHC QC. Signature Date

11.0 UPPER IMPACT LIMITER FILL COVERS

NOTE: This step will be performed only if the crane is available. WHC will authorize continuance onto the next step.

Using a calibrated torque wrench, torque the (16) fill cover screws to 5 ft-lbs in a crossing pattern. QC shall witness and record the following information.

TORQUED TO 5 FT-LBS

Wrench ID. / Serial No.

WHC QC. Signature Date

WHC Engineer Date

12.0 UPPER IMPACT LIMITER OUTER END SCREWS

Using a calibrated torque wrench, torque the (3) outer end cap screws to 20 ft-lbs. Bolts are located on the side of the Impact Limiter. QC shall witness and record the following information.

TORQUED TO 20 FT-LBS 1/4/21/94

Wrench ID. / Serial No.

WHC QC. Signature Date

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WHC-SD-WM-TI-659 Rev. 0
10.0 LOWER IMPACT LIMITER OUTER END SCREWS

[OPERATIONS MANUAL 6.4.7]

Using a calibrated torque wrench, torque the (3) outer end cap screws to 20 ft-lbs. Bolts are located on the side of the Impact Limiter. QC shall witness and record the following information.

TORQUED TO 20 FT-LBS

QC STAMP

1/6/94

Wrench ID. / Serial No.

5576

Done 2/3/94 11:46 2/3/95

Calibration Date

QC STAMP

1/6/94

price

16/2/94

Wrench ID. / Serial No.

5576

Done 2/3/94 11:46 2/3/95

Calibration Date

11.0 UPPER IMPACT LIMITER FILL COVERS

[6.4.3]

NOTE: This step will be performed only if the crane is available. WHC will authorize continuity onto the next step.

Using a calibrated torque wrench, torque the (16) fill cover screws to 5 ft-lbs in a crossing pattern. QC shall witness and record the following information.

TORQUED TO 5 FT-LBS

QC STAMP

5/5/94

Wrench ID. / Serial No.

5576

Done 2/3/94 11:46 2/3/95

Calibration Date

12.0 UPPER IMPACT LIMITER OUTER END SCREWS

[OPERATIONS MANUAL 6.4.7]

Using a calibrated torque wrench, torque the (3) outer end cap screws to 20 ft-lbs. Bolts are located on the side of the Impact Limiter. QC shall witness and record the following information.

TORQUED TO 20 FT-LBS

QC STAMP

1/6/94

Wrench ID. / Serial No.

5576

Done 2/3/94 11:46 2/3/95

Calibration Date

1/6/94

QC STAMP

1/6/94

Wrench ID. / Serial No.

5576

Done 2/3/94 11:46 2/3/95

Calibration Date

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13.0 TRANSPORTATION SKID
BRASS WEAR STRIPS MOUNTED TO HEXAGONAL BASE

Using a calibrated torque wrench, torque the (10) wear strip mounting screws to 50 ft-lbs. QC shall witness and record the following information.

TORQUED TO 50 FT-LBS

QC STAMP

Date

039300

40032 5576

Wrench ID. / Serial No.

Done 2/3/94  1/192 /95

Calibration

Date

T. W. Thompson 11/22/94

WHC QC. Signature Date

WHC Engineer Date

14.0 HEXAGONAL BASE TO SKID MOUNT

Using a calibrated torque wrench, torque the (2) base to skid retaining screws to 10 ft-lbs. See attachment, Figure 3.1 for attachment screw location. QC shall witness and record the following information.

TORQUED TO 10 FT-LBS

QC STAMP

Date

14/2/94

40032 5576

Wrench ID. / Serial No.

Done 2/1/94  1/1/95

Calibration

Date

T. W. Thompson 11/22/94

WHC QC. Signature Date

WHC Engineer Date

15.0 PERSONNEL BARRIER TO SKID

Using a calibrated torque wrench, torque the (18) barrier to skid assembly screws to 20 ft-lbs. QC shall witness and record the following information.

TORQUED TO 20 FT-LBS

QC STAMP

Date

11/2/94

40032 5576

Wrench ID. / Serial No.

Done 2/1/94  1/1/95

Calibration

Date

T. W. Thompson 11/22/94

WHC QC. Signature Date

WHC Engineer Date

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16.0 SKID-TO-TRAILER TIEDOWN

[TORQUE CALC. LETTER ATTACHED # 84100-94-WAM-065]

Remove all existing torque seal prior to torque verification. Using a calibrated torque wrench and multiplier if required, torque the (8) Skid-To-Trailer tiedown bolts to 290 ft-lbs. QC shall witness, apply new torque seal, and record the following information.

TORQUED TO 290 FT-LBS 14/22/94

Wrench ID. / Serial No. 6004617

Multiplier ID. / Serial No. N/A

Calibration Date 2/15/94

QC Stamp Date 14/22/94

QC/Engineer Signature

WHC QC. Signature 14/22/94

WHC Engineer 14-22-94
Appendix E: Impact limiter inspection and weight test
1. Document Number 28-93-01426/W GENERIC WORK ITEM
2. Essential Systems
3. Resolution
   SEE ATTACHED J-4A FOR RESOLUTION.
4. Impact Level/Approval Requirements 3-S Q
5. Tech Spec/OSR Requirements/Reference
   MAINTENANCE MANUAL FROM SANDIA NATIONAL LABORATORIES.
   CVI # 22542
6. Reference Documents
   Type
   22542 CVI
   SAND 92-0967 MAIN
7. Comments: Utilized the same requirements for lifting the upper limiters into the vertical position in accordance with Section 2.3, dated 7/14/94
8. Retest Requirement N
9. Mode N/A
10. Retest
11. QC Involvement in Retest NONE
12. PIC Saueressig, PT
13. PIC Org. ENGINEERING
14. Resolution By
   Signature PAWLAK, MW
   Date 12/17/93
15. Plant Forces Work Review Required N Number N/A
16. Approvals
   Cognizant Engineer Saueressig, PT
   Cognizant Manager Robbins, ED
   Environmental Assurance N/A
   Health/Safety Assurance
   Quality Assurance
   Additional Approvals
   Date 12/21/93
17. Resources Required
   Res Code Description No. Est Hrs Act Hrs
   23 MILLWRIGHT 2 16 20
   35 IRONWORKER/RIGGER 2 16 16
   ENG B PLANT ENGINEERING 1 8
   QC QUALITY CONTROL 1 8

Appendix E
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WHC-SD-WM-TI-659 Rev.0
ACTIVITY: IMPACT LIMITERS ANNUAL INSPECTION & TESTING

1.0 Purpose:

THIS PLAN PROVIDES THE INSTRUCTIONS FOR ANNUAL INSPECTION AND TESTING OF THE BUSS CASK IMPACT LIMITERS AND ASSOCIATED HARDWARE, LIMITER S/N: S48929-001 AND S/N: S48929-002. THE REQUIRED INSPECTION POINTS AND ACCEPTANCE CRITERIA WERE DEVELOPED IN ACCORDANCE WITH THE BUSS CASK MAINTENANCE MANUAL SECTIONS 2.7.5 THRU 2.7.11, 2.8.4 THRU 2.8.8, AND SECTION 9.2. THE BRACKETED NUMBERS IN EACH STEP REFER TO THE VENDOR INFORMATION INSPECTION POINTS REF.(V1 # 22542 SHT. 147-310).

2.0 STATUS AND DESCRIPTION:

THE BUSS CASK IMPACT LIMITERS ARE LOCATED ON THE 225-B CRANE PAD. ONE IMPACT LIMITER IS LOCATED ON THE BUSS CASK HANDLING FRAME WITH THE INTERFACE AREA OF THE IMPACT LIMITER FACING SKYWARD. THE OTHER IMPACT LIMITER IS LOCATED ON THE CONCRETE SECTION OF THE 225-B CRANE PAD WITH THE CASK INTERFACE AREA FACING DOWNWARD.

GENERAL RIGGING PROCEDURES FOR LIFTS REQUIRED TO COMPLETE THE LISTED INSPECTIONS ARE ATTACHED IN THE APPENDIX.

3.0 INSPECTIONS/TEST

3.1 INSPECT 6 LIFTING HOLES (3 ON OUTER END AND 3 ON CIRCUMFERENCE OF EACH IMPACT LIMITER FOR SIGNS OF THREAD WEAR OR DAMAGE. EXAMINE AREAS IMMEDIATELY ADJACENT TO HOLES FOR SIGNS OF DISTORTION. THESE HOLES ARE THREADED INSERTS; INSPECT THEM FOR LOOSENESS. [2.7.8]


MILLWRIGHT SIGNATURE DATE
Mike Carelth 11/6/93

ENGINEERING SIGNATURE DATE
3.2 WEIGH IMPACT LIMITERS

QC.HOLD POINT

WEIGH EACH LIMITER UTILIZING A CALIBRATED DYNAMOMETER
AND COMPARE MEASURED WEIGHT TO THE ORIGINAL WEIGHT
(MARKED ON THE ATTACHED ID PLATES). THE WEIGHT OF EACH
LIMITER SHOULD NOT DEVIATE MORE THAN -1 % OR +3 % FROM
ITS ORIGINAL VALUE. IF AN OUT-OF-LIMIT CONDITION IS
NOTED, CONTACT WESF ENGINEERING [2.7.5]

LIMITER WEIGHTED; CRITERIA MEET

Serial No. S48929-001 Original weight 30061lbs.

Present weight 3045 lbs. Net % change

Note: Net % change = New weight - Original Weight x 100 %

LIMITER WEIGHTED; CRITERIA MEET

SERIAL NO.S48929-002 ORIGINAL WEIGHT 29941.35.

PRESENT WEIGHT 3045 NET % CHANGE

8/03/94 1/05/93 8/03/93 1/05/93
Dynamometer Serial No. Date Calibrated

8/03/94 Calibration Due Date QC. Signature/Stamp/Date

3.3 EXTERIOR SURFACE INSPECTIONS

INSPECT EXTERIOR SURFACE OF LIMITER SKIN FOR DENTS,
GOUGES, OR TEARS. SMALL DENTS ARE PERMISSIBLE. REPAINT
AREAS OF MISSING PAINT DUE TO DINGS OR SCRAPES.
[2.7.6]

INSPECTED FOR MECHANICAL DAMAGE; NOTE LOCATIONS

Milwright Signature 1/05/93

Engineer Signature 1/05/93

---

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3.4 LIMITER/CASK INTERFACE INSPECTION

QC.HOLD POINT

Inspect limiter-to-cask interface structure, especially tape joint groove. Look for signs of wear, galling, or damage. (QC) Visually inspect welds around the interface structure for cracks. Check that air flow holes are not obstructed. See Figure 2.6, attached, for inspection points. [2.7.7]

Millwright Signature Date

QC Signature / Stamp Date

3.5 LIMITER FILL-COVER INSPECTIONS

REPLACE THE FOUR FILL-COVER GASKETS OF EACH LIMITER BY REMOVING 4 FOUR SCREWS SECURING EACH COVER. LOOK FOR SIGNS OF GASKET DETERIORATION. REMOVE ANY LOOSE MATERIAL ADHERED TO THE COVER OR LIMITER USING A PUTTY KNIFE. WIPE OFF DEBRIS OR DIRT WITH A DRY RAG. PLACE A NEW GASKET OVER EACH FILL HOLE, ORIENTING OVER THE SCREW HOLES. REINSTALL COVERS AND ATTACH WITH THE SCREWS. TIGHTEN SCREWS TO APPROXIMATELY 5 FT-LB. [2.7.9]

Millwright Signature Date

Engineering Signature Date

3.6 TURNBUCKLE ATTACHMENT LUGS

QC.HOLD POINT

EXAMINE 4 TURNBUCKLE ATTACHMENT LUGS OF EACH LIMITER. LOOK FOR SIGNS OF WEAR OR DAMAGE. ALSO INSPECT AREA AROUND EACH FITTING FOR SIGNS OF DISTORTION OF THE LIMITER SKIN OR CRACKS IN THE WELDS. REMOVE PAINT FOR FURTHER INSPECTION ONLY IF OBVIOUS CRACKS ARE OBSERVED THROUGH THE PAINT. [2.7.10]
Figure 2.6
Impact Limiter

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3.7 NON-STRUCTURAL WELD INSPECTION

QC HOLD POINT

(QC) VISUALLY INSPECT WELD AROUND CIRCUMFERENCE OF LIMITER FOR CRACKS. REMOVE PAINT FOR FURTHER INSPECTION ONLY IF OBVIOUS CRACKS ARE OBSERVED THROUGH THE PAINT. [2.7.11]

Miltwright Signature Date

QC Signature / Stamp Date

3.8 TAPE INSPECTION

VISUALLY INSPECT EACH OF THE FOUR IMPACT LIMITER TAPES. LOOK FOR INDICATIONS OF DAMAGE, GALLING OR CRACKING, PARTICULARLY AT THE THIN SECTION OF EACH SLOT. IF NECESSARY, CLEAN TAPES USING RAGS DAMPENED WITH BIODEGRADABLE DETERGENT TO REMOVE DIRT AND ACCUMULATED LUBRICANT PRIOR TO INSPECTION. DO NOT USE SOLVENTS. [2.3.4]

INSPECTED FOR MECHANICAL DAMAGE; NOTE LOCATIONS

Miltwright Signature Date

Engineering Signature Date

INSPECT BONDED LUBRICANT ON THE TAPES. IF LUBRICANT IS EXCESSIVELY WORN, REMOVE EXISTING LUBRICANT AND RECOAT WITH NEOLUBE [2.9.5]

Miltwright Signature Date

Engineering Signature Date
3.9 TURNBUCKLE INSPECTIONS

INSPECT 4 LIMITER TURNBUCKLES. ACTUATE EACH AND CHECK FOR SMOOTH OPERATION. IF THREAD DAMAGE IS NOTED, REPAIR THE COMPONENT PER SECTION 9.2 BELOW. LUBRICATE THREADS WITH NEVERSEEZ OR EQUIVALENT BEFORE INSTALLATION. LUBRICATE ROD ENDS WITH LITHIUM BASED GREASE FITTINGS. ADJUST ROD ENDS OF EACH ASSEMBLY SUCH THAT APPROXIMATELY 1.50 INCHES OF SHANK IS THREADED INTO THE TURNBUCKLE BODY. [2.9.6]

--- Signatures and Dates ---

* Milwright Signature: 1/12/28/93
* Engineering Signature: 1/12/28/93

INSPECT 8 QUICK-RELEASE PINS FOR DAMAGE. ACTUATE EACH AND CHECK FOR SMOOTH OPERATION AND POSITIVE LOCKING UPON RELEASE. CHECK SPACER WASHER AND LANYARD FOR SECURE ATTACHMENT TO PIN. [2.8.7]

--- Signatures and Dates ---

* Milwright Signature: 1/12/28/93
* Engineering Signature: 1/12/28/93

DISASSEMBLE THE DIRTY/DAMAGED ROD END FROM THE TURNBUCKLE BODY.
CLEAN ANY DIRT AND EXCESS LUBRICANT FROM BOTH INTERNAL AND EXTERNAL THREADS AND INSPECT CLOSELY FOR SIGNS OF NICKS, WEAR, OR GALLING. IF THE THREADS ARE GALLED, I.E., SHOWING SIGNS OF SEIZING, ONE OR BOTH COMPONENTS WILL HAVE TO BE REPLACED. [9.2]

USE A TAP (FOR TURNBUCKLE BODIES) OR DIE (FOR ROD ENDS)
1. Document Number 2B-93-01426/W GENERIC WORK ITEM
   Work Item Title BUSS CASK IMPACT LIMITER ANNUAL INSPECTION

ENDS) TO CHASE THE THREADS. ALL COMPONENTS HAVE A 1.50-12UNF THREADS IN EITHER RIGHT- OR LEFT-HAND THREADS. LUBRICATE THREADS DURING CHASING OPERATION WITH A CUTTING FLUID APPROPRIATE FOR THE MATERIAL. (NOTE: ALL COMPONENTS ARE 4130 OR 4140 ALLOY STEEL WITH THE EXCEPTION OF IMPACT LIMITER TURNBUCKLE BODIES WHICH ARE NITRONIC 60 STAINLESS STEEL.)

CLEAN CUTTING FLUID FROM COMPONENTS AND LUBRICATE THREADS WITH NEVERSEEZ OR EQUIVALENT, REASSEMBLE COMPONENT.

INSPECTED FOR MECHANICAL DAMAGE; NOTE LOCATIONS AND REPAIRS

MILLWRIGHT SIGNATURE /DATE_____________________

ENGINEERING SIGNATURE DATE_____________________

APPENDIX
GENERAL RIGGING PROCEDURES

GENERAL INFORMATION

IMPACT LIMITER WEIGHT IS APPROXIMATELY 3000 LBS
EACH OF THE 6 LIFTING POINTS IS INDIVIDUALLY CAPABLE OF LIFTING THE LOAD. THE LIFTING POINTS ARE USUALLY USED TWO OR THREE AT A TIME.
THES LiftS ARE NOT CONSIDERED CRITICAL LiftS
LIFTING BRIDAL HAS BEEN TAGGED FOR 3.1 T CAPACITY THROUGH 10/94. THE RIGGING SPECIALIST MAY SUBSTITUTE SIMILAR RATED EQUIPMENT.
SAFETY SHOES AND HARD HATS ARE REQUIRED ON THE CRANE PAD

A.1 VERTICAL LIFT OF IMPACT LIMITER (CASK INTERFACE AREA DOWN) FOR WEIGHING

1. ENGAGE IMPACT LIMITER LIFTING BRIDAL. ZERO DYNAMOMETER OR NOTE WEIGHT OF BRIDAL.

2. INSTALL SWIVEL EYES INTO EACH OF THREE LIFT POINTS AT THE END OF THE IMPACT LIMITER TORQUE EACH LIFTING EYE TO 100 FT-LBS.
1. Document Number 28-93-01426/W  GENERIC WORK ITEM
   Work Item Title BUSS CASK IMPACT LIMITER ANNUAL INSPECTION

3. APPLY MINIMUM TENSION. INSPECT AND ADJUST RIGGING AS REQUIRED. STAND CLEAR AND RAISE IMPACT LIMITERS APPROXIMATELY (2") AND OBTAIN REQUIRED WEIGHT DATA.

4. SLOWLY LOWER IMPACT LIMITER ONTO CRANE PAD SURFACE. DISENGAGE SWIVEL EYES AND STORE BRIDAL IN BUSS CASK GANG BOX.

A.2 VERTICAL LIFT OF IMPACT LIMITER (CASK INTERFACE AREA UP) FOR WEIGHING

NOTE: THIS IS APPLICABLE TO THE IMPACT LIMITER LOCATED ON THE BUSS CASK HANDLING FRAME. THE HANDLING FRAME HAS A KEYED FLOATING PAD WHICH INTERLOCKS WITH THE IMPACT LIMITER. THIS PAD NEEDS TO BE RE-ALIGN TO ASSURE THE BUSS CASK CAN BE EASILY REASSEMBLE.

1. ENGAGE IMPACT LIMITER LIFTING BRIDAL. ZERO DYNAMOMETER OR NOTE WEIGHT OF BRIDAL.

2. INSTALL SWIVEL EYES INTO EACH OF THREE LIFT POINTS ON THE OUTER CIRCUMFERENCE OF THE IMPACT LIMITER. TORQUE EACH LIFTING EYE TO 100 FT-LBS.

3. USE SOFTENERS TO PREVENT SLINGS FROM SCRATCHING THE IMPACT LIMITERS WHEN TENSION IS APPLIED.

4. APPLY MINIMUM TENSION. INSPECT AND ADJUST RIGGING AS REQUIRED. STAND CLEAR AND RAISE IMPACT LIMITERS APPROXIMATELY (2") AND OBTAIN REQUIRED WEIGHT DATA.

5. SLOWLY LOWER IMPACT LIMITER ONTO HANDLING FRAME PAD SURFACE. VISUALLY ENSURE THAT THE IMPACT LIMITER ENGAGES THE RAISED KEYED AREA OF THE HANDLING FRAME PAD. DISENGAGE SWIVEL EYES AND STORE BRIDAL IN BUSS CASK GANG BOX.

A.3 LIFTING IMPACT LIMITER FOR CASK INTERFACE INSPECTION

NOTE: THIS APPLIES TO A IMPACT LIMITER WITH THE INITIAL POSITION OF THE CASK INTERFACE AREA DOWN. THE IMPACT LIMITER IS RAISED TURNED IN A POSITION IN THE SAME ORIENTATION AS IT IS TRANSPORTED EXPOSING THE CASK INTERFACE SURFACE.
1. Prepare area to rotate impact by lifting vertically (see note above) placing cardboard or rubber matting to protect the painted surface of the cask from the abrasive surface of the concrete crane pad.

2. Install bridal on two of the side lifting points and torque the swivel eyes to 100 ft-lbs (see figure for lifting locations). Ensure that third unused sling on the bridal is in between the other two slings.

3. Apply minimum tension. Inspect and adjust rigging as required. Stand clear and slowly raise impact limiter, allowing the bottom end of the impact limiter to rotate beneath the point of rigging.

4. Maintain minimum tension on the two points to prevent the limiter from rolling. Chock the limiter on two sides.

5. Inspect cask interface area as described in test procedure.

6. Lower the crane block sufficiently to allow the third unused bridal sling to be installed into lifting point on the end of the impact limiter (see figure).

7. Stand clear and slowly lift the impact limiter the bridal sling installed in the end of the impact limiter will engage first. Continue lifting until the center of gravity of the impact limiter rotates below the rigging point.

8. Slowly lower the impact limiter. Landing it cask interface side down, as it was originally positioned.

9. Perform vertical lift (see A.1) as necessary to reposition impact limiter to the centerline of the crane pad.
1. Document Number  28-93-01426/W  GENERIC WORK ITEM  
Work Item Title  BUSS CASK IMPACT LIMITER ANNUAL INSPECTION

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<td>20. QC Verify Retest (If Required)</td>
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Appendix E  
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