

71-5805



**CHEM-NUCLEAR SYSTEMS, LLC**

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December 05, 2000  
579-229-00

Mr. E. William Brach, Director  
Spent Fuel Project Office  
Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Mr. Brach:

**SUBJECT: SAFETY ANALYSIS REPORT FOR MODEL NO. CNS 3-55, REV. 1**

Chem-Nuclear Systems respectfully submits the enclosed application for the subject revision to the Safety Analysis Report (SAR) for the CNS 3-55 Certificate of Compliance No. 5805.

The operating procedures specified in Chapter 7 of the SAR have been ammended to provide additional detail and clarification of certain operations to avoid some confusion among the users of this cask.

The changes/additions are summarized as follows:

- The size and quantity of the tie-down strap bolts were corrected.
- Added steps to describe the use of the "turning cradle" method of up-ending the cask as an option to the "wood plank" method currently described in the procedure.
- Corrected the size of the vent plug bolts.
- Added information to describe the steps necessary for the use of a redundant lifting device.

Please remove Chapter 7 from Revision 0 of the SAR, dated February 1994, and replace it with the revised Chapter 7 included herein.

No change to packaging contents is being requested.

If you or members of your staff have any questions about this revision, or wish to arrange a meeting to discuss the changes we have requested, please feel free to contact me at (803) 758-1824.

Sincerely,

*J. Shayne Merritt FOR Patrick L. Paquin*

Patrick L. Paquin  
General Manager  
Engineering and Licensing

*NMSSOIPublic*

Attachments: 1 - Revision 1 of Chapter 7 of the CNS 3-55 Safety Analysis Report  
2 - Revision 1 Safety Analysis Report Title Page  
3 - Revision 1 Table of Contents

**ATTACHMENT 1**

**Revision 1 of Chapter 7 of the CNS 3-55 Safety  
Analysis Report**

## 7.0 OPERATING PROCEDURES

This chapter describes the general procedure for loading and unloading of the CNS 3-55 cask.

### 7.1 Procedure for Loading the Package

NOTE: WHEN DEPLETED NEUTRON SOURCES ARE TO BE LOADED IN THE CASK, ACTIVATION ANALYSIS MUST BE PERFORMED TO ENSURE SECTION 4 LIMITS ARE NOT EXCEEDED.

7.1.1 Remove the sunshade/personnel barrier, if used, from the cask by removing the twelve (12) bolts that attach the frame to the trailer and lifting it off using the crane.

7.1.2 Prepare to remove the hold-down straps.

NOTE: THE HOLD-DOWN STRAPS MUST BE MATCH-MARKED TO THE CRADLE BEFORE REMOVAL.

7.1.2.1 Remove the sixteen (16) 1¼-inch by 5-inch bolts that secure the two straps to the cradle. Retain the bolts for re-installation.

7.1.2.2 Match mark the hold-down straps as to left and right.

7.1.2.3 Attach a lifting sling to the lifting lug on one of the hold-down straps.

7.1.2.4 Attach the crane hook to the sling, if necessary.

7.1.2.5 Remove the hold-down strap and detach the lifting sling.

7.1.2.6 Repeat Steps 7.1.2.3 – 7.1.2.5 to remove the other hold-down strap.

7.1.3 Attach the 4-inch removable trunnions to the cask. Hand tighten the bolts.

7.1.4 Remove the impact absorbers from the cask lifting trunnions by removing the four bolts from each impact absorber. Retain these bolts for re-installation.

**NOTE: THE “WOOD PLANK” METHOD AND “TURNING CRADLE” METHOD ARE BOTH ACCEPTABLE METHODS FOR UP ENDING AND DOWN ENDING THE CASK. THE STEPS FOR THE “WOOD PLANK” METHOD ARE DESIGNATED WITH THE LETTER “A”, WHILE “B” DESIGNATES THE “TURNING CRADLE” METHOD.**

7.1.5A Transfer of cask from trailer cradle and lift the cask in a horizontal position using the “wood plank” method.

**NOTE: AT LEAST SIXTEEN (16) INCHES OF WOOD MUST BE PLACED BETWEEN THE CASK AND THE LOADING SURFACE.**

7.1.5.1A Place the two (2) slings around the cask and attach them to the large crane hook.

**NOTE: ONE SLING MUST BE POSITIONED AHEAD (TOWARD THE CASK BELL END) OF THE LIFTING TRUNNIONS, AND THE OTHER SLING MUST BE POSITIONED BEHIND (TOWARD THE CASK CLOSURE END) THE REMOVABLE TRUNNIONS. USE THE SLINGS PROVIDED.**

7.1.5.2A Lift the cask in a horizontal position, lower it onto the wood blocks, and chock it so that it will not roll.

7.1.5.3A Remove the slings from the crane hook and lay back out of the way.

7.1.5B Transfer of cask from trailer cradle and lift the cask in a horizontal position using the "turning cradle" method.

7.1.5.1B Place the two slings around the cask and attach them to the crane hook.

**NOTE: ONE SLING MUST BE POSITIONED AHEAD (TOWARD THE CASK BELL END) OF THE LIFTING TRUNNIONS, AND THE OTHER SLING MUST BE POSITIONED BEHIND (TOWARD THE CASK CLOSURE END) THE REMOVABLE TRUNNIONS. USE THE SLINGS PROVIDED.**

7.1.5.2B Lift the cask in a horizontal position and lower it onto the turning cradle.

7.1.5.3B Remove the slings from the crane hook and lay back out of the way.

7.1.6 Prepare to remove the impact limiters from the end of the cask.

7.1.6.1 Remove the six (6) ¾-inch bolts that secure the impact limiters to the bell section end of the cask.

7.1.6.2 Attach a lifting sling to the eyebolts on the impact limiter.

7.1.6.3 Attach a lifting sling to the crane hook.

7.1.6.4 Slide off the impact limiter and detach the lifting sling.

7.1.6.5 Remove the six (6) nuts from the six (6) installation bolts on the base plate end of the cask. Slide the bolts out and retain them for re-installation.

7.1.6.6 Attach a lifting sling to the eyebolts on the impact limiter.

7.1.6.7 CAREFULLY remove the impact limiter by sliding it off.

7.1.6.8 Remove the six (6) reinforcing blocks and retain them for re-installation.

**NOTE: THE “WOOD PLANK” METHOD AND “TURNING CRADLE” METHOD ARE BOTH ACCEPTABLE METHODS FOR UP ENDING AND DOWN ENDING THE CASK. THE STEPS FOR THE “WOOD PLANK” METHOD ARE DESIGNATED WITH THE LETTER “A”, WHILE “B” DESIGNATES THE “TURNING CRADLE” METHOD.**

7.1.7A Upright the cask using the “wood plank” method.

7.1.7.1A Attach the lifting slings (two) to the appropriate crane hook.

7.1.7.2A Transfer the cask in horizontal position from staging pallets to wood staging pallet. Assure cask will not roll by using chocks.

7.1.7.3A Remove the slings and lay back out of the way.

7.1.7.4A Attach the large crane hook to the lifting yoke.

7.1.7.5A Attach the lifting yoke to the cask lifting trunnions.

7.1.7.6A With the yoke on the large crane hook, start uprighting the cask. Periodically, as the cask is being uprighted, the crane will have to trolley in the direction of cask lift for a smooth transition.

7.1.7.7A Rotate the cask upward until the cask is vertical.

7.1.7.8A With the cask in vertical position and stabilized, move the cask to a predesignated staging area.

7.1.7B Upright the cask using the “turning cradle” method.

7.1.7.1B Place the slings on the large crane hook.

7.1.7.2B Attach the 3-55 primary lifting yoke to the slings.

7.1.7.3B Attach the 3-55 primary lift yoke to the lift trunnions with the open side of the hook toward the outboard end of bell section.

**NOTE: THE 3-55 CASK TURNING TRUNNIONS SHOULD NOT SUPPORT THE FULL WEIGHT OF THE LOADED CASK. USE CAUTION WHEN ROTATING CASK THAT THE FULL LOADED WEIGHT OF THE CASK IS NOT BROUGHT TO BEAR ON THE TURNING TRUNNIONS.**

**NOTE: ENSURE CRANE CABLES, CRANE HOOK, AND PRIMARY YOKE AT 0 DEGREES FROM VERTICAL AT THE BEGINNING OF CASK ROTATION. DURING LIFT TROLLEY CRANE AS NECESSARY TO ASSURE A SMOOTH TRANSITION OF CASK TO A VERTICAL**

**POSITION (AT NO TIME ALLOW THE CABLE AND YOKE TO BE MORE THAN 20 DEGREES OFF OF VERTICAL POSITION).**

- 7.1.7.4B With the primary yoke in place, slowly rotate cask to upright position.
- 7.1.7.5B Raise cask slowly to just clear cask turning trunnions above turning cradle bearings (approximately 6") then traverse crane horizontal to clear cradle uprights and cask base plates prior to any further lift on cask.
- 7.1.7.6B With cask clear of turning cradle, move the cask to pre-designated staging area.

7.1.8 Remove the cask drain plug relief valve and prepare to collect contaminated water, if necessary. Remove the cask vent plug at the top of the cask by removing the four (4) ½-inch bolts that hold it in place.

7.1.9 Remove the removable trunnions from the cask and retain them for re-installation.

7.1.10 Prepare to remove the cask base plate.

NOTE: COUNT THE NUMBER OF TURNS IT TAKES TO REMOVE THE (4) TAPERED LEAD-IN BOLTS AND RECORD THIS NUMBER FOR FUTURE REFERENCE.

7.1.10.1 Remove the eight (8) 1½-inch bolts on the cask base plate and the four (4) tapered lead-in bolts from the flange.

7.1.10.2 Visually inspect the bolts for any structural defects such as cracks or unusual signs of distress. Replace bolt if threads or bolt head is damaged.

7.1.10.3 With the lifting yoke attached to the crane and the upper trunnions, raise the cask bell section clear of the base plate and set it aside on wood blocks. While the bell is being removed, check the cask interior for radiation fields (check that shield ring is in place on base closure plate).

NOTE: RADIOACTIVELY CONTAMINATED LIQUIDS MAY BE REMOVED BY USE OF AN ABSORBENT MATERIAL. REMOVAL OF ANY MATERIAL FROM INSIDE THE CASK SHALL BE PERFORMED UNDER THE SUPERVISION OF QUALIFIED HEALTH PHYSICS (HP) PERSONNEL WITH THE NECESSARY HP MONITORING AND RADIOLOGICAL HEALTH SAFETY PRECAUTIONS AND SAFEGUARDS.

7.1.10.4 Inspect the O-Ring seals and the guide pins on base plate, and the o-ring and gasket on vent plug for damage. The seals must be replaced with new seals if inspection shows any defects or at least every six (6) months, as required by Section 8.2.4.

NOTE: WHEN O-RINGS ARE REPLACED, LEAK TESTING IS REQUIRED AS SPECIFIED IN SECTION 8.2.2.1.

7.1.10.5 Place the cask bell section back on the base plate and fasten the bell section to the base plate with four tapered lead-in bolts on the flange. Tighten the bolts firmly but do not torque them down.

7.1.11 Attachment of the Redundant Lifting Device (if required)

- 7.1.11.1 Remove the cask lifting yoke.
- 7.1.11.2 Thread one nut onto each end of each threaded rod, such that the nuts are approximately twelve (12) inches from the ends of the rods.
- 7.1.11.3 Install the threaded rods downward through the holes in the cask bell flange.
- 7.1.11.4 Lift the threaded washer in place under lower flange of cask bell flange, and turn threaded rod into threaded washer until two (2) full threads are exposed
- 7.1.11.5 Turn the nut on the lower end of the threaded rod downward until the threaded washer is in firm contact with lower flange of cask bell flange and nut is in firm contact with upper flange of cask bell flange.
- 7.1.11.6 Rotate the stabilizing band with the small crane or a jib crane so that the cut-out areas are directly above the cask lifting trunnions.
- 7.1.11.7 Place the stabilizing band over the threaded rod ends.
- 7.1.11.8 Position the stabilizing band at the top end of the cask so that the flat part of the band (the top) is at the same level as the top of the cask.
- 7.1.11.9 Place the spreader bar over the threaded rod ends which penetrate the stabilizing band.
- 7.1.11.10 Thread a 1-1/2-inch nut onto the top of each threaded rod.
- 7.1.11.11 If cask-lifting device has been removed, re-attach the cask lifting yoke and redundant slings to the overhead crane.
- 7.1.11.12 Lower the yoke over the cask and raise the yoke until contact is made between the hooks of the yoke, and the cask lifting trunnions. DO NOT lift the cask.

- 7.1.11.13 Connect the redundant slings to the spreader bar and tighten the turnbuckles.
- 7.1.12 Prepare to place the cask into the pool.
  - 7.1.12.1 SLOWLY lower the cask into the pool, allowing time for the cask to fill with water. Allow approximately 30 minutes for the cask to fill.
  - 7.1.12.2 Locate the position of the yoke in two directions 90E apart. Mark these points on the side of the pool for repositioning of the crane.
  - 7.1.12.3 Confirm that the markings for alignment of the cask base plate and the flange on the bell section are visible.
  - 7.1.12.4 Using the remote tool, unbolt the four (4) 1½-inch tapered lead-in bolts from the flange on the cask bell section.
  - 7.1.12.5 Lift the cask bell section out of the pool.
- 7.1.13 Load the liner or basket onto the cask base plate.
- 7.1.14 Prepare to lift the cask out of the pool.
  - 7.1.14.1 Position the cask bell section in the exact location as when it was removed from the pool.
  - 7.1.14.2 Lower the cask bell section into the pool, aligning the base plate with the bell section by using the guide pins and alignment marks.
  - 7.1.14.3 To ensure exact alignment, watch with binoculars as the flange on the bell section makes contact with the base plate. If the bell and base plate are properly aligned, the four tapered lead-in bolts that are dangling from the flange will rise about one inch on contact. After alignment has been confirmed, rest the bell section on the base plate.
  - 7.1.14.4 Secure the base plate to the cask by tightening the four (4) tapered lead-in bolts with the special tool. The bolts are in painted locations.
  - 7.1.14.5 Lift the cask out of the pool so that the drain clears the pool surface and allow water to drain into the pool. This will require that the cask remains suspended over the pool for about 45 minutes.
- 7.1.15 Prepare to decontaminate the cask.
  - 7.1.15.1 While the cask is suspended over the pool, hose it and the lifting device with demineralized water.
  - 7.1.15.2 Move the cask to a letdown area and set it down in the vertical position.

7.1.15.3 Re-inspect vent plug gasket and O-ring, then install the cask vent plug. Torque bolts to 50 ft-lbs. ( $\pm$  5 ft-lbs.). Attach anti-tamper seals to the vent plug bolts.

7.1.15.4 Apply pipe thread sealant to the drain plug relief valve and install and torque to 12 ft-lbs. ( $\pm$  1 ft-LB).

7.1.15.5 Scrub the cask with soapy water to decontaminate.

7.1.16 Removal of the Redundant Lifting Device

7.1.16.1 Confirm that the cask is resting securely on the floor.

7.1.16.2 Remove the redundant slings.

7.1.16.3 Remove the cask yoke from the lifting trunnions.

7.1.16.4 Remove the cask yoke from the overhead crane, if necessary

7.1.16.5 Remove upper nuts from threaded rods and remove spreader bar.

7.1.16.6 Lift stabilizing band straight up off the cask.

7.1.16.7 Loosen nut above cask bell flange, unscrew threaded rods from threaded washers and remove.

7.1.17 Replace the eight (8) 1½-inch base plate bolts. Torque all 12 base plate bolts to a lubricated value of 75 ft-lbs. ( $\pm$  7 ft-lbs.).

7.1.17.1 Prior to delivery of the package to a carrier for transport, the package containment cavity shall be leak tested. The sensitivity of the test shall be at least  $1 \times 10^{-1}$  ATM cm<sup>3</sup>/sec (STP) per Section 8.2.2.1.

7.1.18 Re-Install the removable trunnions.

**NOTE: THE “WOOD PLANK” METHOD AND “TURNING CRADLE” METHOD ARE BOTH ACCEPTABLE METHODS FOR UP ENDING AND DOWN ENDING THE CASK. THE STEPS FOR THE “WOOD PLANK” METHOD ARE DESIGNATED WITH THE LETTER “A”, WHILE “B” DESIGNATES THE “TURNING CRADLE” METHOD.**

7.1.19A Prepare to return the cask to a horizontal position using the “wood plank” method.

7.1.19.1A Attach primary lift yoke to large crane hook.

7.1.19.2A Attach primary yoke to lift trunnions on the cask.

7.1.19.3A Position cribbing appropriately.

**NOTE: POSITION THE CASK ON THE WOODEN CRIBBING SO THE DRAIN LINE WILL BE ON THE TOP SIDE OF THE CASK AFTER THE CASK IS LAID IN THE HORIZONTAL POSITION ON THE CRIBBING.**

7.1.19.4A SLOWLY lower the upper end of the cask onto the cribbing with the yoke until the cask is horizontal. The crane will have to trolley with the cask direction for smooth transition.

7.1.19.5A Lower the entire cask in a horizontal position onto wood blocks and chock it to prevent it from rolling.

7.1.19.6A Re-install the removable trunnions.

7.1.19.7A Place the slings two (2) under the cask and attach to the large crane hook.

7.1.19.8A Lift cask in horizontal position and place on wood cribbing.

7.1.19.9A Unhook the slings from the crane and lay back out of the way.

7.1.19B Prepare to return the cask to a horizontal position using the "turning cradle" method.

7.1.19.1B Reinstall removable trunnion and attach primary lift yoke to crane hook (if removed), then attach lift yoke to cask lift trunnions.

7.1.19.2B Move cask to turning cradle staging area.

7.1.19.3B Slowly lower cask to desired height to assure cask base plate will traverse between upright sections of turning cradle and cask turning trunnions are of sufficient height to clear turning table trunnion bearings.

7.1.19.4B Slowly move cask in a horizontal traverse direction to achieve alignment between cask turning trunnions and cask turning cradle bearings until a firm contact is made between cradle bearing and turning trunnion.

**NOTE: THE 3-55 CASK TURNING TRUNNIONS SHOULD NOT SUPPORT THE FULL WEIGHT OF THE LOADED CASK. USE CAUTION WHEN ROTATING CASK THAT THE FULL LOADED WEIGHT OF THE CASK IS NOT BROUGHT TO BEAR ON THE TURNING TRUNNIONS.**

7.1.19.5B Begin cask rotation to horizontal position. To assure a smooth transition in this operation, trolley crane in direction of rotation while lowering cask. Continue this operation to completion of cask rotation to horizontal position.

7.1.19.6B Remove the primary yoke from lift trunnion and remove yoke from large crane hook.

7.1.20 Prepare to replace the impact limiters on the bell section end of the cask.

7.1.20.1 Attach a lifting sling to the eyebolts on the impact limiters.

7.1.20.2 Attach the crane hook to the lifting sling.

7.1.20.3 Position the impact limiter near the end of the cask.

7.1.20.4 Align the six (6) tabs on the impact limiter with the six (6) bolt holes on the sides of the cask.

7.1.20.5 Attach the six (6) ¾-inch bolts that secure the impact limiter to the cask.

7.1.21 Prepare to replace the impact limiter on the base plate end of the cask.

7.1.21.1 Attach a lifting sling to the eyebolts on the impact limiter.

7.1.21.2 Attach the crane hook to the lifting sling.

7.1.21.3 Position the impact limiter near the end of the cask.

7.1.21.4 Place the six (6) 1-inch by 16-inch bolts through the sequentially numbered blocks, bolts facing the reverse direction, and attach the impact limiter loosely to the cask. Retain a spare bolt for next step in the procedure.

7.1.21.5 When the six (6) bolts and blocks are aligned, slide the impact limiter CAREFULLY into place, reverse the bolts one by one using the spare bolt, and place nuts on the bolts.

7.1.21.6 Tighten the nuts and attach wire seals to the impact limiter.

7.1.22 Prepare to replace the cask on the trailer.

7.1.22.1 Remove the cask lifting yoke from the cask lifting trunnions and the crane hook.

7.1.22.2 Attach the two (2) slings around the cask and attach them to the crane hook.

**NOTE: ONE SLING MUST BE POSITIONED AHEAD (TOWARD THE CASK BELL END) OF THE LIFTING TRUNNIONS, AND THE OTHER SLING MUST BE POSITIONED BEHIND (TOWARD THE CASK CLOSURE END) OF THE REMOVABLE TRUNNIONS.**

7.1.22.3 Raise the cask high enough to get the trailer under it.

- 7.1.22.4 Place the cask in the cradle.
- 7.1.22.5 Remove the slings and place them in the equipment box.
- 7.1.22.6 Remove the removable trunnions and place them in the equipment box.
- 7.1.23 Prepare to replace the hold-down straps.
  - 7.1.23.1 Attach the lifting sling to the lifting lug on the hold-down strap.
  - 7.1.23.2 Attach the crane hook to the lifting sling.
  - 7.1.23.3 Position the match-marked strap on the cradle using the alignment marks.
  - 7.1.23.4 Attach the eight (8) 1¼-inch by 5-inch bolts that secure the strap to the cradle.
  - 7.1.23.5 Detach the lifting sling from the hold-down strap.
  - 7.1.23.6 Repeat Steps 7.1.24.1-7.1.24.5 to replace the other hold-down strap.
- 7.1.24 Replace the lifting trunnion impact absorbers with four (4) bolts each.
- 7.1.25 Replace the sunshade/personnel barrier, if used, by attaching the twelve (12) bolts that secure the frame to the trailer.
- 7.1.26 Before the cask leaves the facility, the following shall be confirmed:
  - 7.1.26.1 That external lifting trunnions are properly covered or removed for transport.
  - 7.1.26.2 That trailer placarding and cask labeling meet DOT Specifications 49 CFR 172.500 and NRC Specification 10 CFR 71.85(c).
  - 7.1.26.3 The exterior radiation and contamination levels should meet the specification set forth in D.O.T. 49 CFR 173.441 and NRC 10 CFR 71.47 and 71.87. When depleted neutron sources are contained in the cask, perform measurement for neutrons.
  - 7.1.26.4 That the impact limiters are sealed with anti-tamper seals.
  - 7.1.26.5 That the drain plug relief valve has been installed using a pipe thread sealant and sealed with an anti-tamper seal.
  - 7.1.26.6 That the vent plug assembly is sealed with anti-tamper seals.

## 7.2 Procedure for Unloading the Package

In addition to the following sequence of events for unloading a package, packages containing quantities of radioactive material in excess of Type "A" quantities specified in 10 CFR 20.205 (b) shall be received, monitored and handled by the licensee receiving the package in accordance with the requirements of 10 CFR 20.205 as applicable.

NOTE: Keep crane cables vertical at all times to prevent lateral movement of the cask. The cask shall be replaced on the trailer in the exact orientation as it was received.

7.2.1 Remove the sunshade/personnel barrier, if used, from the cask by removing the twelve (12) bolts that attach the frame to the trailer and lift it off using the appropriate crane.

7.2.2 Prepare to remove hold-down straps.

NOTE: THE HOLD-DOWN STRAPS MUST BE MATCH-MARKED TO THE CRADLE BEFORE REMOVAL.

7.2.2.1 Remove the seal wires and the sixteen (16) 1-1/4-inch by 5-inch bolts that secure the two straps to the cradle. Retain the bolts for re-installation.

7.2.2.2 Match-mark the hold-down straps as to left and right.

7.2.2.3 Attach a lifting sling to the lifting lug on one of the hold-down straps.

7.2.2.4 Attach the crane hook to the sling, if necessary.

7.2.2.5 Remove the hold-down strap and detach the lifting sling.

7.2.2.6 Repeat Steps 7.2.2.3 – 7.2.2.5 to remove the other hold-down strap.

7.2.3 Attach the 4-inch removable trunnions to the cask, if necessary. Hand tighten the bolts.

7.2.4 Remove the impact absorbers from the cask lifting trunnions by removing the four (4) bolts from each impact absorber. Retain these bolts for re-installation.

7.2.5 Prepare to lift the cask in a horizontal position.

7.2.5.1 Place the two (2) slings around the cask and attach them to the crane hook.

NOTE: ONE SLING MUST BE POSITIONED AHEAD (TOWARD THE CASK BELL END) OF THE LIFTING TRUNNIONS, AND THE OTHER SLING MUST BE POSITIONED BEHIND (TOWARD THE CASK CLOSURE END) OF THE REMOVABLE TRUNNIONS. USE THE SLINGS PROVIDED.

7.2.5.2 Lifting the cask in a horizontal position, lower it onto wood blocks, and chock it so that it will not roll.

7.2.6 Prepare to remove the impact limiters from the ends of the cask.

- 7.2.6.1 Remove the six (6) 3/4-inch bolts that secure the impact limiters to the bell section end of the cask.
- 7.2.6.2 Attach a lifting sling to the eyebolts on the impact limiter.
- 7.2.6.3 Attach the lifting sling to the crane hook.
- 7.2.6.4 Slide off the impact limiter and detach the lifting sling.
- 7.2.6.5 Remove the six (6) nuts from the six (6) installation bolts on the base plate end of the cask. Slide the bolts out and retain them for installation.
- 7.2.6.6 Attach a lifting sling to the eyebolts on the impact limiter.
- 7.2.6.7 CAREFULLY remove the impact limiter by sliding it off.
- 7.2.6.8 Remove the (6) reinforcing blocks and retain them for re-installation.
- 7.2.7 Prepare to remove the cask base plate.
  - 7.2.7.1 Attach two (2) shackles to two (2) holes in the base plate where the shackles fit in.
  - 7.2.7.2 Attach the lifting sling to the shackles.
  - 7.2.7.3 Attach the lifting sling to the small crane.
  - 7.2.7.4 Remove the eight (8) 1-1/2-inch bolts and the four (4) tapered lead-in bolts from the cask. Retain them for re-installation.
  - 7.2.7.5 Reposition the cask so that the open end of the cask is over the disposal area of the trench.
  - 7.2.7.6 Attach a cable around the lifting trunnions and to a piece of heavy equipment to prevent movement of the cask.
  - 7.2.7.7 Remove the cask base plate and place it on or wrap it with absorbent material or plastic sheeting.
- 7.2.8 Prepare to remove the contents of the cask.
  - 7.2.8.1 Attach a hook-cable assembly to the basket or liner.
  - 7.2.8.2 Lead the throw-away cable assembly from the cask to a load-pulling winch or crane.
  - 7.2.8.3 SLOWLY operate the puller so that the attached cable will pull the liner out of the cask. Continuous movement until the liner clears the cask and is in burial position in the trench.

- 7.2.9 Reposition the cask onto the wood blocks.
- 7.2.10 Survey the interior of the cask for radiation/contamination levels. Decontaminate if acceptable levels are exceeded.

CAUTION: TREAT ANY LIQUID IN THE CASK OR USED IN THE DECONTAMINATION PROCESS AS DECONTAMINATED.

- 7.2.11 Visually inspect the inside of the cask for damage, liquid accumulation, or plugged drains. Remove the liquid and clean any plugged drains or fittings. If the inside surfaces of the cask are damaged, remove the cask from service.
- 7.2.12 As required, clean the inside of the cask base plate, shield ring, the O-rings, and the seating surfaces. Replace any O-rings if inspection shows any defects or replace in accordance with Section 8.2.4. If O-ring replacement is required, cask must be subjected to leak testing as specified in Section 8.2.2.1.
- 7.2.13 Prepare to replace the base plate on the cask.
  - 7.2.13.1 Lift the base plate into position using the small crane.
  - 7.2.13.2 Replace the eight (8) 1-1/2-inch bolts and the four (4) tapered lead-in bolts to the base plate. Torque the eight (8) 1-1/2-inch bolts to a lubricated value of 75 ft.-lbs. ( $\pm$  7 ft.-lbs.).
- 7.2.14 Decontaminate the cask surfaces. Survey to confirm that the cask is free of contamination. (As per Step 7.1.26.3.4)
  - 7.2.14.1 If the external surface of the cask is painted, visually inspect the painted surfaces for wear, deep scratches, chipping, etc. Repair as necessary, using CNSI Engineering repair procedures. Based on the condition of the coating, the entire surface may be covered with a single coating of epoxy and/or polyurethane paint.
- 7.2.15 Prepare to replace the impact limiter on the base plate end of the cask.
  - 7.2.15.1 Attach a lifting sling to the eyebolts on the impact limiter.
  - 7.2.15.2 Attach the crane hook to the lifting sling.
  - 7.2.15.3 Position the impact limiter near the end of the cask.
  - 7.2.15.4 Place the six (6) 1-inch by 16-inch bolts through the sequentially numbered blocks, bolts facing in the reverse direction, and attach the impact limiter loosely to the cask. Retain a spare bolt for next step in the procedure.
  - 7.2.15.5 When the six (6) bolts and blocks are aligned, slide the impact limiter CAREFULLY into place, reverse the bolts one by one using the spare bolt, and place nuts on the bolts.

7.2.15.6 Tighten the nuts and attach wire seals to the impact limiter.

7.2.16 Prepare to replace the cask on the trailer.

7.2.16.1 Attach the two (2) slings around the cask and attach them to the crane hook, if necessary.

NOTE: ONE SLING MUST BE POSITIONED FORWARD OF THE LIFTING TRUNNIONS, AND THE OTHER SLING MUST BE POSITIONED AFT OF THE REMOVABLE TRUNNIONS.

7.2.16.2 Raise the cask high enough to get the trailer under it.

7.2.16.3 Place the cask in the cradle.

7.2.16.4 Remove the slings and store them inside the impact limiter on the cask.

7.2.16.5 Remove the removable trunnions and replace them in the equipment box.

7.2.17 Prepare to replace the hold-down straps.

7.2.17.1 Attach a lifting sling to the lifting lug on one hold-down strap.

7.2.17.2 Attach the crane hook to the lifting sling.

7.2.17.3 Position the match-marked strap on the cradle using the alignment marks.

7.2.17.4 Attach the eight (8) 1-1/2-inch by 5-inch bolts that secure the straps to the cradle.

7.2.17.5 Detach the lifting sling from the hold-down straps.

7.2.17.6 Replace the other hold-down strap following the same procedure.

7.2.18 Replace the trunnion impact absorbers with four (4) bolts each.

7.2.19 Replace the sunshade/personnel barrier, if used, by attaching the twelve (12) bolts that secure the frame to the trailer.

7.2.20 Before the cask leaves the facility, perform Step 7.3.

### 7.3 Preparation of an Empty Package for Transport

7.3.1 Verify from previous unloading and Inspection Procedures check-off forms that package interior was decontaminated, clean and free of liquids; that cask interior surfaces were free of damage, shield ring properly in place, and seals and seal surfaces were checked and found acceptable. The requirements of 49 CFR 173.427 with respect to shipment of empty packages will be complied with.

- 7.3.2 Visual inspection of all external surfaces of cask, impact limiters, skid assembly and trailer shall be performed and any defects shall be repaired.
- 7.3.3 Before the cask leaves the facility, the following shall be confirmed:
  - 7.3.3.1 That external lifting trunnions are properly covered or removed for transport.
  - 7.3.3.2 That trailer placarding and cask labeling meet DOT Specifications 49 CFR 172.500 and NRC Specifications 10 CFR 71.85.
  - 7.3.3.3 That exterior radiation levels are per References 1 and 2 in Section 1.3 of this Safety Analysis Report.
  - 7.3.3.4 That the impact limiters are sealed with anti-tamper seals.
  - 7.3.3.5 That the drain plug relief valve is securely installed and sealed with a pipe thread sealant.
  - 7.3.3.6 That the vent plug assembly is securely installed and sealed with an anti-tamper seal.

**ATTACHMENT 2**

**Safety Analysis Report Title Page – Revision 1**

# SAFETY ANALYSIS REPORT

For

MODEL CNS 3-55 TYPE B SHIPPING PACKAGING

REVISION 1

DECEMBER, 2000

Submitted by:

Chem-Nuclear Systems, LLC  
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**ATTACHMENT 3**

**Safety Analysis Report Table of Contents –  
Revision 1**

# Safety Analysis Report For the CNS 3-55 Shipping Cask

## Table of Contents

		<u>Page</u>
1.0	General Information .....	1-1
1.1	Introduction .....	1-1
1.2	Package Description .....	1-1
	1.2.1 Packaging .....	1-1
	1.2.2 Operational Features .....	1-6
	1.2.3 Contents of Packaging .....	1-6
1.3	Appendix .....	1-7
	1.3.1 References .....	1-7
	1.3.2 Detailed Package Description .....	1-8
2.0	Structural Evaluation .....	2-1
2.1	Structural Design .....	2-1
	2.1.1 Discussion .....	2-1
	2.1.2 Design Criteria .....	2-1
2.2	Weights and Centers of Gravity .....	2-3
2.3	Mechanical Properties of Materials .....	2-3
2.4	General Standards for all Packages .....	2-5
	2.4.1 Chemical and Galvanic Reactions .....	2-5
	2.4.2 Positive Closure .....	2-5
	2.4.3 Lifting Devices .....	2-6
	2.4.4 Tiedown Devices .....	2-8
2.5	Standards for Type B and Large Quantity Packaging .....	2-9
	2.5.1 Load Resistance .....	2-9
	2.5.2 External Pressure .....	2-10
2.6	Normal Conditions of Transport .....	2-12
	2.6.1 Heat .....	2-12
	2.6.2 Cold .....	2-14
	2.6.3 Pressure .....	2-18
	2.6.4 Vibration .....	2-18
	2.6.5 Water Spray .....	2-18
	2.6.6 Free Drop .....	2-18
	2.6.7 Corner Drop .....	2-31
	2.6.8 Penetration .....	2-31
	2.6.9 Compression .....	2-31

## Table of Contents

2.7	Hypothetical Accident Conditions .....	2-32
2.7.1	Free Drop.....	2-32
2.7.2	Puncture.....	2-72
2.7.3	Thermal .....	2-77
2.7.4	Water Immersion.....	2-79
2.7.5	Summary .....	2-79
2.8	Special Form .....	2-80
2.9	Fuel Rods.....	2-80
2.10	Appendix .....	2-81
2.10.1	Test Report – Scale Model Testing of Short Pipe Sections For Energy Absorption of Impact Loads.....	2-82
2.10.2	Test Data – Scale Model Testing of Cask End Plates for Deflection and Energy Absorption.....	2-107
3.0	Thermal Evaluation .....	3-1
3.1	Discussion .....	3-1
3.2	Summary of Thermal Properties of Materials .....	3-7
3.3	Technical Specifications of Components .....	3-7
3.4	Thermal Evaluation for Normal Conditions of Transport.....	3-8
3.4.1	Thermal Model.....	3-8
3.4.2	Maximum Temperature .....	3-9
3.4.3	Minimum Temperature .....	3-9
3.4.4	Maximum Internal Pressures.....	3-10
3.5	Hypothetical Accident Thermal Evaluation .....	3-11
3.5.1	Thermal Model.....	3-13
3.5.2	Package Conditions and Environment .....	3-17
3.5.3	Package Temperatures.....	3-18
3.5.4	Maximum Internal Pressures.....	3-18
3.5.5	Maximum Thermal Stresses.....	3-21
3.5.6	Evaluation of Package Performance for the Hypothetical Accident Thermal Conditions .....	3-21
3.6	Appendix .....	3-24
4.0	Containment .....	4-1
4.1	Containment Boundary.....	4-1
4.1.1	Containment Vessel.....	4-1
4.1.2	Containment Penetrations .....	4-2
4.1.3	Welds and Seals .....	4-2
4.1.4	Closure .....	4-3

## Table of Contents

4.2	Requirements for Normal Conditions of Transport.....	4-3
4.2.1	Release of Radioactive Material.....	4-3
4.2.2	Pressurization of Containment Vessel.....	4-4
4.2.3	Coolant Contamination .....	4-4
4.2.4	Coolant Loss.....	4-4
4.3	Containment Requirements for the Hypothetical Accident Conditions .....	4-4
4.3.1	Fission Gas Products .....	4-5
4.3.2	Releases of Contents .....	4-5
5.0	Shielding Evaluation .....	5-1
5.1	Discussion and Results .....	5-1
5.2	Source Specification.....	5-4
5.2.1	Gamma Source .....	5-4
5.2.2	Neutron Source.....	5-4
5.3	Model Specification .....	5-5
5.3.1	Description of Radial and Axial Shielding Configuration .....	5-5
5.3.2	Description of Lead Slump Configuration .....	5-5
5.3.3	Shield Regional Densities .....	5-9
5.4	Shielding Evaluation .....	5-9
5.5	Appendix .....	5-20
5.6	Appendix .....	5-25
6.0	Criticality Evaluation .....	6-1
7.0	Operating Procedures .....	7-1
7.1	Procedures for Loading the Package.....	7-1
7.2	Procedure for unloading the Package.....	7-10
7.3	Preparation of an Empty Package for Transport .....	7-14
8.0	Acceptance Tests and Maintenance Program.....	8-1
8.1	Acceptance Tests.....	8-1
8.2	Maintenance Program.....	8-3
8.3	Appendix .....	8-5
9.0	Drawings .....	9-1