DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
B&W SPENT FUEL RECEIPT, STORAGE AND SHIPPING
WITH NAC-1 CASK

1.0 PURPOSE

The purpose of this procedure is to define the proper control of B&W Spent Fuel during receiving, storing, and shipping operations.

2.0 Limits and Precautions

3.0 Installation and Removal of Fuel Pool Rack Spacers

4.0 Receipt and Unloading of Spent Fuel with NAC-1 Cask

5.0 Storage of Spent Fuel

6.0 Shipping of Empty NAC-1 Cask

7.0 Shipping of B&W Spent Fuel with NAC-1 Cask

8.0 Enclosures

2.0 LIMITS AND PRECAUTIONS

2.1 Extreme care must be taken when loading or unloading the cask to prevent damage to the trailer or denting of the cask.

2.2 Place wheel chocks on the transporter when loading and unloading.

2.3 Insure that the cask is vented prior to unbolting the closure head.

2.4 Exercise care when installing the closure head to prevent damaging the O-ring sealing surface.

2.5 Do not submerge the cask in water which has a temperature of 100°F less than that of the cask surface to prevent thermally shocking the cask structure.

2.6 The cask surface may not be cleaned with steel wool or any other abrasive material.

2.7 The cask should be thoroughly rinsed as it emerges from the pool and should be kept wet until decontamination begins to prevent airborne contamination.

2.8 Radiation levels in the Spent Fuel Building will be monitored by appropriate area monitoring equipment and/or by portable instruments.

2.9 Open and red tag the decontamination pump breakers before personnel enter the decon pit.

2.10 Rack Spacers and the Rack Spacer Basket will be monitored by appropriate portable instruments when removed from the pool.

2.11 Spent Fuel Pool Ventilation System (VF) must be in operation and discharging through the HEPA filters and charcoal adsorbers while handling irradiated fuel or loads over a pool containing irradiated fuel per Tech. Spec. 3.9.12.

2.12 Requirements of the Radiation Work Permit (RWP) or Standing Radiation Work Permit (SRWP) shall be adhered to.

2.13 Minimum of 23 feet of water required over irradiated fuel in racks per Tech. Spec. 3.9.11.

2.14 Loads greater than 3000 lbs. prohibited from travel over fuel assemblies in pool per Tech. Spec. 3.9.7.

3.0 INSTALLATION AND REMOVAL OF FUEL POOL RACK SPACERS

3.1 Initial Conditions

3.1.1 Enclosure 8.4 has been initiated by Reactor Engineer.

3.1.2 The Spent Fuel Pool Manipulator Crane is in operation per OP/O/A/6550/04 (Fuel and Component Handling).

3.1.3 The New Fuel Elevator is in the full up position.

3.2 Procedure (Installation of Fuel Pool Rack Spacers)

3.2.1 Hand-carry and place the Rack Spacer Basket into the New Fuel Elevator envelope.

3.2.2 Hand-carry and place the spacer into the Rack Spacer Basket.

3.2.3 Lower the New Fuel Elevator to its full down position.

3.2.4 Position the Spent Fuel Pool Manipulator Crane Monorail Hoist over the Spacer Handling Tool storage location.

3.2.5 Place the Monorail Hoist hook in the Spacer Handling Tool lifting bail and lift clear of the storage hangers.

3.2.6 Position the Spacer Handling Tool over the New Fuel Elevator containing the spacer.

3.2.7 Lower the Spacer Handling Tool into the Rack Spacer Basket matching the square bottom of the tool into the square opening of the spacer until the tool is resting on the spacer.

3.2.8 Turn the Spacer Handling Tool clockwise, by hand, until the tool pick-up plate is stopped by the pick-up plate stops on the spacer. The tool is now engaged in the spacer.

3.2.9 Raise the Spacer Handling Tool and guide by hand until the hoist stops.

3.2.10 Position the Monorail Hoist over the fuel pool rack designated to store the B&W fuel assembly.

3.2.11 Lower the Spacer Handling Tool with the spacer into the fuel pool rack until the spacer is resting in the bottom of the rack.

3.2.12 Turn the Spacer Handling Tool counter-clockwise until the tool is disengaged from the spacer.

3.2.13 Raise the Spacer Handling Tool out of the rack until the hoist stops.

3.2.14 Raise the New Fuel Elevator to the full up position.

NOTE: If more spacers are to be placed in the fuel pool racks at this time, repeat steps 3.2.2, 3.2.3, and 3.2.6 thru 3.2.14.

3.2.15 Position the Spacer Handling Tool over its storage location and lower until the tool is resting on its storage hangers.

3.2.16 Release the Monorail Hoist hook from the Spacer Handling Tool lifting bail and raise the hook to its full up position.

3.2.17 Return the Spent Fuel Pool Manipulator Crane to a resting position in the pool.

3.2.18 Notify Health Physics of removal of rack spacer basket from pool.

3.2.19 Use appropriate portable instrument to monitor the Rack Spacer Basket during removal from the New Fuel Elevator and storage.

3.2.20 Hose off Rack Spacer Basket with demineralized water. Wipe dry, place in clean poly bag and return to storage.

3.3 Procedure (Removal of Fuel Pool Rack Spacers)

3.3.1 Hand-carry and place the Rack Spacer Basket into the New Fuel Elevator envelope.

3.3.2 Lower the New Fuel Elevator to the full down position.

3.3.3 Position the Spent Fuel Pool Manipulator Crane Monorail Hoist over the Spacer Handling Tool storage location.

3.3.4 Place the Monorail Hoist hook in the Spacer Handling Tool lifting bail and lift clear of the storage hangers.

3.3.5 Position the Spacer Handling Tool over the fuel pool rack which is to have the spacer removed.

3.3.6 Lower the tool into the spacer matching the square bottom of the tool into the square opening in the spacer until the tool is resting on the spacer.

3.3.7 Turn the Spacer Handling Tool clockwise, by hand, until the tool pick-up plate is stopped by the pick-up plate stops on the spacer. The tool is now engaged in the spacer.

3.3.8 Raise the Spacer Handling Tool and guide by hand until the hoist stops.

3.3.9 Position the Spacer Handling Tool with spacer over the Rack Spacer Basket in the New Fuel Elevator.

3.3.10 Lower the Spacer Handling Tool into the Rack Spacer Basket until the spacer is resting in the bottom of the basket.

3.3.11 Turn the Spacer Handling Tool counter-clockwise until the tool is disengaged from the spacer.

3.3.12 Notify Health Physics of removal of Rack Spacer Tool and Basket from pool.

3.3.13 Raise the Spacer Handling Tool out of the Rack Spacer Basket until the hoist stops.

3.3.14 Position the Spacer Handling Tool over its storage location and lower until the tool is resting on its storage hangers and remove the Monorail Hoist hook.

3.3.15 Raise the New Fuel Elevator to the full up position.

3.3.16 Use portable instruments to monitor the spacer before removing the spacer from the New Fuel Elevator. Hose off spacer with demin. water and wipe dry. If further decontamination is necessary, remove to the decon area and continue decon. Place the spacer in clean poly bag and return to storage.

3.3.17 Repeat steps 3.3.1 to 3.3.15 for additional rack removal.

3.3.18 Hose off Rack Spacer Basket, wipe dry, place in clean poly bag and store.

4.0 RECEIPT AND UNLOADING OF SPENT FUEL WITH NAC-1 CASK

4.1 Initial Conditions

4.1.1 The Reactor Engineer has received notification of the shipment and has authorized receipt.

4.1.2 The Station Health Physicist, or his representative, has received notification of the shipment.

4.1.3 Periodic test of the Overhead Fuel Handling Bridge Crane and Auxiliary Hoist has been performed within the past six months as per MP/0/B/7650/05 (Crane and Hoist Safety Inspection).

4.1.4 Fuel Pool Cooling loops operable as per OP/1/A/6200/05 or OP/2/A/6200/05 (Fuel Pool Cooling System).

4.1.5 Spent Fuel Pool Ventilation (VF) operable or in operation per technical specifications 3.9.11 prior to cask handling.

4.1.6 The following forms should be obtained from the driver:

A. Three (3) NRC/ERDA 741
B. One (1) Shipping Note (if required)
C. One (1) Bill of Lading

4.1.7 Locate and have ready the following tools and equipment:

A. Calibrated torque wrench/multiplier and adapter 1" drive. Calibrated at 600 & 1000 ft/lbs.
B. Wire cutter
C. Hand-held pyrometer
D. Wrench for 1" diameter hex nuts
E. Two wrenches for 5/8" diameter trunnion tie-down (hex).
F. Container calibrated at 22 gal. and 24 gal. with drain valve.
G. Wheel chocks for trailer
H. One cask long lift adapter
I. One cask short lift adapter
J. One lifting yoke (furnished)
K. One cask bottom shield (polyethylene)
L. NAC-1 Valve opening tool (furnished)
M. NAC-1 Spent Fuel Shipping Cask pressure checker and drain line (furnished).
N. NAC-1 Lid Spider and four 1" X 1 1/2" long bolts (furnished)
O. Tamper seals

P. Torque wrench calibrated at 50 ft./lbs.
Q. 3/8" stainless steel closure head lifting cable, 40' long
R. Spare O-rings for cask closure head
S. Cask Port Cover Spanner Wrench

Complete Enclosure 8.5.

4.1.8 YM water supplies available.

4.1.9 Short and long lift adapter annual inspection has been completed within one year per MP/0/A/7650/44 (Spent Fuel Cask Lifting Equipment Inspection). Date Inspected _____

4.1.10 Visually inspect the short and long lift adapters for damages or deformation.

4.2 Procedure

4.2.1 Health Physics shall survey the transport trailer and cask upon arrival at the site.

4.2.2 Request Health Physics complete Part 1 of Enclosure 8.1 (Spent Fuel Receiving Record-Container Report).

4.2.3 Inspect the trailer for any physical damage. Complete Part 2 of Enclosure 8.1 (Spent Fuel Receiving Record Container Report).

4.2.4 If Health Physics survey of the transport trailer and cask indicates readings of <2000 dpm/100cm^2, wash down transport trailer and cask in the wash down area outside the roll-down door at the receiving area if necessary. If >2000 dpm/cm^2, the cask may be placed in the cask decon pit for removal of road dirt.

4.2.5 Open the roll-down door and place transport trailer and cask in receiving area. Set the trailer brakes and install chocks on the trailer wheels.

4.2.6 Verify that the Cask Short Lift Adaptor has been installed on the Overhead Fuel Handling Bridge Crane hook and that the decon pit cover has been removed.

4.2.7 Unlock and open the trailer access doors if applicable.

4.2.8 If applicable, unlatch the fore and aft roof snap hooks on the trailer. Swing open the roof panel using one-inch square bar handles inserted into the receptacles at the ends of the roof. Swing the roof panel open until the handles rest against the trailer frame or receiving area wall.

4.2.9 Release the two front cask tie-downs (5/8" hex nuts) or trunnion flanges.

4.2.10 Release the two rear cask tie-downs (5/8" hex nuts) or trunnion flanges.

4.2.11 Unbolt the lid impact limiter from the cask (four one-inch socket bolts).

4.2.12 Roll the impact limiter forward on the sling carriage built into the trailer.

4.2.13 Attach the lifting yoke to the Cask Short Lift Adaptor hook and position over the NAC-1 Cask.

4.2.14 Attach the lifting yoke to the upper trunnions on the cask. (Place hinged ear on first, walk yoke over to place fixed ear).

4.2.15 Lock the moveable lift arm in place using the attached Ball-Loc pin. The lay-down rests of the yoke will be toward the front of the transport trailer.

4.2.16 Raise the cask to the vertical position on the transport trailer while moving the crane forward as necessary to keep the hoist cables vertical. Insure that the cask is vertical and 125 ton crane block is centered over the cask. Slowly raise the cask about an inch. If the cask is vertical it will pendulum in the lower trunnion supports. Realign crane block to center as needed. Carefully raise cask clear of trailer. Continue raising cask, now at full speed, until bottom is clear to traverse to decon area.

4.2.17 Remove the handrails from around the decon pit if necessary.

4.2.18 Raise the cask and position adjacent to the decon pit and place the cask bottom shield on the cask.

4.2.19 Check the external cask temperature at the cask midpoint using a hand-held pyrometer. Record the reading on part 3 of Enclosure 8.1 (Spent Fuel Receiving Record-Container Report).

4.2.20 Place the cask in the decon pit and wipe off road dirt as necessary. If necessary to remove road dirt, the decon pump may be used per OP/0/B/6500/06 (Equipment Decontamination System) or demin. water may be used.

4.2.21 Remove the five (5) port covers with the special spanner wrench after removing the port cover tamper seals. Remove the lock wire from the closure head bolts.

4.2.22 Inspect the cask externals for damage to the neutron shield, valves, rupture disc, etc. and record on part 3 of Enclosure 8.1 (Spent Fuel Receiving Record-Container Report).

4.2.23 Verify the cask vent valve is closed. Attach the pressure check assembly to the vent valve and pressurize the gauge with air through the check assembly valve. Check the assembly for leaks at 50 psig; remove the air and vent the gauge to atmosphere. Close the valve on the check assembly.

4.2.24 Open the cask vent and read the cask pressure. Complete part 3 of Enclosure 8.1 (Spent Fuel Receiving Record-Container Report). If the pressure exceeds 50 psig and/or if the cask surface exceeds 170°F, cool the cask exterior using demineralized water until the cask pressure is less than 50 psig and/or cask temp is within 100°F difference of Fuel Pool temp., prior to proceeding to step 4.2.25.

4.2.25 Attach a hose from the cask-mounted check assembly to the spent fuel area ventilation system. Open the check assembly valve and vent the cask into the Spent Fuel Pool Ventilation system. Remove the vent line after the vent is complete and leave the vent valve open.

CAUTION: Airborne contaminants may be released during this operation.

4.2.26 Remove the pressure check assembly and store.

4.2.27 Remove the closure head holddown bolts (six 1 ½" hexhead bolts) and attach the closure head lifting spider using four 1" bolts.

CAUTION: Do Not raise the Closure Lid.

4.2.28 Attach stainless steel cable to closure head spider.

CAUTION: Stainless steel cable free end must be kept slack and above water level at all times except actual closure head removal or replacement.

5.0 STORAGE OF SPENT FUEL

5.1 Initial Conditions

5.1.1 Section 4.0 of this procedure is complete.

5.1.2 Periodic test of the Fuel Handling Cask Crane and Auxiliary Hoist has been performed within the past six months as per MP/0/B/7650/05 (Crane and Hoist Safety Inspection).
Date Tested _____

5.1.3 Fuel Pool Cooling loops operable per OP/1/A/6200/05 or OP/2/A/6200/05 (Fuel Pool Cooling System).

5.1.4 Spent Fuel Pool Manipulator Crane is in operation per OP/0/A/6550/04 (Fuel and Component Handling).

5.2 Procedure

5.2.1 Using the Overhead Fuel Handling Bridge Crane and Cask Short Lift Adaptor, lift the cask out of the decon pit and inspect the cask bottom shield for a secure fit. Place the cask on the cask area platform and remove the Cask Short Lift Adaptor.

5.2.2 Remove the Cask Short Lift Adaptor from the Overhead Fuel Handling Bridge Crane Hoist hook and place in its storage stand.

5.2.3 Take the Cask Long Lift Adaptor out of its storage location and place on the Overhead Fuel Handling Bridge Crane hook. Position the Long Lift Adaptor over the cask.

5.2.4 Lower the Cask Long Lift Adaptor onto the cask lifting yoke and engage. Raise the cask from the cask area platform and position the cask over the cask area lower level.

5.2.5 Lower the cask to the cask area lower level aligning the trunnions pointing North and South, and the lifting yoke pointing East with its feet on the top of the cask.

5.2.6 Disengage the Cask Long Lift Adaptor from the lifting yoke being sure to leave the lifting yoke in its resting position on the cask.

5.2.7 Remove the Cask Long Lift Adaptor from the cask area being sure to wash the adaptor with demineralized water as it emerges from the water. Move the adaptor to its storage location.

5.2.8 Inform Health Physics of the pending removal of the cask closure head from the pool.

CAUTION: The highest dose rates experienced during cask handling come from O-ring inspection.

5.2.9 Center the Overhead Crane Aux. Hoist over the cask closure head. Attach stainless steel cable loop on Aux. Hoist hook and very slowly raise the closure head.

NOTE: Any air that has not escaped through the vent will be released at this time.

5.2.10 Raise the closure head to a position slightly above the cask area platform, then place on the platform.

5.2.11 Remove the Aux. Hoist hook from the stainless steel cable loop and place the 'Chicago' style gripper onto the Aux. Hoist hook. Clamp the jaws around the stainless steel cable slightly above the water level.

5.2.12 Raise the closure head and rinse closure head, cable, and block assembly with demineralized water being sure to perform radiation survey of closure head as it emerges from the pool.

5.2.13 Record the readings in Part 4 of Enclosure 8.1 (Spent Fuel Receiving Record-Container Report).

5.2.14 Visually inspect the closure head and O-Ring Seals and record data in Part 5 of Enclosure 8.1(Spent Fuel Receiving Record-Container Report).

5.2.15 Place the closure head, lifting spider, and cable on a sheet of polyethylene and blotter paper on the South side of the Spent Fuel Pool operating deck and cover with polyethylene.

5.2.16 Return the Overhead Fuel Handling Bridge Crane to a position over the fuel receiving area.

5.2.17 Align the Spent Fuel Pool Manipulator Crane East Aux. Hoist over the B&W Spent Fuel Assembly Handling Tool in its storage location. Attach a 2500 lb. spring scale to the Hoist Hook.

5.2.18 Attach the Spent Fuel Pool Manipulator Crane East Aux. Hoist hook and scale in the B&W Spent Fuel Assembly Handling Tool lifting bail.

5.2.19 Slowly raise the East Aux. Hoist until the B&W Spent Fuel Assembly Handling Tool has cleared its storage hangers.

5.2.20 Align the Spent Fuel Pool Ventilation System (VF) for discharge through the HEPA filters and charcoal adsorbers per OP/1/A/6450/04.

5.2.21 Using the Fuel Handling Machine bridge and trolley as per OP/0/A/6550/04 (Fuel and Component Handling), position the B&W Spent Fuel Assembly Handling Tool over the cask in the cask area.

5.2.22 Verify the handling tool operating handle is in the "OPEN" position. Slowly lower the handling tool onto the fuel assembly in the cask.

5.2.23 When the tool is fully seated on the fuel assembly (Zero Scale Reading), move the operating handle to the "CLOSED" position. The assembly is now ready to be lifted.

5.2.24 Slowly lift the fuel assembly until the hoist stops.

NOTE: B&W Fuel Assembly Weights are:
Without Insert - 1600 lb.
With Insert - 1750 lb.

5.2.25 Using the Spent Fuel Pool Manipulator Crane bridge and trolley as per OP/0/A/6550/04 (Fuel and Component Handling), position the fuel assembly over the fuel rack designated by the Reactor Engineer to receive the spent fuel assembly. Verify that spacer is in the fuel rack.

5.2.26 Position fuel assembly I.D. # to the East face and lower the fuel assembly until it has bottomed out on the spacer in the fuel rack (Zero Scale Reading).

5.2.27 Move the operating handle on the tool to the "OPEN" position. The tool is now disengaged from the fuel assembly.

5.2.28 Raise the B&W Spent Fuel Handling Tool up until the hoist stops.

5.2.29 Verify and record the information in Part 6 of Enclosure 8.1 (Spent Fuel Receiving Record-Container Report) and rack location in Part 2 of Enclosure 8.4.

5.2.30 Position the Monorail Hoist over the B&W Spent Fuel Handling Tool storage location.

5.2.31 Lower the tool until the tool is resting on its hangers in the storage location. Release the Monorail Hoist hook from the tool lifting bail and return the Spent Fuel Pool Manipulator Crane to a resting location. Remove scale from hook.

5.2.32 Align the Spent Fuel Pool Ventilation System (VF) for normal operation per OP/1/A/6450/04 (Fuel Pool Ventilation System).

5.2.33 Forward a copy of all completed Procedure Enclosures, shipping papers received, and NRC Form-741 received to the Reactor Engineer.

6.0 SHIPPING OF EMPTY NAC-1 CASK

6.1 Initial Conditions

6.1.1 Section of 5.0 of this procedure is complete.

6.1.2 Periodic test of the Overhead Fuel Handling Bridge Crane and Auxiliary Hoist has been performed within the past six months as per MP/0/B/7650/05 (Crane and Hoist Safety Inspection). Date Inspected _____

6.2 Procedure

6.2.1 Position the Overhead Crane Aux. Hoist over the closure head lifting spider and cable.

6.2.2 Lower the hook and engage the 'Chicago' style gripper.

6.2.3 Clamp the jaws onto the cable at a position that will be out of the water when the closure head is resting on the cask area platform.

6.2.4 Lift the closure head assembly and place on the cask area platform.

6.2.5 Unclamp the jaws of the 'Chicago' style gripper and remove the gripper from the hoist hook.

6.2.6 Place the Aux. Hoist hook into the cable loop at the end of the cable.

6.2.7 Lift the closure head assembly and position over the cask.

6.2.8 Lower the closure head onto the cask aligning the fitting mark (W) on the closure head to the fitting mark (A) on the cask. Visually insure that cask closure head indexing pin is properly aligned with closure head indexing hole.

6.2.9 Remove hoist hook from the Cable Loop. Temporarily secure cable to cask pit handrail.

6.2.10 Attach the Cask Long Lift Adaptor to the Overhead Fuel Handling Bridge Crane Hoist hook and position over the cask.

6.2.11 Lower the long lift adaptor hook and engage in the cask lifting yoke.

6.2.12 Raise the cask to a level just above the cask area platform and position over the cask area platform. Rinse adaptor, yoke and cask as they emerge.

CAUTION: Insure that closure head cable remains slack.

6.2.13 Lower the cask onto the cask area platform. Release the adaptor hook from the lifting yoke and remove the long lift adaptor from the cask area. Rinse adaptor as it emerges from the pool.

6.2.14 Move the Cask Long Lift Adaptor to its storage location and store.

6.2.15 Position the Overhead Fuel Handling Bridge Crane hook over the Cask Short Lift Adaptor in the adaptor storage stand.

6.2.16 Attach the Cask Short Lift Adaptor onto the Overhead Fuel Handling Bridge Crane hook and raise the adaptor from its storage stand.

6.2.17 Position the short lift adaptor over the cask on the cask area platform.

6.2.18 Lower the short lift adaptor and engage its hook into the cask lifting yoke.

6.2.19 Slowly raise the cask from the cask area platform and continue rinsing with demin water the lift adaptor, yoke, and cask as they emerge from the water. Have Health Physics monitor the cask and complete part 1 of Enclosure 8.2 (Shipment of Empty B&W Spent Fuel Cask).

6.2.20 Place polyethylene and blotter paper on pool deck between the cask area and decon pit.

6.2.21 Position the cask over the decon pit and lower to a convenient height.

6.2.22 Install at least two of the six closure head bolts finger tight. Remove the closure head lifting spider. Remove cable and 'Chicago' style gripper and place in clean poly bag.

6.2.23 Ensure that cask cavity vent valve is open and then raise cask above Spent Fuel Pool Level. Attach a drain hose to the cask drain valve. Open drain valve and drain the cask to the Spent Fuel Pool or Decon Pit as appropriate. Lower the cask to a convenient height.

6.2.24 Install the remaining closure head bolts hand tight. Torque the closure head bolts to 200 ft-lb. using a 1, 4, 2, 5, 3, 6 sequence.

6.2.25 Attach pressure check assembly to the gasket check line. Open the gasket check valve and pressurize the double O-ring seal with 10 to 15 psig air and close the valve on the pressure check assembly. The seals should hold this pressure for 10 minutes. If the pressure continues to drop after transient equalization, replace the O-ring seals and retest. Complete Part 2A of Enclosure 8.2.

CAUTION: Airborne contamination may be present.

6.2.26 Close the gasket check valve and remove the pressure check assembly.

6.2.27 Close cask cavity drain. Remove drain line and attach the pressure check assembly to the vent line. Insure the cask cavity vent valve is open.

6.2.28 Pressurize the cask cavity to 80-100 psig with air through the vent line. Hold the pressure for 10 minutes. If the pressure continues to drop after transient equalization, replace the O-ring seals per steps 6.2.29 through 6.2.36.

If not, skip to step 6.2.37. Visually inspect the cask, closure head, and valve for leakage. Close vent valve. Complete Part 2B of Enclosure 8.2.

6.2.29 Close the valve on the pressure check assembly. Attach the pressure check assembly to the cask vent valve and run a hose from the check assembly to the Spent Fuel Pool Ventilation System. Open the vent valve and the valve on the pressure check assembly to vent off any cask internal pressure. Disconnect the pressure check assembly from the cask and close all valves on the cask.

6.2.30 Remove the closure head bolts and attach the closure head lifting spider (4 one-inch bolts) to the head.

6.2.31 Move the cask to the lower platform of the cask area, using Section 5.2 of this procedure (Steps 5.2.1 through 5.2.11).

6.2.32 Raise the cask closure head out of the cask area using Section 5.2 of this procedure (Steps 5.2.12 through 5.2.18). Health Physics shall monitor the head, but the results of their survey need not be recorded as long as they are within the proper limts of exposure.

6.2.33 Remove the O-ring(s) that failed the leak test. It will pop out of the machine groove in the cask head.

6.2.34 Replace the O-ring(s) using Devcon (or similar silicon sealer) on the sealing surfaces.

6.2.35 Return the closure head to the cask and proceed to close up the cask per the normal procedure (steps 7.2.16 through 7.2.57 of this procedure).

6.2.36 If the seal leakage persists, repeat the above steps for replacement of the O-ring seals.

6.2.37 Disconnect the air line from the air supply and vent to VF connection.

CAUTION: Airborne contamination may be present.

6.2.38 Decontaminate the cask surfaces to meet the Catawba Health Physics shipping requirements per HP/O/B/1004/01. If necessary, place decon pit cover on pit and operate the decon spray as per OP/O/A/6500/06 (Equipment Decontamination System). Health Physics swipes should be taken to determine the need for further decontamination.

6.2.39 Remove the decon pit cover, if used, being careful to prevent spreading contamination from dripping decon cover as it is moved.

6.2.40 Insure that transport trailer is in the fuel receiving area and ready to receive cask.

6.2.41 Replace all port covers finger tight and install tamper seals on all five (5) port covers. Replace two closure head bolts and install tamper seals on both bolts.

6.2.42 Raise the cask from the decon pit and remove the cask bottom protective cushion. Check the cask bottom for contamination and decon as necessary.

6.2.43 Rotate the cask to the proper loading orientation and position the cask over the transport trailer. Lower the cask and carefully place the lower trunnions into the tie-downs at the back end of the trailer.

6.2.44 Place cable tie-downs around the trunnions and secure with 5/8" nuts fingertight.

6.2.45 Lower the cask to a horizontal position by moving the crane as necessary to keep the crane cables vertical.

6.2.46 Remove the yoke from the cask by disengaging the Ball-loc pins and then tie down the upper trunnions.

6.2.47 Latch the two fore and aft trunnion tie-downs. Torque the tie-downs to 50 Ft-lbs.

6.2.48 Install the closure head impact limiter on the cask and torque the four limiter bolts to 50 ft.-lbs.

6.2.49 Verify with Health Physics that all cask signs and labels are proper for shipment.

6.2.50 Close the trailer roof panel, if applicable, and secure this with the snap hooks.

6.2.51 Perform final radiation and contamination surveys and then close and lock the transport trailer doors. Have Health Physics complete part 3 of Enclosure 8.2 (Shipment of Empty B&W Spent Fuel Cask).

6.2.52 Remove the trailer wheel chocks.

6.2.53 Provide Health Physics release and Bill of Lading for the truck driver. Trailer can be removed.

6.2.54 Position the Cask Short Lift Adaptor over the adaptor storage stand.

6.2.55 Lower the adaptor into its storage stand, release Overhead Fuel Handling Bridge Crane hook, and return the Overhead Fuel Handling Bridge Crane to the receiving area.

6.2.56 Return all handrails, tools, slings etc. to proper storage and dispose of all waste material.

7.0 SHIPPING OF B&W SPENT FUEL WITH NAC-1 CASK

7.1 Initial Conditions

7.1.1 Empty cask is located in cask pit by completion of section 4.0 and by completion of section 5.0 thru step 5.2.13 if received empty or in its entirety if received with fuel assembly payload.

7.1.2 Periodic test of the Overhead Fuel Handling Bridge Crane and Auxiliary Hoist has been performed within the past six months as per MP/0/B/7650/05 (Crane and Hoist Safety Inspection). Date Tested _____

7.1.3 Spent Fuel Pool Manipulator Crane is in operation per OP/0/A/6550/04 (Fuel and Component Handling).

7.1.4 Spend Fuel Pool Ventilation System (VF) operable or in operation per Tech. Spec. 3.9.12 prior to moving fuel.

7.1.5 Use of NAC-1 cask for shipment of Westinghouse Fuel assemblies requires removal of extension rack for B & W Fuel assemblies from bottom of cask (Refer to 7.2.7, Note #3).

7.2 Procedure

7.2.1 Position the Spent Fuel Pool Manipulator Crane East Aux. Hoist over the B&W Spent Fuel Assembly Handling Tool in its storage location. Attached 2500 lb. spring scale to Hoist Hook.

7.2.2 Attach the Spent Fuel Pool Manipulator Crane East Aux. Hoist hook with scale in the B&W Spent Fuel Assembly Handling Tool lifting bail.

7.2.3 Slowly raise the East Aux. Hoist until the B&W Spent Fuel Assembly Handling Tool has cleared its storage hangers and hoist stops.

7.2.4 Align the Spent Fuel Pool Ventilation System (VF) for discharge through the HEPA filters and charcoal adsorbers per OP/1/A/6450/04 (Fuel Pool Ventilation System).

7.2.5 Using the Spent Fuel Pool Manipulator Crane bridge and trolley as per OP/0/A/6550/04 (Fuel and Component Handling) position the B&W Spent Fuel Assembly Handling Tool over the rack that contains the fuel assembly that the Reactor Engineer has designated to be shipped.

7.2.6 Verify data on the fuel assembly matches the data sent by the Reactor Engineer. A minimum of two operators shall

verify the Handling Tool is located over the proper rack location. Place data in Part 1 of Enclosure 8.3.

7.2.7 Verify the handling tool operating handle is in the "OPEN" position. Slowly lower the handling tool onto the fuel assembly in the rack.

7.2.8 When the tool is fully seated on the fuel assembly move the operating handle to the "CLOSED" position. The assembly is now ready to be lifted.

7.2.9 Record the rack position that the assembly was removed from on Part 1 of Enclosure 8.3 (B&W Spent Fuel Cask Data).

7.2.10 Lift the spent fuel assembly until the hoist reaches "Gripper Tube Up" position. Hook Block will be at the top.

7.2.11 Using the Spent Fuel Pool Manipulator Crane bridge and trolley as per OP/0/A/6550/04 (Fuel and Component Handling) position the fuel assembly over the cask in the cask area lower level.

7.2.12 Lower the fuel assembly down into the cask until the assembly is properly seated in the cask and the hoist slack cable light (blue) illuminates. Visually verify that assembly is fully inside the cask.

7.2.13 Move the operating handle to the "OPEN" position. The tool is now disengaged from the assembly.

7.2.14 Carefully raise the tool and verify the tool has not hung up on the fuel assembly.

7.2.15 Using the Spent Fuel Pool Manipulator Crane bridge and trolley as per OP/0/A/6550/04 (Fuel and Component Handling) position the B&W Spent Fuel Assembly Handling Tool over its storage location.

7.2.16 Slowly lower the tool until it is resting on the storage hangers.

7.2.17 Remove the Spent Fuel Pool Manipulator Crane East Aux. Hoist hook from the tool lifting bail. Remove scale and store. Return the Spent Fuel Pool Manipulator Crane to a resting position over the pool.

7.2.18 Align Spent Fuel Pool Ventilation System (VF) for normal operation per OP/1/A/6450/04 (Fuel Pool Ventilation System).

7.2.19 Position Overhead Crane Aux. hoist hook over the closure head lifting spider.

7.2.20 Engage Aux. Hoist Hook with the 'Chicago' style gripper.

7.2.21 Clamp the jaws onto the cable at a position that will be out of the water when the closure head is resting on the cask area platform.

7.2.22 Lift the closure head assembly and place on the cask area platform.

7.2.23 Unclamp the jaws of the 'Chicago' style gripper and remove the gripper from the hoist hook.

7.2.24 Place the Aux. Hoist hook into the Cable Loop at the end of the cable.

7.2.25 Lift the closure head assembly and position over the cask.

7.2.26 Lower the closure head onto the cask aligning the fitting mark ( ) on the closure head to the fitting mark ( ) on the cask. Insure that cask closure head indexing pin is properly aligned with the closure head. When the pin is properly aligned it will protrude thru the hole in the closure head without binding allowing level sealing.

7.2.27 Release the Aux. Hoist from the lifting cable. Temporarily secure the closure head spider lifting cable to pit handrail. Raise hoist to full up.

7.2.28 Attach the Cask Long Lift Adaptor to the Overhead Fuel Handling Bridge Crane Hoist hook and position over the cask.

7.2.29 Lower the long lift adaptor hook and engage in the cask lifting yoke.

7.2.30 Raise the cask and rinse the adapter and yoke with demin. water as they emerge. Monitor for neutron and Beta-Gamma dose rates as cask approaches and breaks the pool surface. Record the data on Enclosure 8.3 Part 2.

NOTE: Readings should not exceed 10mR/hr @ 3 ft.

7.2.31 Continue raising and rinsing the cask to a level just above the cask area platform and position the cask over the cask area platform.

7.2.32 Lower the cask onto the cask area platform. Release the adaptor hook from the lifting yoke and remove the long lift adaptor from the cask area. Rinse the adaptor as it emerges from the pool.

7.2.33 Move the cask long lift adaptor to its storage location and store.

7.2.34 Position the Overhead Fuel Handling Bridge Crane hook over the Cask Short Lift Adaptor in the adaptor storage stand.

7.2.35 Attach the Cask Short Lift Adaptor onto the Overhead Fuel Handling Bridge Crane hook and raise the adaptor from its storage stand.

7.2.36 Install 2 bolts hand tight in the closure head. Use appropriate personnel protection to prevent personnel or equipment from falling in the pool.

7.2.37 Position the short lift adaptor over the cask on the cask area platform.

7.2.38 Lower the short lift adaptor and engage its hook into the cask lifting yoke.

7.2.39 Slowly raise the cask from the cask area platform and rinse with demineralized water the lift adaptor, yoke and cask as they emerge from the water. Have Health Physics monitor the cask and complete part 2 of Enclosure 8.3 (B&W Spent Fuel Cask Data).

7.2.40 Place polyethylene and blotter paper on the pool deck between the cask area and the decon pit.

7.2.41 Position the cask over the decon pit and lower to a convenient height.

7.2.42 Install at least two of the six closure head bolts finger tight. Remove the closure head lifting spider. Remove cable and "Chicago" style gripper and place in clean poly bag.

7.2.43 Attach a drain hose to the cask cavity vent line. Raise cask until the cask cavity vent is slightly above the decon pit operating deck level. Place the loose end of the vent drain hose into the calibrated drum and open vent valve. Remove the vent drain hose when no water is coming through the vent being sure to leave the cask cavity vent valve open.

7.2.44 Lift the cask until the cask cavity drain line is slightly above the decon pit operating deck level. Attach a drain hose to the cavity drain line. Attach the loose end of the drain line into the calibrated drum and open the drain valve. Drain 24 (+0,-2) gallons of water from the cask cavity into the calibrated drum. Include in this 24 gallons any water previously collected from the vent line.

7.2.45 Check the drain check valve against the drain globe valve for leakage. Check the drain glove valve against the drain check valve for leakage for both front and rear drain valves.

NOTE: A screwdriver will be required to hold the check valve open when checking the globe valve for leakage.

7.2.46 Complete Part 3 of Enclosure 8.3.

7.2.47 Close drain valve and remove the drain hose.

7.2.48 Lower the cask to a convenient height and install the remaining closure head bolts hand tight. Remove lifting cable and place in clean poly bag and store. Remove the closure head lifting spider and store. Torque closure head bolts to 1000 ft-lbs using a 1,4,2,5,3,6 sequence in 200 ft-lbs increments.

7.2.49 Using an instrument air hose attachment and pressure gauge, pressurize the annulus between the double O-rings to 80-100 psig. Hold this pressure for ten minutes. There may be a slight pressure change as temperature equalizes. Record any leakage on part 4 of Enclosure 8.3 (B&W Spent Fuel Cask Data). Vent annulus to VF connection.

NOTE: If seal leakage is found, the cask should be returned to the pool bottom and the O-rings replaced.

7.2.50 Using an instrument air hose attachment and pressure gauge, pressurize the cask cavity to 80-100 psig through the cask cavity vent line. Visually inspect the cask, closure head and valves for leakage. Record any leakage on Part 4 of Enclosure 8.3 (B&W Spent Fuel Cask Data).

NOTE: If seal leakage is found, the cask should be returned to the pool bottom and the O-rings replaced.

7.2.51 If O-Rings do not leak, skip to step 7.2.60.

7.2.52 Close the valve on the pressure check assembly. Attach the pressure check assembly to the cask vent valve and run a hose from the check assembly to the Spent Fuel Pool Ventilation System. Open the vent valve and the valve on the pressure check assembly to vent off any cask internal pressure. Disconnect the pressure check assembly from the cask and close all valves on the cask.

7.2.53 Remove the closure head bolts and attach the closure head lifting spider to the head.

7.2.54 Move the cask to the lower platform of the cask area, using steps 5.2.1 - 5.2.10.

7.2.55 Raise the cask closure head out of the cask area using steps 5.2.11 - 5.2.15. HP shall monitor the head but the

results of their survey need not be recorded as long as they are within the limits for proper exposure.

7.2.56 Remove the O-ring(s) that failed the leak test. It will pop out of the machined groove in the cask head.

7.2.57 Replace the O-ring(s) using DEVCON (or similar silicon sealer) on the sealing surfaces.

7.2.58 Return the closure head to the cask and proceed to close up the cask per normal procedure (steps 7.2.22 - 7.2.48 of this procedure).

7.2.59 If the seal leakage persists, repeat steps 7.2.52 thru 7.2.58 for replacement of the O-ring seals.

7.2.60 Disconnect the pressurizing air line and vent the cask cavity to the Spent Fuel Pool ventilation system. Shut the vent valve and check that all valves are closed.

7.2.61 Disconnect all hoses from the cask and replace all port covers finger tight.

7.2.62 Decon the cask to meet Catawba Health Physics shipping requirements as stated in Catawba Health Physics Procedure HP/0/B/1004/01 if shipping offsite. If necessary, operate decon spray system per OP/0/B/6500/06 (Equipment Decontamination System) with Decon Pit cover in place. Tighten port covers and place tamper seals on the port covers and head bolts.

7.2.63 Raise the cask from the decon pit and remove the cask bottom protective cushion. Check bottom of cask for contamination and decon if necessary.

7.2.64 Rotate the cask to its proper orientation for trailer loading.

7.2.65 Verify that the transport trailer in fuel receiving area in position with the roof panels open, move the cask over the trailer and lower it near the trailer

7.2.66 Open the fuel receiving area door and attach a tractor to the trailer. Lower the cask so that the lower trunnions fit into the tie-downs at the trailer rear end.

7.2.67 Place cable tie-downs around the lower cask trunnions and secure the 5/8" nuts hand tight.

7.2.68 Lower the cask to a horizontal position by moving the Overhead Fuel Handling Bridge Crane as necessary to keep the crane cables vertical.

7.2.69 Remove the yoke from the cask and place on truck or store as desired.

NOTE: If shipping between units at the site, this step is not required.

7.2.70 Place cable tie-downs around the upper cask trunnions and secure the 5/8" nuts hand tight.

7.2.71 Torque the upper and lower cask trunnion tie-down nuts to 50 ft-lbs.

7.2.72 Install the closure head impact limiter on the cask and torque its four bolts to 50 ft-lbs. Close trailer cover if applicable.

NOTE: If shipping between units at the site, this step is not required.

7.2.73 Survey the cask and trailer. Record data on Part 5 of Enclosure 8.3. Obtain Health Physics release for the driver.

7.2.74 Return all tools, slings, etc to proper storage and properly dispose of all waste material.

7.2.75 If shipping offsite, present driver with Bill of Lading, Radioactive Shipment Report, and 3 copies of NRC-741 form. Forward a copy of all procedure enclosures, shipping papers, and NRC form 741 to the Reactor Engineer.

7.2.76 Remove trailer wheel chocks.

NOTE: Section 7.0 may be utilized for the shipment of Westinghouse fuel in the NAC-1 cask with the following procedural changes.

1) In Steps 7.2.1 through 7.2.16 substitute "Westinghouse Spent Fuel Assembly Handling Tool" for "B & W Spent Fuel Assembly Handling Tool" and refer to OP/0/A/6550/04 (Fuel and Component Handling) for its operation. or

2) A prefered method would be to utilize ~~this~~ the Spent Fuel Pool Manipulator Crane to transport and insert the desired Westinghouse Fuel Assembly into the cask. In this instance, substitute operational detail (including bypassing of bridge and trolley interlocks to access the mast over the cask only) from OP/0/A/6550/04 (Fuel and Component Handling), to place the assembly in the cask in lieu of explicit Steps 7.2.1 through 7.2.16 and resume procedure at Step 7.2.17.

3) The difference in height between Westinghouse and B & W Fuel assemblies requires placing

an extension rack in bottom of NAC-1 cask for transport of B & W assemblies.

7.2.77 Rotate the 2 "empty" signs to read "Radioactive Fissile III." Rotate the 4 "Drive Safely" signs to read "Radioactive."

7.2.78 Forward all procedure enclosures and shipping papers to Reactor Engineer.

8.0 ENCLOSURES

8.1 Spent Fuel Receiving Record - Container Report

8.2 Shipment of Empty Cask

8.3 Data for Shipping Spent Fuel in NAC-1 Cask

8.4 Authorization to Receive and Store B & W Spent Fuel

8.5 Tool and Instrument Documentation

8.6 Authorization to Remove from Storage and Ship B & W Spent Fuel

OP/O/A/6550/12
B&W SPENT FUEL RECEIPT, STORAGE AND SHIPPING
ENCLOSURE 8.1
SPENT FUEL RECEIVING RECORD-CONTAINER REPORT

Part 1 Radiation Inspection (Completed by Health Physics)

Radiation level: Contact _____ MRem/hour
Three Feet _____ MRem/hour

Instrument Used: Type _____

Serial No. _____

Surface Contamination: _____ $dpm/100cm^2$ (β, γ)
_____ $dpm/100cm^2$ (α)

Completed by: _____

Part 2 Receiving and Inspection (External)

Plant _____ Shipment No. _____ Date _____

Shipment by: Truck _____ Rail _____

Container Serial No. _____

DOT/ICC No. _____ Received by: _____

Labels and Marking Intact: Yes _____ No. _____

Remarks: Note unusual dents, scrapes, missing parts or other signs of damage in Part 7 under remarks in this enclosure.

Inspected by: _____

Part 3 Cask Inspection

External Cask Temperature: _____ Cask Cavity Pressure: _____

Remarks: Note any dents or scrapes to the neutron shield, valves rupture disc or any other signs of cask damage in Part 7 under remarks in the enclosure.

Note: In case of damage or suspicion of damage to cask or internals, immediately notify the Reactor Engineer.

Part 4 Closure Head Radiation Inspection

Radiation Level: Contact _____ MRem/hour

Three feet _____ MRem/hour

OP/O/A/6550/12
B&W SPENT FUEL RECEIPT, STORAGE AND SHIPPING
ENCLOSURE 8.1
SPENT FUEL RECEIVING RECORD-CONTAINER REPORT

Instrument Used: Type _____

Serial No. _____

Surface Contamination: _____ $dpm/100cm^2$ (β, γ)
_____ $dpm/100cm^2$ (α)

Completed by: _____

Part 5 Closure Head Visual Inspection

Note any unusual dents, scrapes, or any other signs of damage to closure head of O-ring seals in Part 7 under remarks in this enclosure.

Part 6 Fuel Assembly Placement

Assembly Region Reference Number _____

Assembly ANSI Number _____

Numbers Agree with Shipping Forms: Yes ____ No _____

Place in storage rack _____

Part 7 Remarks

Place any remarks from Part 2, 3, or 5 in this section.

Document Completed: Time _____ Date _____ Initial _____

OP/O/A/6550/12
B&W SPENT FUEL RECEIPT, STORAGE AND SHIPPING
ENCLOSURE 8.2
SHIPMENT OF EMPTY CASK

Part 1 Radiation Inspection

Radiation Level: Contact _____ MRem/hour

Three feet _____ MRem/hour

Instrument Used: Type _____

Serial No. _____

Surface Contamination: _____ $dpm/100cm^2$ (β, γ)
_____ $dpm/100cm^2$ (α)

Completed by: _____

Part 2 Air Leakage

A. At least 10 psig pressure test on rings completed with no observable pressure drop. _____ initials _____ date

B. 80-100 psig test on cask cavity completed with no observable pressure drop. _____ initials _____ date

Part 3 Final Radiation Inspection

Radiation Level: Contact _____ MRem/hour

Three feet _____ MRem/hour

Instrument Used: Type _____

Serial No. _____

Surface Contamination: _____ $dpm/100cm^2$ (β, γ)
_____ $dpm/100cm^2$ (α)

Proper Radioactive Shipment signs displayed

Completed by: _____

OP/O/A/6550/12
B&W SPENT FUEL RECEIPT, STORAGE AND SHIPPING
ENCLOSURE 8.3
DATA FOR SHIPPING SPENT FUEL IN NAC-1 CASK

Part 1 Fuel Assembly Removal

Assembly Region Reference Number _____

Assembly ANSI Number _____

Removed from Storage Rack _____

Visually Verified by: _____

Part 2 Radiation Inspection

Radiation level: Contact _____ MRem/hour

Three feet _____ MRem/hour

Instrument used: Type _____

Serial No. _____

Surface Contamination: _____ $dpm/100cm^2$ (,)
_____ $dpm/100cm^2$ ( )

Completed by: _____

Part 3 Drain Valve Leakage

	Front		Rear	
Drain Globe Valve Leaking:	Yes _____	No _____	Yes _____	No _____
Drain Check Valve Leaking:	Yes _____	No _____	Yes _____	No _____

Part 4 Air Leakage

O-Ring Leaking: Yes _____ No _____

Cask Cavity Vent Leaking: Yes _____ No _____

Any Cask Valves Leaking: Yes _____ No _____

Part 5 Final Radiation Inspection

Radiation Level: Contact _____ MRem/hour

Three feet _____ MRem/hour

Instrument Used: Type _____ Serial No. _____

Surface Contamination: _____ $dpm/100cm^2$ (,)
_____ $dpm/100cm^2$ ( )

Proper Radioactive Shipment Signs displayed

Completed by: _____

OP/O/A/6550/12
B & W SPENT FUEL RECIEPT, STORAGE AND SHIPPING
ENCLOSURE 8.4
AUTHORIZATION TO RECEIVE AND STORE B & W SPENT FUEL

Part 1 Authorization

Station Name _____

Unit No. _____

Station is licensed to receive shipment _____ (initials of Reactor Engineer or designee)

Part 2 Storage

Identification Number of Assembly to be Stored	Storage Location in Spent Fuel Pool	Location Authorized by (Initials)	Actual Storage Location	Time/Date	Initials

OP/O/A/6550/12
B & W SPENT FUEL RECEIPT, STORAGE AND SHIPPING
ENCLOSURE 8.5

TOOL AND INSTRUMENTATION DOCUMENTATION

1. Torque Wrench:
   Date Used _____
   Serial Number _____
   Calibration Due Date _____

2. Pyrometer:
   Date Used _____
   Serial Number _____
   Calibration Due Date _____

3. Pressure Gauge:
   Date Used _____
   Serial Number _____
   Calibration Due Date _____

OP/O/A/6550/12
B & W SPENT FUEL RECEIPT, STORAGE AND SHIPPING
ENCLOSURE 8.6
AUTHORIZATION TO REMOVE FROM STORAGE AND SHIP B & W SPENT FUEL

Part 1 Authroization

Station Name _____

Unit No. _____

Destination of Shipment _____

Method of Shipping: _____ Truck _____ Rail

Receiver of shipment is licensed to receive material _____
(Initials of Reactor Engineer or designee)

Station has been authorized by the Manager of Nuclear Production to make shipment _____ (Initials of Reactor Engineer or designee)

Part 2 Shipment

Identification No. of Assembly	Present Storage Location in Spent Fuel Pool	Actual Storage Location/Verified By	Time/Date Assembly Removed	Initials

Shipment left station site (Date/Time/Initials _____/_____/_____)