



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION II
101 MARIETTA ST., N.W., SUITE 3100
ATLANTA, GEORGIA 30303

Report No. 50-261/81-33

Licensee: Carolina Power and Light Company
411 Fayetteville Street
Raleigh, NC 27602

Facility Name: H. B. Robinson 2

Docket No. 50-261

License No. DPR-23

Inspection at Robinson site near Hartsville, South Carolina

Inspector: C. Julian 12/23/81
C. Julian, Reactor Inspector Date Signed

Inspector: C. Julian for 12/23/81
C. W. Burger, Section Chief, Division of Date Signed
Resident and Reactor Project Inspection

Approved by: R. C. Lewis 12/23/81
R. C. Lewis, Director, Division of Resident Date Signed
and Reactor Project Inspection

SUMMARY

Inspection on December 2-3, 1981

Areas Inspected

This special announced inspection involved 32 inspector-hours on site in the areas of review of the circumstances of the November 30 charging system leak and subsequent reactor coolant system pressure transient and evaluation of licensee's corrective actions.

Results

Of the areas inspected, no violations or deviations were identified.

DETAILS

1. Persons Contacted

Licensee Employees

- *R. B. Starkey, Plant General Manager
- *C. W. Crawford, Manager, Operations and Maintenance
- J. M. Curley, Manager, Technical Support
- *M. F. Page, Engineering Supervisor
- F. L. Lowery, Operating Supervisor, Unit No. 2
- R. H. Chambers, Maintenance Supervisor, Unit No. 2
- *F. Gilman, Senior Specialist Regulatory Compliance

Other licensee employees contacted included technicians, operators, security force members, and office personnel.

NRC Resident Inspector

*S. Weise

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on December 3, 1981, with those persons indicated in paragraph 1 above. Licensee representatives acknowledged their understanding of the findings. The Plant Manager stated that, prior to restart following the next refueling outage, presently scheduled for March 1982, resolution will be achieved on the failure of the PORV block valves to close under design differential pressure and leakage of the PORV valves due to adjustment for low temperature, over pressure protection.

3. Licensee Action on Previous Inspection Findings

Not inspected.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. New unresolved items identified during this inspection are discussed in paragraph 6.

5. Review of November 30, 1981 Transient

On November 30, 1981, with the plant in hot shutdown and preparations being made for startup, the plant experienced a leak in the charging system followed by a pressure reduction transient. The leak was caused by a

body-to-bonnet gasket failure on 3 inch valve CVC-291, located in the charging pump room on the line providing reactor coolant pump seal injection flow from the A charging pump. Operators recognized the problem, located the leak and promptly took steps to isolate it. The leak resulted in spilling approximately 1500 gallons of water onto the charging pump room floor which caused the floor drains to backup. No significant personnel contamination or radiation exposure resulted and there was no radioactivity released from the site as a result of the leak.

To secure the leak, seal injection had to be interrupted therefore, the reactor coolant pumps were stopped to prevent seal damage. Decay heat was minimal since the reactor had been shutdown since November 20, 1981, for repairs of steam generator leaks. Stopping the reactor coolant pumps terminated minimum flow for pressurizer spray. Pressurizer pressure began to increase due to pressurizer heater heat input. The pressurizer heaters were turned off but, due to residual energy of the heaters, the pressure increase did not halt immediately. To terminate the pressure increase, an operator opened the two block valves 535 and 536 to the pressurizer power operated relief valve (PORV). The PORV valves were known to leak but leaked more than expected causing a sharp decrease in reactor coolant system (RCS) pressure. The operator attempted to reclose the block valves but found they would not completely close. An attempt was made to close the valves by use of a control, at the valve circuit breakers, to override the valve operator torque switch. The valves still would not completely close and an operator was dispatched into the containment vessel to manually close the block valves. The valves were manually closed approximately 67 minutes after they were opened.

Approximately 13 minutes after the block valve opening, emergency safeguards functions (ESF) actuation occurred at 1715 psi due to low pressurizer pressure, resulting in Safety Injection (SI) initiation, reactor trip inserting the shutdown banks of control rods, phase A containment isolation, and start of the A and B diesel generators. B diesel generator started but its output voltage was observed to be only 220 volts versus a normal value of 480. Operators were able to manually increase voltage to 440. All other ESF equipment appeared to function normally.

Safety Injection was allowed to run throughout the transient until after the block valves were closed but little water (approximately 40 gallons) was injected, as RCS pressure exceeded pump shutoff head of approximately 1460 psi throughout most of the transient.

Lowest RCS pressure reached was approximately 1460 psi. and adequate water inventory was maintained as evidenced by pressurizer level indication. Minimum subcooling margin observed was greater than 600 psi.

Following the transient, RCS conditions were successfully returned to normal, the leak was repaired by gasket replacement, excess water was directed to the radioactive waste system and cleanup begun.

An approximate sequence of events during the transient is included at the end of these details.

6. Event Followup and Resolution of Open Items

On December 1, 1981, Region II issued a Confirmation of Action Letter to CP&L documenting the understanding that before resuming reactor operation, CP&L would discuss with Region II representatives the results of their investigation and obtain Region II concurrence. On December 2, 1981 Region II concurred with reactor restart provided that the following measures proposed by CP&L were accomplished.

1. The PORV valves spring tension would be increased to minimize leakage at operating temperature and pressure.
2. A leak check would be performed on the PORV valves to verify that Technical Specification 3.1.5 for RCS leakage is being met.
3. PORV block valves will be closed, placed under clearance, and the power removed.
4. Prior to cooling down below 350°F, measures will be taken to reestablish low temperature over pressure protection as required by Technical Specification 3.1.2.1.d.
5. Existing procedures will be modified or special procedures provided to accomplish these tasks.

The inspectors attended a Plant Nuclear Safety Committee (PNSC) meeting called to review the necessary procedure changes. Corrective actions were reviewed with plant management and the results of the PORV leak test reviewed to insure that Technical Specifications were met.

As a result of this occurrence several matters need future resolution. The inspectors identified the following items in the exit interview for followup.

As of 12/3/81, licensee representatives stated that the PORV block valve failed to reclose after opening because the valve operator was too small to provide sufficient closing torque. This information was derived from telephone conversations with the valve vendor and the licensee is researching the matter further to determine the cause of this design error. This matter is unresolved pending further determination by the licensee of the cause of the block valve failure to close (50-261/81-33-01).

The inspectors were told that the plant had been operating for approximately three years with the block valves closed due to an intentional relaxation of the PORV seating spring pressure. The licensee representative stated that the decrease in spring pressure was necessary to allow the PORV to open in 2 seconds when used at low temperatures for over pressure protection. The

inspectors asked if the PNSC had ever reviewed the acceptability of operating the plant with known PORV leakage and the block valves closed. Licensee representatives stated that the PNSC was aware of the condition of the valves but that a search would have to be made for formal documentation of such a review. This matter will remain unresolved as described in the resident inspector's report 81-32 pending results of the licensee's documentation search (50-261/81-32-02).

The licensee does in-service testing of the PORV and block valves via surveillance procedure PT 42.0. A CP&L letter of March 10, 1981 to the NRC appears to commit CP&L to test these valves quarterly. Examination of test records show that the valves are not being tested quarterly in that the block valves were last tested on 6/8/81. Licensee representatives stated that they will review the matter further to better clarify their commitment. This matter is discussed in more detail in the resident inspector's report 81-32, and is a previous inspector followup item (50-261/81-19-02).

The cause of the low voltage on the B diesel generator was determined to be failure of a voltage regulator rheostat. A similar problem had occurred on 11/9/81 and records show that the rheostat was cleaned and returned to service on that date. The inspector questioned whether cleaning rheostats is an acceptable maintenance practice versus replacement. Licensee representatives stated that the PNSC will review this matter to determine if cleaning rheostats is acceptable maintenance practice. This is an inspector followup item. (50-261/81-33-02)

The inspectors noted that when an "alert" was declared the State of North Carolina representatives were not notified within 15 minutes as required by NUREG 0654. Licensee representatives stated that they had in their emergency plan taken specific exception to that requirement and that notification was made within one hour as required by the Robinson emergency procedures. This is an unresolved item pending further NRC review of the matter. (50-261/81-33-03)

Licensee representatives stated that prior to the next refueling, presently scheduled for March 1982, they will have resolution to the question of why the block valves did not reclose and taken appropriate corrective action. In addition they will have devised a method for low temperatures over pressure protection that does not result in PORV leakage at operating conditions. This matter is an inspector followup item as discussed in the resident inspectors report 81-32. (50-261/81-32-01)

Reactor Coolant System Leak and Pressure Reduction Transient

11-30-81 - SEQUENCE OF EVENTS

Initial Conditions: Hot shutdown, Making Preparations for Startup After Outage

1. Three (3) reactor coolant pumps running.
 2. Reactor coolant temperature - 524°F.
 3. Reactor coolant pressure -2235 psig.
 4. "A" and "B" charging pump running.
 5. "B" condensate and "B" main feed pump running.
 6. Holding Temperature Steady.
 7. Manager - Operations & Maintenance in the Control Room.
- 1330 - Control Operator observed:
- Pressurizer level decreasing while tavg was increasing, increasing charging pump speed, initiated looking for leaks.
- 1334 - Leak found on "A" charging pump in the charging pump room (determined to be a body to bonnet leak on CVC-291).
- 1345 - Decreased letdown flow, start "C" charging pump and stopped "A" charging pump.
- 1354 - Stopped "A", "B" and "C" reactor coolant pumps in preparation for stopping seal injection flow to reactor coolant pumps.
- 1355 - Unusual Event declared, sounded local evacuation alarm and announced over PA System to evacuate charging pump room.
- 1356 - Secured letdown.
- 1357 - Stopped "B" and "C" charging pumps.
- 1359 - Secured steam generator blowdown to retain heat.
- 1400 - Shut secondary steam line drains to reduce cooldown
- Pressurizer level continuing to decrease.
- 1402 - Evacuated Auxiliary Building of unnecessary personnel.
- 1413 - Started Auxiliary Building emergency ventilation fans
- Stopped "B" main feedwater pump
 - Isolated "A" charging pump leakage at valve 291.
- 1426 - Started "C" charging pump (through CVC-310B).

- Started driving in shutdown bank control rods.
- 1432 - NRC notified on red phone of Unusual Event.
- Charging pumps were being started and stopped to maintain pressurizer level at this point.
- 1435 - Pressurizer pressure increasing.
- Pressurizer heaters turned off.
- Opened spray valves 455A and B
- Pressurizer pressure at 2280 psig and increasing, opened PORV block valves 535 and 536.
- Pressurizer pressure rapid decrease, tried to close block valves from control room - would not completely close.
- Turned on pressurizer heaters and closed spray valves.
- Stopped "C" charging pump - concerned that auxiliary spray valve may have been leaking.
- Reset block valve breakers, still failed to close completely.
- 1446 - Block valves were closed using the closing relay at the breakers on MCC-6.
- Received closed indication for block valves in control room.
- Block valves appeared to have not completely reseated and plans for containment entry were started.
- Pressurizer relief tank level, pressure and temperature increasing.
- 1448 - Commenced cooldown on Natural Circulation following Procedure GP-5A.
- Opened "A" steam generator PORV.
- Reactor trip and SI (Safety Injection) from low pressurizer pressure SI signal.
- All rods fully inserted.
- "B" diesel voltage observed to be low at 220V - manually increased to 440V.

- 1456 - Secured auxiliary feedwater
- 1506 - Pressurizer level 11%, heaters automatically cut off
 - Started charging pump to increase level and restore heaters
- 1520 - RCS temperature -485°F.
 - RCS pressure - 1450 psig.
 - "Alert" declared
- 1530 - Reset ESF signal to stop RHR pumps.
 - RHR pumps "A" and "B" secured.
 - RCS pressure -1470 psig.
- 1539 - Reset Phase "A" isolation.
 - RCS temperature -487°F.
 - RCS pressure - 1524 psig.
 - Safety Injection pumps still running
- 1542 - CV entry made to manually complete closing off block valves 535 and 536.
 - "Alert" terminated
- 1543 - Control Room notified of "Bomb Threat" received at 1513.
- 1628 - Secured SI pumps and returned valve lineup to normal.
- 1642 - Stopped "C" charging pump (using to maintain pressurizer level).
- 1706 - Started "C" charging pump.
 - Opened one letdown orifice.
- 1730 - "Bomb Threat" Unusual Event terminated.
- 1842 - Stopped ventilation fan HVE-5A.
- 2010 - P.T.-8.0 run to determine reactor coolant system leakage (2.47 gpm mostly from "B" reactor coolant pump #2 seal).

- 2132 - Opened 60 gpm letdown orifice and closed 45 gpm orifice
- 2138 - "A" charging pump started on recirculation.
- CVC-281 leak repaired.
- 2239 - Stopped "A" Charging pump.
- 2246 - P.T.-8.0 run, determined RCS leakage to be 1.59 gpm.
- 2311 - "A" charging pump operable and lined up for normal operation.
- 2312 - Stopped "C" charging pump.
- RCS temperature - 468°F.
- RCS pressure - 2038 psig.