

DUKE POWER COMPANY
McGUIRE NUCLEAR STATION
FUEL AND COMPONENT HANDLING

1.0 Purpose

The purpose of this procedure is to describe the handling of fuel and fuel related components during fuel transferring operations and the utilization of the special fuel handling tools required in the following operations:

- 3.0 Transfer of New Fuel from New Fuel Storage Vault to Spent Fuel Pool
- 4.0 Transfer of New Fuel from Spent Fuel Pool to New Fuel Storage Vault.
- 5.0 Spent Fuel Pool Manipulator Crane
- 6.0 Fuel Transfer System
- 7.0 Reactor Building Manipulator Crane
- 8.0 RCC Change Fixture

2.0 Limits and Precautions

- 2.1 Small tools or other items used on the fuel handling bridges should be secured by a safety line or other positive means.
- 2.2 Remove all loose articles from pockets before working over the Reactor, Canal, or Fuel Pool. Personnel monitoring equipment should be secured with tape.
- 2.3 All personnel participating in fuel handling activities will wear the protective clothing and dosimetry equipment as required by the radiation work permit.
- 2.4 Do not exceed the drag force limits imposed in Enclosure 9.3
- 2.5 Positive identification shall be maintained on all fuel assemblies and related components.
- 2.6 All fuel assemblies and Rod Control Cluster Elements shall be handled in the vertical position only.
- 2.7 Do not energize the under water lights unless they are submerged.
- 2.8 Bypass switches are only to be used in accordance with Station Directive 3.1.12.
- 2.9 Underwater lights must be removed when storing or removing fuel and/or components from the perimeter storage racks adjacent to the lights.

- 2.10 All internal Fuel Movement must be authorized in advance by the Reactor Engineer per OP/O/A/6550/11 (Internal Transfer of Special Nuclear Fuel).
- 2.11 When loading, unloading or repositioning fuel in the core, permission must be obtained from the Fuel Loading Supervisor (a licensed Senior Reactor Operator) before engaging or disengaging the fuel assembly.
- 2.12 Refer to McGuire Limitations and Precautions (OP/O/A/6100/08) as required.
- 2.13 Only qualified operators and trainees under their supervision, as determined by the Superintendent of Operations, will operate the cranes.
- 2.14 Cotton or rubber gloves must be worn by personnel handling the new assemblies, inserts or portions of the handling tools which have been underwater.
- 2.15 When moving the fuel assembly by hand, grasp the fuel assembly at the grids or nozzles only.
- 2.16 Technical Specification 3/4.9.7 requires that no load greater than 3000 pounds may be moved over fuel assemblies stored in the pool.

NOTE

The Spent Fuel Pool weir gates may be moved by crane over the stored fuel provided the spent fuel has decayed for at least 17.5 days since last being part of a core at power.

- 2.17 If any core component (fuel assembly, rod control cluster, burnable poison rod assembly or thimble plug) is damaged or thought to have been damaged, set the component aside and cease further movements. The Reactor Engineer shall be notified who will in turn notify the necessary Westinghouse and Duke personnel for resolution of the problem.
- 2.18 "Fuel Hoist" speed should not exceed 7 ft/min when moving fuel assemblies within the core.
- 2.19 Whenever irradiated fuel is being moved in the storage pool and or during crane operation with loads over the storage pool, the fuel handling ventilation exhaust system shall be operating and discharging through the HEPA filters and charcoal adsorbers.

3.0 Transfer of New Fuel from New Fuel Storage Vault to Spent Fuel Pool

3.1 Initial Conditions

Date/Initials

- ____/____ 3.1.1 The Overhead Fuel Handling Crane available per OP/O/A/6550/02 (Overhead Fuel Handling Cranes Operation).
- ____/____ 3.1.2 Doors in the Spent Fuel Building are closed.

- ___/___ 3.1.3 The following Technical Specifications are met:
- 3.1.3.1 3/4.3.3 Radiation monitors 1EMF17 and 42 are operable.
 - 3.1.3.2 3/4.9.10 A minimum of 23 feet of water is above the irradiated fuel assemblies in the pool.
 - 3.1.3.3 3/4.9.11 The fuel handling ventilation exhaust system shall be operating and discharging through the HEPA filters and charcoal adsorbers during the crane operations with loads over the storage pool.
- ___/___ 3.1.4 New Fuel Storage Vault containing New Fuel as per OP/O/A/6550/01 (Receipt, Inspection and Storage of New Fuel).
- ___/___ 3.1.5 The 2500# Spring Scale is available with calibration sticker date valid.
- ___/___ 3.1.6 New Fuel Handling Tool available.
- ___/___ 3.1.7 Health Physics and Performance have been informed of the transferring operation, and authorization has been obtained from the Reactor Engineer per OP/O/A/6550/11 (Internal Transfer of Special Nuclear Fuel).

3.2 Procedure

- 3.2.1 Remove the New Fuel Storage Vault cover from the storage position for the fuel assembly which is to be transferred.
- 3.2.2 Attach the spring scale and new fuel handling tool to the overhead crane auxiliary hoist. Verify the safety screw on the side of the tool is turned "out" and the operating handles are in the "UP" position.
- 3.2.3 Clear the red tag and close in the "Remote Circuit Breaker" for the overhead crane.
- 3.2.4 Center the tool above the fuel assembly to be lifted and slowly lower the tool and guide the two locating pins into the holes in the fuel assembly top nozzle block.
- 3.2.5 Once the tool has bottomed on the fuel assembly, pull out the operating handles, move them to the "Down" position and turn the safety screw "IN" (locked position).
- 3.2.6 Remove the fuel assembly from the storage rack while monitoring drag load.

CAUTION

Do not exceed the drag limits per Enclosure 9.3.

- 3.2.7 Remove the polyethylene protective jacket from the fuel assembly.
- 3.2.8 Remove the necessary handrails and insure a clear path is available for transfer to the New Fuel Elevator.

- 3.2.9 Raise the empty New Fuel Elevator to its maximum "UP" position.
"UP" light on pendant will be illuminated.
- 3.2.10 Transfer the fuel assembly to a position over the New Fuel Elevator and rotate the fuel assembly to position its Region Reference Number to the Northwest. (Reference hole to southeast corner).

CAUTION

Verify the Spent Fuel Pool Manipulator Crane Bridge is clear of the elevator when approaching the pool with overhead fuel handling crane.

- 3.2.11 Carefully lower the fuel assembly into the New Fuel Elevator.

CAUTION

Do not exceed the drag limits per Enclosure 9.3.

- 3.2.12 When the new fuel assembly has bottomed out, turn the safety screw on the New Fuel Handling Tool OUT and pull out the operating handles and pull them to the "UP" position.
- 3.2.13 Slightly jiggle the New Fuel Handling Tool to make sure it has unlatched from the fuel assembly and operate the hoist to remove the handling tool from the fuel assembly.
- 3.2.14 Lower the New Fuel Elevator to the full down limit.
"Down" light on pendant will be illuminated.
- 3.2.15 For removal of the fuel assembly from the elevator refer to section 5.3 of this procedure.
- 3.2.16 Park the overhead crane with the collectors south of the bus break.
- 3.2.17 Depress the "STOP" button on the control pendant.
- 3.2.18 Place the New Fuel Area Remote Circuit Breaker in the "OFF" position and lock the breaker.

4.0 Transfer of New Fuel from Spent Fuel Pool to New Fuel Storage Vault

4.1 Initial Conditions

Date/Initials

- | | |
|-----------|---|
| ____/____ | 4.1.1 The overhead fuel handling crane available per OP/0/A/6550/02 (Overhead Fuel Handling Crane Operation). |
| ____/____ | 4.1.2 Doors in the Spent Fuel Building are closed. |
| ____/____ | 4.1.3 The following Technical Specifications are met: |
| ____/____ | 4.1.3.1 3/4.3.3 Radiation monitors 1EMF17 and 42 are operable. |
| ____/____ | 4.1.3.2 3/4.9.10 A minimum of 23 feet of water is above the irradiated fuel assemblies in the pool. |

___/___ 4.1.3.3 3/4.9.11 The fuel handling ventilation exhaust system shall be operating and discharging through the HEPA filters and charcoal adsorbers during crane operations with loads over the storage pool.

___/___ 4.1.4 The 2500# spring scale is available with calibration sticker date valid.

___/___ 4.1.5 New Fuel Handling Tool available.

___/___ 4.1.6 Equipment Decontamination System operable per OP/O/A/6500/06 (Equipment Decontamination), if required.

___/___ 4.1.7 Health Physics and Performance have been informed of the transferring operation, and authorization has been obtained from the Reactor Engineer per OP/O/A/6550/11.

___/___ 4.1.8 New Fuel Assembly in the new fuel elevator.

4.2 Procedure

4.2.1 Inform Health Physics to monitor the fuel assembly as it is raised out of the Spent Fuel Pool.

4.2.2 Place the bypass key in the pendant keyhole and turn key to the bypass position.

4.2.3 Raise the elevator containing the New Fuel Assembly to its full up position and turn key in pendant to normal position and remove. "UP" light on pendant will be illuminated.

4.2.4 Attach the spring scale and new fuel handling tool to the overhead crane auxiliary hoist. Verify the safety screw on the side of the tool is turned "out" and the operating handles are in the "UP" position.

4.2.5 Center the tool above the fuel assembly and slowly lower the tool and guide the two locating pins into the holes in the fuel assembly top nozzle block.

CAUTION

Verify the Spent Fuel Pool Manipulator Crane Bridge is clear of the elevator when approaching the pool with the overhead fuel handling crane.

4.2.6 Once the tool has bottomed on the fuel assembly, pull out the operating handle, move them to the "Down" position and turn the safety screw "IN" (locked position).

- 4.2.7 Remove the fuel assembly from the elevator while monitoring drag load.

CAUTION

Do not exceed the drag limits per Enclosure 9.3.

- 4.2.8 Remove the necessary handrails and ensure a clear path is available to the decon pit.
- 4.2.9 Position the fuel assembly over the decon pit.
- 4.2.10 Contact Health Physics to take swipes on the fuel assembly.
- 4.2.11 If the swipes indicate $<200 \text{ dpm}/100 \text{ cm}^2$ proceed to Step 4.2.14.
- 4.2.12 Lower the fuel assembly in the decon pit and decontaminate the fuel assembly with demineralized water.
- 4.2.13 Allow the fuel assembly to dry.
- 4.2.14 Raise the fuel assembly out of the decon pit, stopping momentarily to allow Health Physics to take swipes.
- 4.2.15 If the swipes indicate $>200 \text{ dpm}/100\text{CM}^2$ repeat steps 4.2.10 thru 4.2.12.
- 4.2.16 Remove the lock on the remote circuit breaker for the overhead fuel handling crane. Close in the breaker.
- 4.2.17 Remove the necessary handrails and ensure a clear path is available for transfer to the New Fuel Storage Vault.
- 4.2.18 If the fuel assembly is to be shipped off-site at this time refer to OP/O/A/6550/03 (Package and Shipment of New Fuel).
- 4.2.19 If the fuel is to be stored in the New Fuel Storage Vault remove the desired vault cover.
- 4.2.20 Depress the "ON" pushbutton and the North pushbutton on the overhead crane control pendant and drive the fuel assembly over the New Fuel Storage Vault.
- 4.2.21 Center the fuel assembly over the location listed in OP/O/A/6550/11 (Internal Transfer of Special Nuclear Fuels) and position the assembly approximately four (4) feet above the New Fuel Rack.
- 4.2.22 Place a polyethylene protective jacket around the fuel assembly and tape it around the fuel assembly at appropriate grid locations and nozzle blocks. Do not apply tape directly to any surface of the fuel assembly.
- 4.2.23 Cut a hole in the bottom of the polyethylene jacket to allow for drainage.

4.2.24 Carefully lower the fuel assembly into the storage rack.

CAUTION

Do not exceed the drag limits per Enclosure 9.3.

4.2.25 Once the New Fuel Assembly has bottomed out, turn the safety screw "OUT" and pull out the operating handles and pull them to the "UP" position.

4.2.26 Slightly jiggle the new fuel handling tool to make sure it has unlatched from the fuel assembly and operate the hoist to remove the new fuel handling tool from the fuel assembly.

4.2.27 Replace the cover on the new fuel storage rack.

4.2.28 Inform Reactor Engineer of the new location of the fuel assembly.

4.2.29 Repeat steps 4.2.1 thru 4.2.28 for each new fuel assembly to be moved from the Spent Fuel Pool to the New Vault.

4.2.30 Return the Overhead fuel handling crane to the shipping and receiving area.

4.2.31 Open the "Remote Circuit Breaker" for the overhead fuel handling crane and lock the breaker.

4.2.32 Lower the empty elevator to its full down position.
"Down" light on pendant will be illuminated.

4.2.33 Shutdown the Overhead Crane per OP/0/A/6550/02 (Overhead Fuel Handling Cranes Operation).

5.0 Spent Fuel Pool Manipulator Crane

5.1 Initial Conditions

Date/Initials

____/____ 5.1.1 If the crane is to be used to support a refueling outage, the functional check of the crane, PT/0/A/4550/01, must be performed before the outage commences.

____/____ 5.1.2 The following Technical Specifications are met:

5.1.2.1 3/4.3.3 Radiation monitors 1EMF17 and 42 are operable.

5.1.2.2 3/4.9.10 A minimum of 23 feet of water is above the irradiated fuel assemblies in the pool.

5.1.2.3 3/4.9.11 The fuel handling ventilation exhaust system shall be operating and discharging through the HEPA filters and charcoal adsorbers during movement of irradiated fuel in the pool.

- / 5.1.3 If the north monorail hoist and/or the auxiliary hoist on the SFP manipulator crane are to be used, the crane daily visual inspection must be performed once each 8-hour shift the hoist is used. (Forms are in the Shift Supervisor's Office and should be routed to the Maintenance Supervisor when completed).
- 5.2 Startup of SFP Manipulator Crane.
- 5.2.1 Verify that air is available to the gripper assembly, with the pressure gauge reading 70-100 psi if the fuel hoist is to be used.
 - 5.2.2 Verify that the emergency handwheels are mounted in the storage position if the fuel hoist is to be used.
 - 5.2.3 Verify the sprocket on the selsyn drive is properly engaged in its chain if the fuel hoist is to be used.
 - 5.2.4 Unlock the console and verify that all interlock bypass switches are in the "OFF" position.
 - 5.2.5 Place the circuit breaker (inside the console) to the "ON" position.
 - 5.2.6 Open the door of the MCC (on the bridge) and place the LCB circuit breaker and the Aux. Monorail Hoist Feeder Breaker in the "ON" position.
 - 5.2.7 Place the following circuit breakers in the lighting PNLBD in the "ON" position.
 - 5.2.7.1 Bkr. No. 1 - Control, Selsyn, Dillon.
 - 5.2.7.2 Bkr. No. 2 - Console Receptacle
 - 5.2.7.3 Bkr. No. 3 - Walkway Receptacle
 - 5.2.7.4 Bkr. No. 4 - Console Receptacle
 - 5.2.7.5 Bkr. No. 5 - Walkway Receptacle
 - 5.2.7.6 Bkr. No. 6 - Shaded light for Target
 - 5.2.7.7 Bkr. No. 7 - Heater De-energizer
 - 5.2.8 Place the "Main Power" and "Lighting" breakers (on the outside) of the MCC) in the "ON" position.
 - 5.2.9 Verify the power light "ON" for the fuel bridge area monitor and verify the calibration sticker is valid.
 - 5.2.10 Verify Dillon "ON" light is illuminated (inside console) and verify the Dillon has been calibrated within the last 6 months if the spent fuel pool manipulator main hoist is to be used.
 - 5.2.11 Close and lock the console.

- 5.2.12 Check (push-to-test) all indicating lights. If any light fails to illuminate, replace bulb and check again.
- 5.2.13 The following should be illuminated:
 - 5.2.13.1 "Gripper disengaged" (white).
 - 5.2.13.2 "Gripper up disengaged" (green).
 - 5.2.13.3 "Monorail Hoist Up" (green).
- 5.2.14 Verify Power available to north and south auxiliary hoists by momentarily depressing the "Down" pushbutton, then the "UP" pushbutton.
- 5.3 Transferring Fuel Assemblies Within the Pool (New Fuel Elevator, Storage Racks, Transfer System).
 - 5.3.1 Complete Section 5.2 of this procedure.
 - 5.3.2 Verify the Spent Fuel Pool is at normal operating level (\geq -2 ft. on KFP5120; zero = El. 771'4").
 - 5.3.3 Verify the gripper "disengaged" light is illuminated.
 - 5.3.4 Move the bridge "Right" or "Left" and the trolley "Forward" and "Reverse" to index the bridge and trolley over the desired location to pick up a fuel assembly.
 - 5.3.4.1 When accessing the perimeter storage racks, the bridge or trolley limit switches must be bypassed. When inboard of these areas the bridge and trolley bypass switches must be in the "OFF" position.
 - 5.3.4.2 When accessing the new fuel elevator, verify the elevator is in its full down position and the overhead fuel handling crane is clear of the elevator.
 - 5.3.4.3 When accessing the upender, verify the upender is in its full up position.
 - 5.3.5 Position the fuel mast over the desired location.
 - 5.3.6 Using the hoist control handle, lower the gripper until it is stopped by "Slow Zone #2 (Bottom of Basket/Rack)".
 - 5.3.7 Using the jog pendant control, push the "Down" button and lower the gripper to the top of the fuel assembly verifying that the "gripper tube down" light comes on.

NOTE

"Gripper tube down" light will not illuminate when accessing the elevator or upender.

- 5.3.8 Continue jogging down until "Slack Cable" light is illuminated.
- 5.3.9 Verify correct position of Z-Z tape to within $\pm 1/4$ " for new fuel or $\pm 1/2$ " for spent fuel according to Enclosure 9.4 Unit 1 SFP Z-Z tape readings or Enclosure 9.5 Unit 2 SFP Z-Z tape readings.
- 5.3.10 Place the gripper control to the "Engaged" position, the "Disengaged" light will go off and the "Engaged" light will be illuminated.
- 5.3.11 Push the "UP" button on the pendant control. The "Slack Cable" light and "gripper tube down" light will go off and the load cell reading will increase to approximately 2200 lbs. (2500 lbs. dry weight) without insert when the full weight of the fuel assembly is lifted. (Refer to Enclosure 9.3 for weight with insert).

CAUTION

Do not exceed the drag limits per Enclosure 9.3.

- 5.3.12 Raise the fuel assembly with pendant control until "Slow Zone #2" light goes out. Use the hoist control handle until hoist stops and "gripper tube up" light is illuminated. Verify position with Z-Z tape.

NOTE

If the hoist is stopped in Slow Zone #1 only the jog pendant station can be used to raise the gripper tube.

- 5.3.13 Move the bridge "Right" or "Left" and the trolley "Forward" or "Reverse" to place the bridge and trolley over the desired location to deposit the fuel assembly. Visually (TV Monitor, Binoculars or naked eye) verify that the location receiving the assembly is empty.
 - 5.3.13.1 When depositing the fuel assembly in the perimeter storage racks, the bridge or trolley limit switches must be bypassed. When inboard of these areas the bridge and trolley bypass switches must be in the "OFF" position.
 - 5.3.13.2 When depositing the fuel assembly in the new fuel elevator, verify the elevator is in its full down position, and the overhead fuel handling crane is clear of the elevator.
 - 5.3.13.3 When depositing the fuel assembly in the upender align the fuel transfer system per Enclosure 9.1 and 9.2 appendix A.

CAUTION

Do not exceed the drag limits per Enclosure 9.3.

- 5.3.14 Turn the hoist control handle to the "DOWN" position and lower unit "Slow Zone #1" light illuminates and hoist stops. Then using the jog pendant control, push the "DOWN" button until the "Slow Zone #1" light goes out.
- 5.3.15 Using the hoist control handle, lower the gripper until it is stopped by "Slow Zone #2" (Bottom of Basket/Rack).
- 5.3.16 Using the jog pendant control, push the "DOWN" button and lower the gripper.

NOTE

"Gripper tube down" light will not illuminate when accessing the elevator or upender.

- 5.3.17 Continue jogging down until "Slack Cable" light is illuminated.
- 5.3.18 Verify correct position of Z-Z tape to within $\pm 1/4$ " for new fuel or $\pm 1/2$ " for spent fuel according to Enclosure 9.4 Unit 1 SFP Z-Z tape readings or Enclosure 9.5 Unit 2 SFP Z-Z tape readings.
- 5.3.19 Place the gripper control to the "Disengaged" position and verify that the "Disengaged" light is illuminated.
- 5.3.20 Push the "UP" button on the pendant control and raise the gripper. When the "Slow Zone #2" light goes out, the hoist control handle may be used to raise the gripper.
- 5.3.21 Raise the gripper until it stops, and the "Gripper Up Disengaged" light is illuminated.

5.4 Westinghouse Spent Fuel Handling Tool (Spent Fuel Building)

- 5.4.1 Complete Section 5.2 of this procedure.
- 5.4.2 Verify the doors in the spent fuel building are closed.
- 5.4.3 Verify the Spent Fuel Pool is at normal operating level (≥ -2 ft. on KFP5120; zero = El. 771'-4").
- 5.4.4 Attach the Westinghouse Spent Fuel Handling Tool to the North auxiliary hoist of the SFP Manipulator Crane.
- 5.4.5 Align the handling tool over the fuel assembly to be moved.

NOTE

Insure that the operating handle is in the "UP" (disengaged) position and the orientation pin (red dot) on the tool is in the southeast corner opposite the identification number on top nozzle of the fuel assembly.

- 5.4.6 Slowly lower the tool and guide the two locating pins into the holes in the fuel assembly top nozzle.

NOTE

Manual handwheel may be used for precise North-South alignment, if main power is turned off first.

- 5.4.7 Once the tool has bottomed on the assembly, move the operating handle to the down position (engaged) and insert the locking pin.
- 5.4.8 Slowly raise the fuel assembly and verify that the limit switch on the auxiliary hoist stops the assembly at the proper elevation (top of assembly 10' below water).

NOTE

Should the automatic stop fail to operate properly, immediately lower the assembly and evaluate the situation.

- 5.4.9 Slowly and carefully move the assembly to the desired location. Visually (TV monitor, binoculars or naked eye) verify that the location receiving the assembly is empty.

NOTE

Manual handwheel may be used for precise North-South alignment, if main power is turned off first.

- 5.4.10 Slowly lower the fuel assembly until the cable is slack.
- 5.4.11 Release the Spent Fuel Handling Tool from the fuel assembly by ~~removing the locking pin~~ and moving the handle to the "UP" position.
- 5.4.12 Slowly raise the handling tool being careful that the assembly has been released.
- 5.4.13 Move the Spent Fuel Handling Tool to its storage position or proceed to the next fuel assembly.

5.5 B & W Spent Fuel Handling Tool (Spent Fuel Building)

- 5.5.1 Complete Section 5.2 of this procedure.
- 5.5.2 Verify the doors in the Spent Fuel Building are closed.
- 5.5.3 Attach the B & W Spent Fuel Handling Tool to the North auxiliary hoist of the SFP Manipulator Crane.
- 5.5.4 Align the handling tool over the fuel assembly to be moved.

NOTE

Insure that the operating handle is in the "OPEN" (disengaged) position.

- 5.5.5 Slowly lower the tool and guide the tool onto the assembly.

NOTE

Manual handwheel may be used for precise North-South alignment, if main power is turned off first.

- 5.5.6 Once the tool has bottomed on the assembly, move the operating handle to the CLOSED position (engaged) and insert the locking pin.

- 5.5.7 Slowly raise the fuel assembly and verify that the limit switch on the auxiliary hoist stops the assembly at the proper elevation (top of assembly 10' below water).

NOTE

Should the automatic stop fail to operate properly, immediately lower the assembly and evaluate the situation.

- 5.5.8 Slowly and carefully move the assembly to the desired location Visually (TV monitor, binoculars or naked eye) verify that the location receiving the assembly is empty and a spacer is in the rack.

NOTE

Manual handwheel may be used for precise North-South alignment, if main power is turned off first.

- 5.5.9 Slowly lower the fuel assembly until the cable is slack.

- 5.5.10 Release the Spent Fuel Handling Tool from the fuel assembly by removing the locking pin and moving the handle to the OPEN position.

- 5.5.11 Slowly raise the handling tool being careful that the assembly has been released.

- 5.5.12 Move the Spent Fuel Handling Tool to its storage position or proceed to the next fuel assembly.

5.6 Burnable Poison Rod Handling Tool

- 5.6.1 Complete section 5.2 of this procedure.

- 5.6.2 Verify the Spent Fuel Building Doors are closed.

- 5.6.3 Verify the Spent Fuel Pool is at normal operating level (≥ -2 ft. on KFP5120; zero = El. 771'-4").

- 5.6.4 Removal of BPRA from a fuel assembly or Spent Fuel Rack insert:

- 5.6.4.1 Attach the BPRA Handling Tool to the Auxiliary

Hoist on the north side of the Spent Fuel Pool Bridge.

- 5.6.4.2 Move the bridge and trolley to center the tool over the fuel assembly or rack insert where the BPRA is to be handled. TS-3 (Bridge Left Interlock Bypass), TS-4 (Bridge Right Interlock Bypass) and/or TS-5 (Trolley Interlock Bypass) may be used to precisely align the tool.
- 5.6.4.3 Confirm that the relative orientation of the two large guide holes in the fuel assembly top nozzle or insert are in alignment with the handling tool (the two sets of red dots on two corners of the top frame plate of the tool are in line with the two guide pins).
- 5.6.4.4 With the tool handle in the "UNLATCHED" position slowly lower the tool and guide the two guide pins into the large guide holes in the fuel assembly top nozzle or insert.
- 5.6.4.5 Lower the tool to the full seated position (slack cable on the auxiliary hoist). Restore any bypassed interlocks to the OFF position.

NOTE

If the tool is not properly seated, the BPRA cannot be engaged by the gripper sleeve.

- 5.6.4.6 Observe that the bubble in the circular level mounted on the top plate is contacting some portion of the target.

CAUTION

Do not attempt to engage or withdraw the BPRA unless the tool is level as indicated by the bubble.

- 5.6.4.7 Disengage the pawl from the winch gear by moving the spring loaded pawl arm to the left while gasping the winch handle.
- 5.6.4.8 Manually turn the winch handle slowly in the "DOWN" direction until the suspended load is off the winch. This can be determined by slack in the cable.
- 5.6.4.9 Shift the handle to the "LATCH" position. The gripper has now engaged the holddown bar of BPRA.
- 5.6.4.10 Manually turn the winch handle slowly in the "UP" direction and observe that the rods are passing freely through the closed comb assemblies.
- 5.6.4.11 Continue turning "UP" direction until the BPRA is fully withdrawn into the tool and a significant resistance is felt in turning the winch handle.

CAUTION

Immediately stop applying rotational force and lock pawl into gear teeth.

5.6.4.12 Using the auxiliary hoist on the Spent Fuel Pool Bridge, raise the tool until the top limit switch stops the hoist.

5.6.4.13 Move BPRA to desired location.

5.6.5 Insertion of BPRA into a Fuel Assembly or Storage Rack Insert.

5.6.5.1 Move the bridge and trolley to center the tool (now holding the BPRA) over the fuel assembly or rack insert designated to receive the BPRA. TS-3 (Bridge Left Interlock Bypass), TS-4 (Bridge Right Interlock Bypass) and/or TS-5 (Trolley Interlock Bypass) may be used to precisely align the tool.

5.6.5.2 Confirm that the relative orientation of the two large guide holes in the fuel assembly top nozzle or insert are in agreement with the two guide pins on the handling tool.

5.6.5.3 Lower the tool and guide the two guide pins into the large guide holes in the fuel assembly or insert.

5.6.5.4 Lower the tool to the fully seated position (hoist cable is slack). Restore any bypassed interlocks to the OFF position.

NOTE

If the tool is not properly seated the BPRA cannot be inserted properly.

5.6.5.5 Observe that the bubble in the circulator level mounted on top plate is contacting some portion of the target.

CAUTION

Do not attempt to insert a BPRA into a fuel assembly or rack insert unless the tool is level as indicated by the bubble.

5.6.5.6 Disengage the pawl from the winch gear by moving the spring loaded pawl arm to the left while grasping the winch handle.

5.6.5.7 Manually turn the winch handle slowly in the DOWN direction to feed the bottom ends of the poison rods into the fuel assembly or insert until the BPRA bottoms. This can be determined by slack in the cable.

5.6.5.8 Shift the handle to the "UNLATCHED" position. The BPRA is now disengaged from the tool.

- 5.6.5.9 Manually turn the winch handle in the "UP" direction until all four comb assemblies have been tripped to the closed position.
- 5.6.5.10 Visually check to insure that the BPRA has been released from the tool and is in place in the fuel assembly or rack insert.
- 5.6.5.11 Using the auxiliary hoist on the Spent Fuel Pool Bridge, raise the handling tool until the top limit switch stops the hoist.
- 5.6.5.12 Move the handling tool to desired location.
- 5.7 RCC Thimble Plug Handling Tool (Spent Fuel Building).
 - 5.7.1 Complete Section 5.2 of this procedure.
 - 5.7.2 Verify the Spent Fuel Building Doors are closed.
 - 5.7.3 Verify the Spent Fuel Pool is at normal operating level (≥ -2 ft. on KFP5120; zero = El. 771'-4").
 - 5.7.4 Verify the handle for the thimble plug handling tool is in the "Released" position.
 - 5.7.5 Thimble Plug removal from fuel assemblies.
 - 5.7.5.1 Suspend the RCC Thimble Plug Handling Tool from the North Auxiliary Hoist of the Spent Fuel Pool Manipulator Crane.
 - 5.7.5.2 Move the bridge and trolley to center the tool over the fuel assembly containing the RCC Thimble Plug to be handled. TS-3 (Bridge Left Interlock Bypass), TS-4 (Bridge Right Interlock Bypass) and TS-5 (Trolley Interlock Bypass) may be used to precisely align the tool.
 - 5.7.5.3 Ensure that the tool is in the proper orientation to engage the thimble plug (the two guide pins on the top) should match the two large guide holes on the fuel assembly top nozzle).

Slowly lower the tool and guide the tool's pins into the holes on the assembly top nozzles.
 - 5.7.5.4 Lower the tool until the guide pins bottom out in the top nozzle (slack cable on the hoist). Return any bypassed interlocks to the OFF position.
 - 5.7.5.5 Rotate the operating handle to the "Engaged" position and slowly raise the thimble plug high enough to clear the fuel assembly.
 - 5.7.5.6 Continue raising the tool to the necessary

height to clear any obstacles in route to the fuel assembly that is to receive the thimble plug assembly.

5.7.6 Thimble Plug Insertion into Fuel Assemblies:

- 5.7.6.1 Center the tool above the fuel assembly that is to receive the Thimble Plug insuring that the tool is in the proper orientation in relation to the top nozzle.
- 5.7.6.2 Slowly lower the tool and carefully guide the locating pins into the fuel assembly top nozzle holes and continue lowering the tool; this will permit the thimble plug to enter the fuel assembly.
- 5.7.6.3 Continue lowering the tool until it reaches its bottom stop as seen by the slack cable.
- 5.7.6.4 Rotate the operating handle to the "Released" position.
- 5.7.6.5 Slowly raise the tool and visually insure that the Thimble Plug has been released from the tool.
- 5.7.6.6 Move the RCC Thimble Plug Handling Tool to its storage location or proceed to the next thimble plug.

5.8 New RCC Assembly Handling Tool

CAUTION

The New RCC Assembly Handling Tool can only be used under the following conditions:

- (a) The Fuel Assembly is located in the New Fuel Storage Vault or,
- (b) The Fuel Assembly is located in a "fully raised" new elevator.
- (c) The RCCA is not irradiated.

- 5.8.1 Verify the overhead fuel handling crane available per OP/O/A/6550/02 (Overhead Fuel Handling Crane Operation).
- 5.8.2 Verify the doors in the spent fuel building are closed.
- 5.8.3 Verify the 2500# spring scale is available with calibration sticker date valid.
- 5.8.4 Verify that Health Physics and performance have been informed of the transferring operation.
- 5.8.5 Verify the New RCC Assembly to be handled is housed in a fuel assembly as stated in the "CAUTION" statement above.
- 5.8.6 Attach the New RCC Assembly Handling Tool to the Auxiliary Hoist of the Overhead Fuel Handling Crane with the spring scale between the hook and tool.
- 5.8.7 Center the tool over the fuel assembly containing the RCCA.

- 5.8.8 Slowly lower the tool until it is three to four (3 to 4") inches from the entering the RCCA spider body.
- 5.8.9 Verify that the operating handles are in the full up (disengaged) position.
- 5.8.10 Continue lowering the tool slowly into the RCCA until the cable just begins to become slack, then stop.
- 5.8.11 Engage the tool into the RCCA by moving the operating handle to the "Down" position.
- 5.8.12 Slowly raise the RCCA about one foot (1 ft.) then lower it back into place.

CAUTION

Do not exceed the drag limits per Enclosure 9.3.

- 5.8.13 It it is desired to remove the New RCC Assembly from the fuel assembly.
 - 5.8.13.1 Slowly raise the RCCA, until the RCCA is nearly, but not quite out of the fuel assembly.

CAUTION

Do not exceed the drag limits per Enclosure 9.3.

- 5.8.13.2 Attach the RCCA radial support combs to the RCCA.
- 5.8.13.3 Slowly raise the RCCA, until the RCCA is dislodged from the fuel assembly.
- 5.8.13.4 Position the RCCA over the desired fuel assembly to deposit the RCCA.
- 5.8.13.5 Slowly lower the RCCA into the fuel assembly until the RCCA starts into the fuel assembly, then stop.

CAUTION

Do not exceed the drag limits per Enclosure 9.3.

- 5.8.13.6 Remove the RCCA radial support combs.
- 5.8.13.7 Slowly lower the RCCA into the fuel assembly until the RCCA is bottomed out in the fuel assembly and "slack cable" is reached.
- 5.8.14 Disengage the tool from the RCCA by moving the operation handles to the "UP" position.
- 5.8.15 Slowly raise the tool verifying that the RCCA is disengaged from the tool.
- 5.8.16 Move the New RCCA Handling Tool to its storage location or proceed to the NEW RCCA to be handled.

5.9 Shutdown of SFP Manipulator Crane.

- 5.9.1 Open the door of the MCC (on the bridge) and place the LCB circuit breaker and the Aux. Monorail Hoist Feeder Breaker in the "OFF" position.
- 5.9.2 Place the following circuit breakers in the lighting PNLBD in the "OFF" position.
 - 5.9.2.1 Bkr. No. 1 - Control, Selsyn, Dillon.
 - 5.9.2.2 Bkr. No. 2 - Console Receptacle.
 - 5.9.2.3 Bkr. No. 3 - Walkway Receptacle.
 - 5.9.2.4 Bkr. No. 4 - Console Receptacle.
 - 5.9.2.5 Bkr. No. 5 - Walkway Receptacle.
 - 5.9.2.6 Bkr. No. 6 - Shaded light for Target.
 - 5.9.2.7 Bkr. No. 7 - Heater De-energizer.
- 5.9.3 Place the "Main Power" and "Lighting" breakers (on the outside of the MCC) in the "OFF" position.
- 5.9.4 Unlock the console and verify that all interlock bypass switches are in the "OFF" position.
- 5.9.5 Place the circuit breaker (inside the console) to the "OFF" position and close and lock the console.
- 5.9.6 Verify that the emergency handwheels are mounted in the storage position.
- 5.9.7 Close and lock the console.

6.0 Fuel Transfer System

6.1 Initial Conditions

Date/Initials

- | | | |
|-----------|---------|--|
| ____/____ | 6.1.1 | If the transfer system is to be used to support a refueling outage the functional check of the crane PT/0/A/4550/01 must be performed before the outage commences. |
| ____/____ | 6.1.2 | The refueling cavity is filled per OP/1/A/6200/13 or OP/2/A/6200/13 (Filling, Draining, and Purification of Refueling Cavity). |
| ____/____ | 6.1.3 | Communications are established between the pool side and reactor side control stations. |
| ____/____ | 6.1.4 | The Transfer System Conveyor car is located at the end of its travel under the appropriate lifting frame. |
| | 6.1.5 | The following Technical Specifications are met: |
| ____/____ | 6.1.5.1 | 3/4.3.3 Radiation monitors LEMF17 and 42 are operable. |
| ____/____ | 6.1.5.2 | 3/4.9.11 The fuel handling ventilation exhaust system shall be operating and discharging through the HEPA filters and charcoal adsorbers during movement of irradiated fuel in the pool. |

___/___ 6.1.6 KF-122 (Fuel Transfer Tube) is open.

___/___ 6.1.7 Blind Flange has been removed from the fuel transfer tube.

6.2 Transfer of Fuel Assembly from the Spent Fuel Pool to Reactor Side.

6.2.1 Close the main power switch on the Spent Fuel Pool control console, and the reactor side control console.

6.2.2 Align the Spent Fuel Pool Fuel Transfer System control board per Enclosure 9.1 Appendix A.

6.2.3 Align the Reactor Side Fuel Transfer System control board per Enclosure 9.2 Appendix A.

6.2.4 Push to test the indicating lights on the Pool Side and Reactor Side control console. Replace any bulbs that will not light and retest.

6.2.5 Verify the fuel assembly is in the transfer basket.

6.2.6 De-energize the panel and motor heaters on the pool side and reactor side control panels.

6.2.7 Push the "Frame Down" button, on the pool side control console and verify that the "Frame Up" light goes out.

6.2.8 Verify the "Frame Down" light comes on when the frame is in the horizontal position.

6.2.9 Turn the Conveyor Control select switch to the "ON" position. The conveyor can now be controlled by the pool side control console.

6.2.10 Push the "Conveyor Start" pushbutton and verify that the conveyor begins to move toward the Reactor and the "Conveyor at Pit" light goes out and the conveyor position indicator begins to count up indicating conveyor movement to the reactor.

6.2.11 Observe the conveyor torque indicator for any unusual signs during traverse car movement.

6.2.12 Verify the conveyor stops and the "Conveyor at Reactor" light comes on when the conveyor reaches the Reactor Side.

6.2.13 Verify that on the Reactor Side control console the "Conveyor at Reactor" light comes on.

6.2.14 Push the "Frame Up" pushbutton, on reactor side control console and verify the frame begins to move up.

- 6.2.15 Verify the "Frame Up" light comes on and the hoist stops when the frame reaches the vertical position.
- 6.2.16 For removal of the fuel assembly from the upender refer to section 7.0 of this procedure.
- 6.2.17 Energize the panel and motor heaters on the pool side and reactor side control panels when not in use.
- 6.3 Transfer of fuel assembly from the reactor side to the Spent Fuel Pool.
 - 6.3.1 Close the main power switch on the Spent Fuel Pool control console, and the Reactor Side Control Console.
 - 6.3.2 Align the Spent Fuel Pool Fuel Transfer System control board per Enclosure 9.1 Appendix B.
 - 6.3.3 Align the Reactor Side Fuel Transfer System control board per Enclosure 9.2 Appendix B.
 - 6.3.4 Push to test the indicating lights on the Pool Side and Reactor Side control console. Replace any bulbs that will not light and retest.
 - 6.3.5 Verify the fuel assembly is in the transfer basket.
 - 6.3.6 De-energize the panel and motor heaters on the pool side and reactor side control panels.
 - 6.3.7 Push the "Frame Down" button on Reactor Side control panel and verify that the "Frame Up" light goes out.
 - 6.3.8 Verify the "Frame Down" light comes on when the frame is in the horizontal position.
 - 6.3.9 Turn the Conveyor Control select switch to the "ON" position.
The conveyor car can now be controlled by the pool side control console.
 - 6.3.10 Push the "Conveyor Start" pushbutton and verify that the conveyor begins to move toward the Spent Fuel Pit and that the "Conveyor at Reactor" light goes out, and the conveyor position indicator begins to count down indicating conveyor movement to the SFP.
 - 6.3.11 Observe the conveyor torque indicator for any unusual signs during traverse car movement.
 - 6.3.12 Verify that the conveyor stops and the "Conveyor at Pit" light comes on when the conveyor reaches the Spent Fuel Side.
 - 6.3.13 Push the "Frame Up" pushbutton on the pool side control console and verify the frame begins to move up and the "Frame Down" light goes off.

- 6.3.14 Verify the "Frame Up" light comes on and the hoist stops when the frame reaches the vertical position.
- 6.3.15 For removal of the fuel assembly refer to section 5.0 of this procedure.
- 6.3.16 Re-energize the panel and motor heaters on the pool side and reactor side control panels when not in use.

7.0 Reactor Building Manipulator Crane

7.1 Initial Conditions

Date/Initials

- / 7.1.1 If the Reactor building Manipulator Crane is to be used to support a refueling outage the functional check of the crane, PT/O/A/4550/01, must be performed before the outage commences.
- 7.1.2 The following Technical Specifications are met:
 - / 7.1.2.1 3/4.9.3 The reactor must be subcritical for 100 hours before refueling operations commence.
 - / 7.1.2.2 3/4.9.5 Communications are established between the Reactor Building and Control Room during core alterations.
 - / 7.1.2.3 3/4.9.6 The Manipulator Crane must be proved operable before refueling operations commence.
 - / 7.1.2.4 3/4.9.10 A minimum of 23 feet of water is above the fuel in the reactor.
- / 7.1.3 If the auxiliary hoist on the reactor building manipulator crane is to be used, the crane daily visual inspection must be performed once each 8-hour shift the hoist is used. (Forms are in the Shift Supervisor's Office and should be routed to the Maintenance Supervisor when completed).

7.2 Startup of Reactor Building Manipulator Crane.

- 7.2.1 Verify that air is available to the gripper assembly with the pressure gauge reading 70-100 psi.
- 7.2.2 Verify that the emergency handwheels are mounted in the storage position.
- 7.2.3 Verify the sprocket on the selsyn drive is properly engaged in its chain.
- 7.2.4 Unlock the console and verify that all interlock bypass switches are in the "OFF" position.
- 7.2.5 Place the ACB Breaker (inside the console) to the "ON" position.
- 7.2.6 Open the door to the MCC (on the bridge) and place the circuit breaker in the "ON" position.

- 7.2.7 Place the following circuit breakers in the lighting PNLBD, in the "ON" position.
 - 7.2.7.1 Bkr. No. 1 - Control, Selsyn, Dillon
 - 7.2.7.2 Bkr. No. 2 - Console Receptacle
 - 7.2.7.3 Bkr. No. 3 - Walkway Receptacle
 - 7.2.7.4 Bkr. No. 4 - Console Receptacle
 - 7.2.7.5 Bkr. No. 5 - Walkway Receptacle
 - 7.2.7.6 Bkr. No. 6 - Shaded light for target
 - 7.2.7.7 Bkr. No. 7 - Heater De-energizer
 - 7.2.8 Place the "Main Power" and "Lighting" breakers (on the outside of MCC) in the "ON" position.
 - 7.2.9 Verify the power light "ON" for the fuel bridge area monitor and verify the calibration sticker is valid.
 - 7.2.10 Verify both Dillon "ON" lights are illuminated (inside console) and verify the Dillons have been calibrated within the last 6 months.
 - 7.2.11 Close and lock the console.
 - 7.2.12 Check (push-to-test) all indicating lights on the control console. If any light fails to illuminate, replace bulb, and check again.
 - 7.2.13 The following should be illuminated.
 - 7.2.13.1 "Fuel Gripper disengaged" (opal)
 - 7.2.13.2 "Fuel Gripper Up disengaged" (green)
 - 7.2.13.3 "Latch Extended" (opal)
 - 7.2.13.4 "Rod Gripper disengaged" (opal)
 - 7.2.13.5 "Rod Gripper Up First Stage" (green)
 - 7.2.13.6 "Rod Slow Zone in Basket Area" (amber), if not over core area.
 - 7.2.14 Verify power available to the auxiliary hoist by momentarily depressing the "down" pushbutton, then the "UP" pushbutton.
- 7.3 Transferring Fuel
- 7.3.1 Complete section 7.2 of this procedure.
 - 7.3.2 Verify the Refueling cavity is at normal operating level (≥ -2 ft. on KFP5120; zero = El. 771'-4"). If the core is being loaded "dry", this requirement is waived.
 - 7.3.3 Verify the "Fuel Gripper UP Disengaged" light is illuminated.
 - 7.3.4 Move the bridge "Forward" or "Reverse" and trolley "Right" or "Left" to index the bridge and trolley over the desired location to pick up a fuel assembly.
 - 7.3.4.1 When accessing the transfer basket verify the basket is in its full up position.

- 7.3.4.2 When accessing the RCC Change Fixture, verify that the carriage is cleared from under the guide tube and locked in position to remove or receive a fuel assembly.
- 7.3.4.3 When accessing the core area, verify the index marks correspond to the proper mast being used.
- 7.3.5 Position the fuel mast over the desired location.
- 7.3.6 Use the fuel hoist control handle to lower the gripper until stopped by the appropriate slow zone.
 - 7.3.6.1 If over the transfer basket or RCC Change Fixture the "Fuel Gripper Zone Bottom of Core" will illuminate.
- 7.3.7 Using the job pendant control, push the "Jog Down" button and lower the gripper until the "Fuel Gripper Low Load" light is illuminated.
- 7.3.8 Verify correct position of Z-Z tape of within $\pm 1/4$ " for new fuel or $\pm 1/2$ " for spent fuel according to Enclosure 9.6 Unit 1 Reactor Z-Z tape readings or Enclosure 9.7 Unit 2 Reactor Z-Z tape readings.
- 7.3.9 Place the fuel gripper control to the "Engaged" position the "Disengaged" light will go "OFF" and the "Engaged" light will be illuminated.
 - 7.3.9.1 If over the core, get permission from the Fuel Loading Supervisor before engaging the fuel assembly.
- 7.3.10 Begin raising the gripper with Jog pendant control. The "Low Load" light will go out and the Dillon load cell reading should increase to 2020 lbs. (2320 lbs dry weight) to 2180 lbs. (2480 lbs. dry weight).

CAUTION

It is very important that the crane operator monitor the Dillon load cell when fuel is being moved. If the initial reading (established when the assembly is raised or lowered the first few inches) varies by ± 60 pounds the operator must stop fuel movement and evaluate the situation. Before re-initiating fuel movement the operator must determine the reason(s) for the variance and take corrective action, if necessary.

- 7.3.11 When the appropriate slow zone clears, use the fuel hoist master control, at its slowest available speed, to raise the assembly out of the core. Once the bottom of the assembly has cleared the core the fuel hoist master control's faster speeds may be used to raise the assembly until the hoist stops and the "Fuel Gripper Full Up Light" illuminates. Verify the gripper full up position on the Z-Z tape.

CAUTION

When removing fuel from the core, fuel should be raised slowly until it is clear of the core. The weight indicator should be watched continually to see that indicated weight does not exceed approximately 2300 lbs., (2600 lbs. dry weight) which would indicate that the fuel assembly is hanging up on adjacent assemblies.

- 7.3.12 Move the bridge "Forward" or "Reverse" and the trolley "Right" or "Left" to index the bridge and trolley over the desired location to deposit the fuel assembly.
 - 7.3.12.1 If the assembly is to be deposited in the transfer basket, align the transfer system per Enclosure 9.1 and 9.2 Appendix B.
 - 7.3.12.2 If assembly is to be deposited in the RCC Change Fixture, verify that the carriage is clear from under the guide and locked in position to receive the fuel assembly.
 - 7.3.12.3 If the assembly is to be deposited in the core, verify that the trolley is positioned using the fuel mast index mark, not the rod mast index mast.
- 7.3.13 ~~Using the fuel hoist control handle~~, lower the gripper until it is stopped by the appropriate slow zone.
 - (a) If over the transfer basket or RCC Change Fixture the "Fuel Slow Zone Entering Basket" will illuminate.
 - (b) If over the core the "Fuel Slow Zone Entering Core" will illuminate.
- 7.3.14 ~~Using the jog pendant control~~, push the "Jog Down" button and lower the gripper until the appropriate slow zone light goes out.
- 7.3.15 Use the fuel hoist control handle to lower the gripper until the appropriate slow zone light comes on.
 - 7.3.15.1 If over the transfer basket or RCC Change Fixture the "Fuel Gripper Zone Bottom of Basket" will illuminate.
 - 7.3.15.2 If over the core, the slowest available speed of the fuel hoist control must be used between slow zones to avoid serious damage to the fuel assembly. The operator must continually monitor the Dillon load cell while lowering an assembly and must stop fuel movement if the weight drops more than 200 lbs. If a variance occurs, the operator must determine the cause and take corrective action before continuing the fuel placement. The appropriate slow zone if over the core, is "Bottom of Core".

CAUTION

During insertion of fuel into the core, the weight indicator should be watched continually. Stop operation if indicated weight drops below approximately 1800 lbs. (2100 lbs. dry weight). The fuel assembly is interferring with adjacent assemblies and should be withdrawn and realigned with core position.

- 7.3.16 Depress "Jog Down" pushbutton until hoist drive stops. "Fuel Gripper Low Load" light should come on.
- 7.3.17 Verify hoist elevation indicator Z-Z tape reading on Enclosure 9.6 Unit 1 Reactor Z-Z tape readings or Unit 2 Reactor Z-Z tape readings.
- 7.3.18 Place gripper control to the "Disengaged" position. "Gripper Engaged" light will go out, "Gripper Disengaged" light will come on.
 - 7.3.18.1 If over the core, get permission from the Fuel Loading Supervisor before disengaging the fuel assembly.
- 7.3.19 Depress "Jog Up" pushbutton and raise gripper out of appropriate slow zone then use fuel hoist control handle to raise gripper.
- 7.3.20 Continue raising the gripper until it stops. Verify that the "Fuel Gripper Up Disengaged" light comes on.
- 7.4 Transferring thimble plugs (Reactor Building Manipulator Crane Rod Mast).
 - 7.4.1 Complete section 7.2 of this procedure.
 - 7.4.2 Verify the Refueling Cavity is at normal operating level (\geq -2 ft. on KFP5120; zero = El. 771'-4"). If the core is being loaded "dry" this requirement is waived.
 - 7.4.3 Verify the following lights illuminated:
 - "Rod Gripper Disengaged"
 - "Rod Gripper Up First Stage"
 - "Latch Extended"
 - 7.4.4 Move the bridge "Forward" or "Reverse" and trolley "Right" or "Left" to index the bridge and trolley over the desired location to pick up a thimble plug.
 - 7.4.4.1 When accessing the transfer basket; verify the basket is in its full up position.
 - 7.4.4.2 When accessing the core area, verify that the trolley is positioned according to the rod mast index mark, not the fuel mast index mark.
 - 7.4.5 Position the rod mast over the desired location.

NOTE

If over the transfer basket proceed to step

7.4.8 omitting step 7.4.7.

- 7.4.6 Using the Rod Hoist Control Handle, lower the rod gripper until it stops. Verify the "Rod Gripper Up First Stage" light goes off and the "Rod Slow Zone - Core Area" light comes on.
- 7.4.7 Using the "Rod Inner Mast Jog Switch"; lower the rod gripper until it stops. Verify that the "Rod Inner Mast Low Load" light comes on.
 - 7.4.7.1 If over the Transfer basket the "Rod Inner Mast down in Basket" will illuminate and the "Rod Slow Zone Basket Area" light will go out.
 - 7.4.7.2 If over the core the "Rod Inner Mast Down In Core" light will illuminate.
- 7.4.8 Using the "Rod Gripper Jog Switch" lower the rod gripper until stopped by "Rod Gripper Low Load"; verify the "Rod Gripper Low Load" light illuminates.
 - 7.4.8.1 If over the transfer basket; verify the "Rod Gripper Down in Basket" light illuminates.
 - 7.4.8.2 If over the core; verify the "Rod Gripper Down In Core" light illuminates.
- 7.4.9 Verify correct position of Z-Z tape to within $\pm 1/4$ " for new fuel or $\pm 1/2$ " for spent fuel according to Enclosure 9.6 Unit 1 Reactor Z-Z tape readings or Enclosure 9.7 Unit 2 Z-Z tape readings.
- 7.4.10 Place the Rod Gripper Control to the "ENGAGED" position verify the "Rod Gripper Disengaged" light goes "OFF".
- 7.4.11 Verify the "Thimble Plug Engaged" light illuminates.
- 7.4.12 Using the "Rod Gripper Jog Switch"; raise the rod gripper and verify the "Rod Gripper Low Load" light goes "OFF."

CAUTION

Refer to drag limits per Enclosure 9.3.

- 7.4.13 Verify the following:
 - 7.4.13.1 If over the transfer basket; verify the "Rod Gripper Down in Basket" light goes "OFF".
 - 7.4.13.2 If over the core; verify the "Rod Gripper Down in Core" light goes "OFF".
- 7.4.14 Continue raising the gripper with the "Rod Gripper Jog Switch" until the gripper stops and the "Rod Inner Mast Low Load" light goes "OFF".

NOTE

If over the transfer basket the "Rod Slow Zone Basket Area" light will illuminate.

- 7.4.15 Raise the gripper using the "Rod Inner Mast Jog Switch".
- 7.4.16 Verify the following:
 - 7.4.16.1 If over the transfer basket; verify the "Rod Inner Mast down in Basket" light goes "OFF".
 - 7.4.16.2 If over the core, verify the "Rod Inner Mast Down in Core" light goes "OFF".
- 7.4.17 Continue raising the gripper using the "Rod Inner Mast Jog Switch" until the appropriate slow zone light goes "OFF".

NOTE

If over the transfer basket: verify the "Rod Slow Zone Basket Area" stays "ON"

- 7.4.17.1 If over the core; verify the "Rod Slow Zone Core Area" light goes "OFF".
- 7.4.18 Continue raising the gripper using the "Main Rod Hoist Control Handle" until the rod gripper stops and "Rod Gripper Up First Stage" light illuminates.

NOTE

If over the transfer basket the "Rod Inner Mast Jog Switch" must be used.

- 7.4.19 Verify the correct gripper position on the Z-Z tape.
- 7.4.20 If the fuel assembly is to be transferred, refer to section 7.3 of this procedure.
- 7.4.21 Move the bridge "Forward" or "Reverse" and the trolley "Right" or "Left" to index the bridge and trolley over the desired location to deposit the thimble plug.
 - 7.4.21.1 If depositing the thimble plug in a fuel assembly in the transfer basket, verify the basket is in its full up position.
 - 7.4.21.2 If depositing the thimble plug in a fuel assembly in the core area, verify that the trolley is positioned according to the rod mast index mark, not the fuel mast index mark.
- 7.4.22 Position the Rod Mast over desired location.
- 7.4.23 Verify the proper lights illuminated:
 - "Rod Gripper Up First Stage"
 - "Thimble Plug Engaged"
 - "Latch Extended"

NOTE

If over the transfer basket, proceed to Step 7.4.25 omitting Step 7.4.24.

- 7.4.24 Using "Main Rod Hoist Control Handle" lower the rod gripper until it stops. Verify that the "Rod Gripper Up First Stage" light goes out and the "Rod Slow Zone-Core Area" lights comes on.
- 7.4.25 Using the "Rod Inner Mast Jog Switch" lower the rod gripper until it stops. Verify that the "Rod Inner Mast Low Load" light comes on.
 - 7.4.25.1 If the over the transfer basket the "Rod Inner Mast Down in Basket" light will illuminate and the "Rod Slow Zone Basket Area" light will go out.
 - 7.4.25.2 If the over the core; the "Rod Inner Mast Down in Core" light will illuminate.

CAUTION

Do not exceed the drag limit listed in Enclosure 9.3.

- 7.4.26 Using the "Rod Gripper Jog Switch" lower the rod gripper until it stops and the "Rod Gripper Low Load" light illuminates.
 - 7.4.26.1 If over the transfer basket the "Rod Gripper Down in Basket" light will illuminate.
 - 7.4.26.2 If over the core; the "Rod Gripper Down in Core" light will illuminate.
- 7.4.27 Verify correct position of Z-Z tape to within $\pm 1/4$ " for new fuel or $\pm 1/2$ " for spent fuel according to Enclosure 9.6 Unit 1 Reactor Z-Z tape readings or Enclosure 9.7 Unit 2 Reactor Z-Z tape readings.
- 7.4.28 Place the "Rod Gripper Control" switch to disengaged. Verify the "Thimble Plug Engaged" light goes off and the "Latch Extended" light stays on.
- 7.4.29 Verify the "Rod Gripper Disengaged" Light illuminates.
- 7.4.30 Using the "Rod Gripper Jog Switch" raise the Rod Gripper and verify the "Rod Gripper Low Load" light goes "OFF".
- 7.4.31 Verify the following:
 - 7.4.31.1 If over the transfer basket; verify the "Rod Gripper Down in Basket" light goes "OFF".
 - 7.4.31.2 If over the core; verify the "Rod Gripper Down in Core" light goes "OFF".
- 7.4.32 Continue raising the gripper with the "Rod Gripper Jog switch" until the gripper stops and the "Rod Inner Mast Low Load" light goes "OFF".

NOTE

If over the transfer basket the "Rod Slow Zone Basket Area" light will illuminate.

7.4.33 Raise the gripper using the "Rod Inner Mast Jog Switch".

7.4.34 Verify the following:

7.4.34.1 If over the transfer basket; verify the "Rod Inner Mast Down in Basket" light goes "OFF".

7.4.34.2 If over the core; verify the "Rod Inner Mast Down in Core" light goes "OFF".

7.4.35 Continue raising the gripper using the "Rod Inner Mast Jog Switch" until the appropriate slow zone light goes "OFF"

NOTE

If over the transfer basket; verify the "Rod Slow Zone Basket Area" light stays "ON".

7.4.35.1 If over the core; verify the "Rod Slow Zone Core Area" lights goes "OFF".

7.4.36 Raise the gripper using the "Main Rod Hoist Control Handle" until the rod gripper stops and "Rod Gripper Up First Stage" light illuminates.

NOTE

If over the transfer basket the "Rod Inner Mast Jog Switch" must be used.

7.4.37 Verify the correct gripper position on the Z-Z tape.

7.4.38 If a fuel assembly is to be transferred, refer to section 7.3 of this procedure.

7.5 Transferring Control Rods (Reactor Building Manipulator Crane Rod Mast).

7.5.1 Complete section 7.2 of this procedure.

7.5.2 Verify the Refueling Cavity is at normal operating level (\geq -2 ft. on KFP5120; zero = El. 771'-4"). If control rod shuffles are being done during a "dry" initial core load, this requirement is waived.

7.5.3 Verify the following lights illuminated:

"Rod Gripper Disengaged"

"Rod Gripper Up First Stage"

"Latch Extended".

7.5.4 Move the bridge "Forward" or "Reverse and trolley "Right" or "Left"

to index the bridge and trolley over the desired location to pick up a control rod.

7.5.4.1 When accessing the transfer gasket; verify the basket is in its full up position.

7.5.4.2 When accessing the core area; verify that the trolley is positioned according to the rod mast index mark, not the fuel mast index marks.

7.5.5 Position the Rod Mast over the desired location.

NOTE

If over the transfer basket proceed to Step 7.5.8 omitting Step 7.5.7.

7.5.6 Using the "Main Rod Hoist Control Handle" lower the Rod Gripper until it is stopped by the appropriate Slow Zone; verify the "Rod Gripper Up First Stage" light goes "OFF".

7.5.6.1 If over the core; verify the "Rod Slow Zone Core Area" light illuminates.

7.5.7 Using the "Rod Inner Mast Jog Switch"; lower the rod gripper until stopped by the "Rod Inner Mast Low Load" verify the "Rod Inner Mast Low Load" light illuminates:

7.5.7.1 If over the transfer basket; verify the "Rod Inner Mast Down in Basket" light illuminates and the "Rod Slow Zone Basket Area" light goes out.

7.5.7.2 If over the core; verify the "Rod Inner Mast Down in Core" light illuminates.

7.5.8 Using the "Rod Gripper Jog Switch" lower the rod gripper until stopped by "Rod Gripper Low Load", verify the "Rod Gripper Low Load" light illuminates.

7.5.8.1 If over the transfer basket; verify the "Rod Gripper Down in Basket" light illuminates.

7.5.8.2 If over the core; verify the "Rod Gripper Down in Core" light illuminates.

7.5.9 Verify correct position of Z-Z tape to within $\pm 1/4$ " for new fuel or $\pm 1/2$ " for spent fuel according to Enclosure 9.6 Unit 1 Reactor Z-Z tape readings or Enclosure 9.7 Unit 2 Reactor Z-Z tape readings.

7.5.10 Place the rod gripper control to the "Engaged" position, verify the "Rod Gripper Disengaged" and "Latch Extended" lights go "OFF".

7.5.11 Verify the "Rod Engaged" and "Latch Retracted" lights illuminate.

NOTE

If over the transfer basket proceed to step 7.5.15 omitting steps 7.5.12, 7.5.13, and 7.5.14.

- 7.5.12 Using the "Rod Gripper Jog Switch"; raise the rod gripper and verify the "Rod Gripper Low Load" light goes "OFF".

CAUTION

Do not exceed the drag limits per Enclosure 9.3.

- 7.5.13 Verify the "Rod Gripper Down in Core" light goes "OFF".
- 7.5.14 Continue raising the gripper with "Rod Gripper Jog Switch" until the "Rod Slow Zone Core Area" light goes "OFF".
- 7.5.15 Raise the gripper with the "Main Rod Hoist Control Handle", until stopped by the appropriate slow zone.
- 7.5.15.1 If over the transfer basket; verify the "Rod Slow Zone Basket Area" light illuminates and the "Rod Inner Mast Low Load" light goes off.
- 7.5.15.2 If over the core; verify the "Rod Slow Zone Core Area" light illuminates.
- 7.5.16 If over the core raise the gripper with the "Rod Gripper Jog Switch", until stopped by the "Rod Inner Mast Low Load"; verify the "Rod Inner Mast Low Load" light goes "OUT"
- 7.5.17 Raise the gripper with the "Rod Inner Mast Jog Switch".
- 7.5.18 Verify the following:
- 7.5.18.1 If over the transfer basket; verify the "Rod Inner Mast Down in Basket" light goes "OFF".
- 7.5.18.2 If over the core; verify the "Rod Inner Mast Down in Core" light goes "OFF".
- 7.5.19 Continue raising the gripper with the "Rod Inner Mast Jog Switch" until the appropriate slow zone light goes "OFF".
- 7.5.19.1 If over the transfer area; verify the "Rod Slow Zone Basket Area" light stays "ON".
- 7.5.19.2 If over the core; verify the "Rod Slow Zone Core Area" light goes "OFF".
- 7.5.20 Raise the gripper with the "Main Rod Hoist Control Handle" until the rod gripper stops and "Rod Gripper Full Up" light illuminates.

NOTE

If over the transfer basket the "Rod Inner Mast Jog Switch" must be used.

- 7.5.21 Verify correct position of the gripper on the Z-Z tape.
- 7.5.22 If the fuel assembly is to be transferred, refer to Section 7.3 of this procedure.

- 7.5.23 Move the bridge "Forward" or "Reverse" and the trolley "Right" or "Left" to index the bridge and trolley over the desired location to deposit the control rod.
- 7.5.23.1 If depositing the control rod in a fuel assembly in the transfer basket, verify the basket is in its full up position.
- 7.5.23.2 If depositing the control rod in a fuel assembly in the core area, verify the index marks correspond to the rod mast being used.
- 7.5.24 Position the rod mast over desired location.
- 7.5.25 Verify the proper lights illuminated:
- "Rod Gripper Full Up"
 - "Rod Engaged"
 - "Latch Retracted"

NOTE

If over the transfer basket proceed to step

7.5.27 omitting step 7.5.26.

- 7.5.26 Using the "Main Rod Hoist Control Handle", lower the rod gripper until it is stopped by the appropriate slow zone; verify the "Rod Gripper Full Up" light goes "OFF".
- 7.5.26.1 If over the core; verify the "Rod Slow Zone Core Area" light illuminates.
- 7.5.27 Using the "Rod Inner Mast Jog Switch", lower the rod gripper.
- 7.5.28 Verify the following:
- 7.5.28.1 If over the transfer basket; verify the "Rod Inner Mast Down in Basket" light illuminates.
- 7.5.28.2 If over the core; verify the "Rod Inner Mast Down in Core" light illuminates.
- 7.5.29 Continue lowering the rod gripper with the "Rod Inner Mast Jog Switch" until the rod gripper stops and the "Rod Inner Mast Low Load" light illuminates and the "Rod Slow Zone Basket Area" light goes out.

CAUTION

Do not exceed the drag limits per Enclosure 9.3.

NOTE

If over the transfer basket proceed to step 7.5.32 omitting steps 7.5.30 and 7.5.31.

- 7.5.30 Using the "Rod Gripper Jog Switch" lower the rod gripper until the "Rod Slow Zone Core Area" light goes "OFF".
- 7.5.31 Using the "Main Rod Hoist Control Handle", lower the rod gripper until stopped by the appropriate slow zone; verify the "Rod Slow Zone Core Area" light illuminates.
- 7.5.32 Using the "Rod Gripper Jog Switch" lower the rod gripper until the rod gripper stops and the "Rod Gripper Low Load" lights illuminates.

NOTE

If over the transfer basket the "Main Rod Hoist Control Handle" must be used.

- 7.5.33 Verify the following:
 - 7.5.33.1 If over the transfer basket; verify the "Rod Gripper Down in Basket" light illuminates.
 - 7.5.33.2 If over the core; verify the "Rod Gripper Down in Core" light illuminates.
- 7.5.34 Verify correct position of Z-Z tape to within $\pm 1/4$ " for new fuel or $\pm 1/2$ " for spent fuel according to Enclosure 9.6 Unit 1 Reactor Z-Z tape readings or Enclosure 9.7 Unit 2 Reactor Z-Z tape readings.
- 7.5.35 Place the "Rod Gripper Control" to the "Disengaged" position, verify the "Rod Engaged" and "Latch Retracted" lights go "OFF".
- 7.5.36 Verify the "Rod Gripper Disengaged" and "Latch Extended" lights illuminate.
- 7.5.37 Using the "Rod Gripper Jog Switch" raise the rod gripper and verify the "Rod Gripper Low Load" light goes "OFF".

NOTE

If over the transfer basket the "Main Rod Hoist Control Handle" must be used.

- 7.5.38 Verify the following:
 - 7.5.38.1 If over the transfer basket; verify the "Rod Gripper Down in Basket" light goes "OFF".
 - 7.5.38.2 If over the core; verify the "Rod Gripper Down in Core" light goes "OFF".
- 7.5.39 Continue raising the gripper with the "Rod Gripper Jog Switch" until the gripper stops and the "Rod Inner Mast Low Load" light goes "OFF" and the "Rod Slow Zone Basket Area" light illuminates.

NOTE

If over the transfer basket the "Main Rod Hoist Control Handle" must be used.

7.5.40 Raise the gripper using the "Rod Inner Mast Jog Switch".

7.5.41 Verify the following

7.5.41.1 If over the transfer basket; verify the "Rod Inner Mast Down in Basket" light goes "OFF".

7.5.41.2 If over the core; verify the "Rod Inner Mast Down in Core" light goes "OFF".

7.5.42 Continue raising the gripper using the "Rod Inner Mast Jog Switch" until the appropriate slow zone light goes "OFF".

NOTE

If over the transfer basket, verify the "Rod Slow Zone Basket Area" light stays "ON".

7.5.42.1 If over the core; verify the "Rod Slow Zone Core Area" light goes "OFF".

7.5.43 Raise the gripper using the "Main Rod Hoist Control Handle" until the rod gripper stops and "Rod Gripper Up First Stage" light illuminates.

NOTE

If over the transfer basket the "Rod Inner Mast Jog Switch" must be used.

7.5.44 Verify correct position of the gripper on the Z-Z tape.

7.5.45 If a fuel assembly is to be transferred, refer to section 7.3 of this procedure.

7.6 Shutdown of the Reactor Building Manipulator Crane

7.6.1 Open the door to the MCC (on the bridge) and place the circuit breaker in the "OFF" position.

7.6.2 Place the following circuit breakers in the lighting PNLBD, in the "OFF" position.

7.6.2.1 Bkr. No. 1 - Control, Selsyn, Dillon.

7.6.2.2 Bkr. No. 2 - Console Receptacle.

7.6.2.3 Bkr. No. 3 - Walkway Receptacle.

7.6.2.4 Bkr. No. 4 - Console Receptacle.

7.6.2.5 Bkr. No. 5 - Walkway Receptacle.

7.6.2.6 Bkr. No. 6 - Shaded light for target.

7.6.2.7 Bkr. No. 7 - Heater De-energizer.

- 7.6.3 Place the "Main Power" and "Lighting" breakers (on the outside of MCC) in the "OFF" position.
- 7.6.4 Unlock the console and verify that all interlock bypass switches are in the "OFF" position.
- 7.6.5 Place the ACB Breaker (inside the console) to the "OFF" position.
- 7.6.6 Close and lock the console.
- 7.6.7 Verify that the emergency handwheels are mounted in the storage position.

8.0 RCC Change Fixture

8.1 Initial Conditions

Date/Initials

- ____/____ 8.1.1 If the RCC Change Fixture is to be used to support a refueling outage, the functional check of the Change Fixture, PT/O/A/4550/01, must be performed before the outage commences.
- ____/____ 8.1.2 Reactor Building Manipulator Crane in operation per Section 7.2 of this procedure.

8.2 RCC Assembly Transfer

CAUTION

The RCC Change Fixture carriage position cannot be observed from the Operator's location. A second operator must determine visually that the carriage is in the proper position before a fuel assembly or RCC element is inserted or removed.

CAUTION

Do not put air on the gripper while a RCC Assembly is suspended in the guide tube. Air pressure will raise the gripper locking button, allowing the flexure fingers to release and drop the RCC assembly.

- 8.2.1 Lower the revolving stop by moving the operating handle located on the drive mechanism mounting plate to the back of its guide sleeve. Rotate handle 90° to lock in place.
- 8.2.2 Loosen shaft clamp on carriage drive mechanism.
- 8.2.3 Rotate positioning handle of the carriage drive mechanism to move the carriage south along the tracks until a carriage stop contacts the stationary stop at the end of the tracks.
- 8.2.4 Ensure that the carriage is now cleared from under the guide tube and in position to be loaded by the Manipulator Crane.
- 8.2.5 Tighten the Shaft Clamp on the carriage drive mechanism.

NOTE

Each time the carriage is positioned, the Shaft Clamp should be tightened to prevent movement of the carriage during changing operations.

- 8.2.6 Using the Manipulator Crane, transfer a fuel assembly containing a RCC assembly that is to be removed into the north carriage compartment (closest to guide tube), per Section 7.3 of this procedure.
- 8.2.7 Using the Manipulator Crane, transfer a fuel assembly that is to receive a RCC assembly into the south carriage compartment (farthest from guide tube), per Section 7.3 of this procedure.
- 8.2.8 Loosen the shaft clamp on the carriage drive mechanism.
- 8.2.9 Release the revolving stop operating handle to allow the stop to return to the vertical position.
- 8.2.10 Move the carriage under the guide tube by turning the carriage positioning handle until the first carriage stop contacts the revolving stop. The fuel assembly containing the RCC assembly is now located directly under the guide tube and in position for RCC assembly removal.
- 8.2.11 Tighten the shaft clamp on the carriage drive mechanism.
- 8.2.12 Position the pneumatic selector valve (located on the drive mechanism mounting plate) down to energize the gripper position.

NOTE

This will raise the gripper locking button and free the flexure fingers so that they can be inserted into the top of the RCC assembly.

- 8.2.13 Actuate the gripper hoist to lower the gripper through the guide tube until the "Down" light illuminates.

NOTE

Observe the gripper hoist cable during lowering. Slack cable along with the "Down" light will indicate that the flexure fingers have entered the top of the RCC assembly and that the gripper is seated.

- 8.2.14 Verify the gripper hoist is stopped by the Limit Switch when the gripper is seated.
- 8.2.15 Release the pneumatic selector valve to de-energize the gripper piston and engage the RCC.

NOTE

This will lock the flexure fingers in a radially extended position and the RCC assembly will be ready for removal from the fuel assembly.

- 8.2.16 Actuate the gripper hoist to raise the gripper through the guide tube until the "UP" light illuminates. The RCC assembly is now clear of the fuel assembly and carriage.
- 8.2.17 Loosen the shaft clamp on the carriage drive mechanism.
- 8.2.18 Move the carriage along the tracks (south) by turning the carriage positioning handle until the revolving stop can be lowered.
- 8.2.19 Lower the revolving stop.
- 8.2.20 Move the carriage along the tracks (north) by turning the carriage positioning handle until the first carriage stop contacts the stationary stop. The fuel assembly that is to receive the RCC assembly is now located directly below the guide tube.
- 8.2.21 Tighten the shaft clamp on the carriage drive mechanism.
- 8.2.22 Actuate the gripper hoist to lower the gripper and RCC assembly through the guide tube until the "Down" light illuminates.

NOTE

Observe the gripper hoist cable during lowering. Slack cable along with the "Down" light will indicate seating of the RCC assembly.

- 8.2.23 Verify the gripper hoist is stopped when the RCC assembly is properly placed in the fuel assembly.
- 8.2.24 Hold the pneumatic selector valve down to energize the gripper piston, which unlocks the flexure fingers and disengages the RCC assembly.
- 8.2.25 Actuate the gripper hoist to raise the gripper through the guide tube until the "UP" light illuminates. The limit switch on the hoist will stop the gripper at the proper elevation.
- 8.2.26 Release the pneumatic selector valve to de-energize the gripper piston.
- 8.2.27 Loosen the shaft clamp.
- 8.2.28 Move the carriage south along the tracks until a carriage stop contacts the stationary stop at the end of the tracks. The carriage is now in position for removing the fuel assemblies.
- 8.2.29 Tighten the shaft clamp.
- 8.2.30 Using the Manipulator Crane, transfer the fuel assemblies to their desired locations, per section 7.3 of this procedure.

8.3 RCC Assembly Storage

- 8.3.1 Ensure that the carriage is located at the south end of its travel with the carriage cleared from under the guide tube. If not, complete steps 8.2.1 thru 8.2.4 of this procedure.

- 8.3.2 Using the Manipulator Crane, transfer a fuel assembly containing a RCC assembly that is to be stored to the north carriage compartment (closest to guide tube), per Section 7.3 of this procedure.
- 8.3.3 Loosen the shaft clamp on the carriage drive mechanism.
- 8.3.4 Release the revolving stop operating handle to allow the stop to return to the vertical position.
- 8.3.5 Move the carriage under the guide tube by turning the carriage positioning handle until the first carriage stop contacts the revolving stop. The RCC assembly is now located directly under the guide tube and in a position for removal.
- 8.3.6 Tighten the shaft clamp on the carriage drive mechanism.
- 8.3.7 Hold the pneumatic selector valve (located on the drive mechanism mounting plate) down to energize the gripper piston.

NOTE

This will raise the gripper locking button and free the flexure fingers so that they can be inserted into the top of the RCC assembly.

- 8.3.8 Actuate the gripper hoist to lower the gripper through the guide tube until the "Down" light illuminates.

NOTE

Observe the gripper hoist cable during lowering. Slack cable along with the "Down" light will indicate that the flexure fingers have entered the top of the RCC assembly and that the gripper is seated.

- 8.3.9 Verify the gripper hoist is stopped by the Limit Switch when the gripper is seated.
- 8.3.10 Release the pneumatic selector valve to de-energize the gripper piston.

NOTE

This will lock the flexure fingers in a radially extended position and the RCC assembly will be ready for removal from the fuel assembly.

- 8.3.11 Actuate the gripper hoist to lift the gripper and RCC assembly through the guide tube until the "UP" light illuminates. A limit switch on the hoist will stop the gripper at a proper elevation to clear the RCC assembly from the fuel assembly.

- 8.3.12 Loosen the shaft clamp.
- 8.3.13 Move the carriage south by turning the carriage positioning handle until the revolving stop can be lowered.
- 8.3.14 Lower the revolving stop by moving the operating handle located on the drive mechanism mounting plant to back of its guide sleeve.
- 8.3.15 Move the carriage north until the first carriage stop has traveled past the location of the revolving stop.
- 8.3.16 Release the revolving stop operating handle to allow the stop to return to the vertical position.
- 8.3.17 Continue moving the carriage until the middle carriage stop contacts the revolving stop. The RCC storage compartment is now located directly under the guide tube and in position for receiving the RCC assembly.
- 8.3.18 Tighten the shaft clamp on the carriage drive mechanism.
- 8.3.19 Actuate the gripper hoist to lower the gripper and RCC assembly through the guide tube until the "Down" light illuminates.

NOTE

Observe the gripper hoist cable during lowering Slack Cable along with the "Down" light will indicate seating of the RCC assembly.

- 8.3.20 Verify the gripper hoist is stopped by the Limit Switch when the RCC assembly is properly placed in the storage compartment.
- 8.3.21 Hold the pneumatic selector valve down to energize the gripper piston, releasing the RCC assembly.
- 8.3.22 Actuate the gripper hoist to raise the gripper through the guide tube until the "UP" light illuminates. A limit switch on the hoist will stop the gripper at the proper elevation.
- 8.3.23 Release the pneumatic selector valve to de-energize the gripper position.
- 8.3.24 Loosen the shaft clamp.
- 8.3.25 Turn the positioning handle of the carriage drive mechanism to move the carriage south until the revolving stop can be lowered.
- 8.3.26 Lower the revolving stop.
- 8.3.27 Turn the positioning handle of the carriage drive mechanism to move the carriage south along the tracks until a carriage stop contacts the stationary stop at the end of the tracks.

NOTE

The carriage is now cleared from under the guide tube and in a position for removing the fuel assembly.

8.3.28 Tighten the shaft clamp.

8.3.29 Using the Manipulator Crane, transfer the fuel assembly to its desired location, per section 7.3 of this procedure.

8.4 RCC Assembly Removal from Storage

8.4.1 Ensure that the carriage is located at the south end of its travel with the carriage cleared from under the guide tube. If not, complete steps 8.2.1 thru 8.2.4 of this procedure.

8.4.2 Using the Manipulator Crane, transfer the fuel assembly that is to receive the RCC assembly that is located in the storage to the north carriage compartment (closest to guide tube), per Section 7.3 of this procedure.

8.4.3 Lower the revolving stop by moving the operating handle located on the drive mechanism mounting plate to the back of its guide sleeve.

8.4.4 Loosen the shaft clamp on the carriage drive mechanism.

8.4.5 Move the carriage north until the first carriage stop has traveled past the location of the revolving stop.

8.4.6 Release the revolving stop operating handle to allow the stop to return to the vertical position.

8.4.7 Continue moving the carriage until the middle carriage stops contacts the revolving stop. The RCC storage compartment is now located directly under the guide tube and in position for RCC assembly removal.

8.4.8 Tighten the shaft clamp on the carriage drive mechanism.

8.4.9 Hold the pneumatic selector valve (located on the drive mechanism mounting plate) down to energize the gripper piston.

8.4.10 Actuate the gripper hoist to lower the gripper through the guide tube until the "Down" light illuminates.

NOTE

Observe the gripper hoist cable during lowering. Slack cable along with the "Down" light will indicate that the flexure fingers have entered the top of the RCC assembly and that the gripper is seated.

8.4.11 Verify the gripper hoist is stopped by the Limit Switch when the gripper is seated.

8.4.12 Release the pneumatic selector valve to de-energize the gripper piston.

8.4.13 Actuate the gripper hoist to lift the gripper and RCC assembly through the guide tube until the "UP" light illuminates. A limit switch on the hoist will stop the gripper at a proper elevation to clear the RCC assembly from the fuel assembly.

8.4.14 Loosen the shaft clamp.

- 8.4.15 Move the carriage south until the revolving stop may be lowered.
- 8.4.16 Lower the revolving stop by moving the operation handle located on the drive mechanism mounting plate to the back of its guide sleeve.
- 8.4.17 Move the carriage south until the north carriage stop has traveled past the location of the revolving stop.
- 8.4.18 Release the revolving stop operating handle.
- 8.4.19 Move the carriage north until stopped by the north compartment carriage stop. The fuel assembly is now located directly under the guide tube.
- 8.4.20 Actuate the gripper hoist to lower the gripper and RCC assembly through the guide tube until the "Down" light illuminates.
- 8.4.21 Tighten the shaft clamp.

NOTE

Observe the gripper hoist cable during lowering. Slack cable along with the "Down" light will indicate seating of the RCC assembly.

- 8.4.22 Verify the gripper hoist is stopped by the Limit Switch when the RCC assembly is properly placed in the fuel assembly.
- 8.4.23 Hold the pneumatic selector valve down to energize the gripper piston which unlocks the flexure fingers and releases the RCC assembly.
- 8.4.24 Actuate the gripper hoist to raise the gripper through the guide tube until the "Up" light illuminates. The limit switch on the hoist will stop the gripper at the proper elevation.
- 8.4.25 Release the pneumatic selector valve to de-energize the gripper piston.
- 8.4.26 Loosen the shaft clamp.
- 8.4.27 Move the carriage south along the tracks until a carriage stop contacts the stationary stop at the south end of the tracks.
- 8.4.28 Tighten the shaft clamp.
- 8.4.29 Lower the revolving stop.
- 8.4.30 Using the Manipulator Crane, transfer the fuel assembly to its desired location, per Section 7.3 of this procedure.

9.0 Enclosures

- 9.1 Pool Side Transfer System Control Board Alignment.
- 9.2 Reactor Side Transfer System Control Board Alignment.
- 9.3 Fuel Assembly and Insert Dry Weights and Associated Drag Forces.
- 9.4 Unit 1 SFP Z-Z Tape Readings
- 9.5 Unit 2 SFP Z-Z Tape Readings
- 9.6 Unit 1 Reactor Z-Z Tape Readings
- 9.7 Unit 2 Reactor Z-Z Tape Readings

FUEL AND COMPONENT HANDLING
OP/O/A/6550/04
ENCLOSURE 9.1

POOL SIDE TRANSFER SYSTEM CONTROL BOARD ALIGNMENT

	<u>APPENDIX A</u>	<u>APPENDIX B</u>
1. Main Power Breaker	On	On
2. Heater Switch	On	On
3. Frame Jog - Run Select Switch	Run	Run
4. Frame Up Lamp	On	Off
5. Frame Down Lamp	Off	On
6. Conveyor Interlock Select Switch	In	In
7. Conveyor at Pit Lamp	On	Off
8. Conveyor at Reactor Lamp	Off	On
9. Valve Open Lamp	On	On
10. Conveyor Control Lamp	Off	Off
11. Frame Interlock Select Switch	In	In
12. Crane Interlock Select Switch	Crane	Crane
13. Heaters On Lamp	On	On
14. Load Trip Lamp	Off	Off
15. Conveyor Direction Select Switch	Reactor	Pit

FUEL AND COMPONENT HANDLING
OP/O/A/6550/04
ENCLOSURE 9.2

REACTOR SIDE TRANSFER SYSTEM CONTROL BOARD ALIGNMENT

	<u>APPENDIX A</u>	<u>APPENDIX B</u>
1. Main Power Breaker	On	On
2. Heater Switch	On	On
3. Frame Jog - Run Select Switch	Run	Run
4. Frame Up Lamp	Off	On
5. Frame Down Lamp	On	Off
6. Conveyor Interlock Select Switch	In	In
7. Conveyor at Reactor Lamp	Off	On
8. Conveyor Control Select Switch	Off	Off
9. Crane Interlock Select Switch	Crane	Crane
10. Heaters On Lamp	On	On
11. Lead Trip Lamp	Off	Off

FUEL AND COMPONENT HANDLING
OP/O/A/6550/04
ENCLOSURE 9.3

FUEL ASSEMBLY AND INSERT DRY WEIGHTS AND ASSOCIATED DRAG FORCES

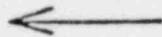
1. Fuel Assembly Weight Without Insert	1467 Lbs.
2. Full Length RCC Weight	149 Lbs.
3. Maximum Allowable Drag Force of Full Length RCC in Fuel Assembly	15 Lbs.
4. Burnable Poison Assembly Weights:	
20 BP	44 Lbs.
16 BP	38 Lbs.
12 BP	32 Lbs.
10 BP	29 Lbs.
9 BP	28 Lbs.
5. Primary Source Assembly Weight	45 Lbs.
6. Secondary Source Assembly Weight	42 Lbs.
7. Maximum Allowable Drag Force of BP, Primary Source, or Secondary Source in Fuel Assembly.	10 Lbs.
8. Thimble Plug Assembly Weight	14 Lbs.
9. Maximum Allowable Drag Force of Thimble Plug Assembly in Fuel Assembly	65 Lbs.
10. Maximum Allowable Drag Force of Fuel Assembly in rack or basket	50 Lbs.

Unit 1 SFP Z-Z Tape Readings

OP/O/A/6550/04

Enclosure 9.4

H	J	K	L	M	N	P	R
27	14' 3 1/16"	14' 3 7/16"	N/A	14' 3 1/16"	14' 3 13/16"	14' 3 3/4"	14' 3 15/16"
28	14' 3 7/16"	14' 3 5/16"	14' 3 1/2"	14' 3 9/16"	14' 3 9/16"	14' 3 1/16"	14' 4"
29	14' 3 7/16"	14' 3 3/8"	14' 3 3/8"	14' 3 9/16"	14' 3 7/16"	14' 3 9/8"	14' 3 7/8"
30	14' 3 7/16"	14' 3 3/8"	14' 3 1/16"	14' 3 9/16"	14' 3 9/8"	14' 3 1/16"	14' 3 15/16"
31	14' 3"	14' 3"	14' 3 1/2"	14' 3 9/16"	14' 3 9/16"	14' 3 1/16"	14' 3 15/16"
32	14' 3"	14' 3 1/16"	14' 3 3/16"	14' 3 5/16"	14' 3 5/8"	14' 3 5/8"	14' 3 13/16"
33	14' 3 1/16"	14' 3 1/4"	14' 3 3/8"	14' 3 1/2"	14' 3 5/8"	14' 3 1/2"	14' 3 13/16"
34	14' 3 1/16"	14' 3 7/16"	14' 3 7/16"	14' 3 7/16"	14' 3 5/8"	14' 3 13/16"	14' 3 7/8"
35	14' 3 1/4"	14' 3 3/8"	14' 3 9/16"	14' 3 9/16"	14' 3 3/4"	14' 3 3/4"	
36	14' 3 3/8"	14' 3 7/16"	14' 3 5/8"	14' 3 1/16"	14' 3 3/4"	14' 3 5/8"	
37	14' 3 9/16"	14' 3 1/2"	14' 3 3/4"	14' 3 13/16"	14' 3 15/16"	14' 3 7/8"	
38	14' 3 9/16"	14' 3 9/16"	14' 3 3/4"	14' 3 7/8"	14' 4"	14' 4"	
39	14' 3 5/8"	14' 3 5/8"	14' 3 1/16"	14' 3 15/16"	14' 3 15/16"	14' 4"	14' 4"
40	14' 3 3/4"	14' 3 1/16"	14' 3 3/4"	14' 4 1/8"	14' 4 1/8"	14' 4 1/8"	14' 4 1/8"
41	14' 3 1/16"	14' 3 1/16"	14' 3 7/8"	14' 4"	14' 4 1/8"	N/A	14' 4 1/8"
42	14' 3 13/16"	14' 3 3/4"	14' 3 7/8"	14' 4"	14' 4"	14' 4 1/16"	
43	14' 3 1/16"	14' 3 1/16"	14' 3 3/4"	14' 3 7/8"	14' 3 15/16"	14' 3 15/16"	
44	14' 3 9/16"	14' 3 9/16"	14' 3 5/8"	14' 3 3/4"	14' 3 3/4"	14' 3 3/6"	
45	14' 3 1/2"	14' 3 7/16"	14' 3 3/8"	14' 3 1/2"	14' 3 5/8"	14' 3 3/4"	
46	14' 3 1/2"	14' 3 3/8"	14' 3 3/8"	14' 3 3/8"	14' 3 1/2"	14' 3 7/16"	
47	14' 3 1/2"	14' 3 7/16"	14' 3 7/16"	14' 3 7/16"	14' 3 5/8"	14' 3 13/16"	
48	14' 3 9/16"	14' 3 5/8"	14' 3 3/8"	14' 3 1/16"	14' 3 3/4"	14' 3 7/8"	14' 4 1/8"
49	14' 3 13/16"	14' 3 7/8"	14' 3 3/4"	14' 4"	14' 3 7/8"	14' 4 1/4"	14' 4 13/16"



NORTH

15' 5 13/16"

Upender

OP/0/A/6550/04

Enclosure 9.5

This information is not available at this time.

Fuel Hoist Readings

TEST FIXTURE

226 3/4

UPENDER

218 1/8

RCC CHANGE FIXTURE

2137/16	2133/8
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CPS	CFN
10	10
20	20
30	30
40	40
50	50
60	60
70	70
80	80
90	90
100	100

NORTH

	R	P	N	M	L	K	J	H	G	F	E	D	C	B	A
1					80 ⁵ / ₈	80 ⁷ / ₈	80 ¹ / ₁₆	80 ⁷ / ₈	80 ¹¹ / ₁₆	80 ⁹ / ₈	80 ⁷ / ₈	80 ⁷ / ₈			
2			80 ⁷ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈		
3		80 ¹¹ / ₁₆	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	
4		80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	
5	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈
6	80 ¹¹ / ₁₆	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈
7	80 ⁵ / ₈	80 ⁹ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁹ / ₈	80 ⁹ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈
8	80 ¹¹ / ₁₆	80 ¹¹ / ₁₆	80 ¹¹ / ₁₆	80 ¹¹ / ₁₆	80 ¹¹ / ₁₆	80 ¹¹ / ₁₆	80 ¹¹ / ₁₆	80 ¹¹ / ₁₆	80 ¹¹ / ₁₆	80 ¹¹ / ₁₆	80 ¹¹ / ₁₆	80 ¹¹ / ₁₆	80 ¹¹ / ₁₆	80 ¹¹ / ₁₆	80 ⁵ / ₈
9	80 ¹¹ / ₁₆	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ¹¹ / ₁₆
10	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈
11	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ³ / ₄
12		80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	
13		80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	
14			80 ¹¹ / ₁₆	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	
15					80 ¹¹ / ₁₆	80 ⁹ / ₈	80 ⁹ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	80 ⁵ / ₈	

Enclosure 9.6

Rod Hoist Readings

TEST FIXTURE

UPENDER

1930/8

2079/20



NORTH

[illegible]

Unit 2 Reactor Z-Z Tape Readings

OP/O/A/6550/04

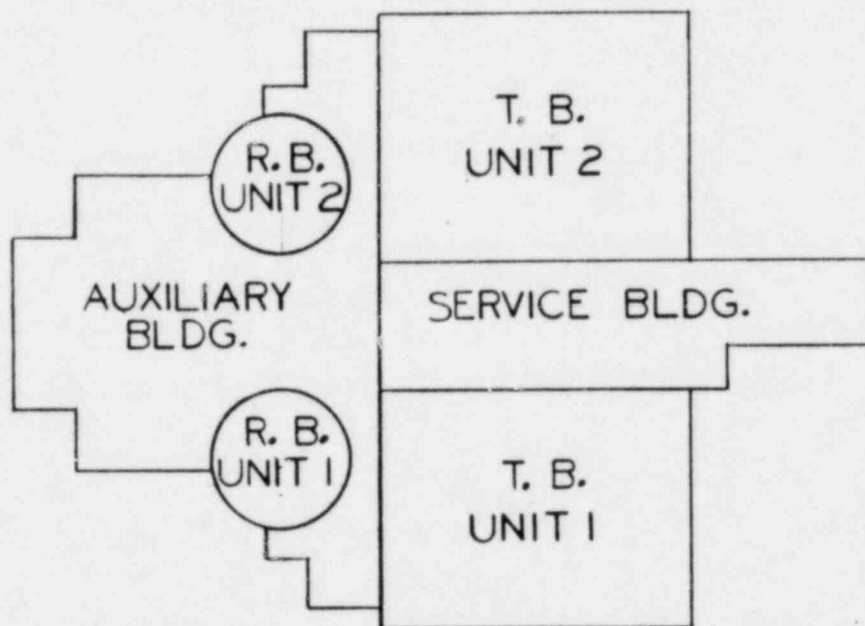
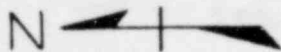
Enclosure 9.7

PAGE 1 OF 1

This information is not available at this time.

McGUIRE NUCLEAR STATION

DUKE POWER CO.



NOTE:

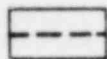
ONLY THE AUXILIARY AND REACTOR
BUILDINGS WILL BE EXAMINED FOR
A RESPONSE TO NUREG0612.

GENERAL ARRANGEMENT DWGS. KEY PLAN

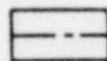
McGUIRE NUCLEAR STATION



LOAD DROP ZONES



MECHANICAL EQUIPMENT REQUIRED FOR PLANT
SHUTDOWN OR DECAY HEAT REMOVAL



ELECTRICAL EQUIPMENT REQUIRED FOR PLANT
SHUTDOWN OR DECAY HEAT REMOVAL