U.S. NUCLEAR REGULATORY COMMISSION

REGION II

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Licensee:	Carolina Power & Light (CP&L)
Facility:	H. B. Robinson Unit 2
Location:	2112 Old Camden Rd. Hartsville, SC 29550
Dates:	August 18 - September 28, 1996
Inspectors:	J. Zeiler, Acting Senior Resident Inspector P. Byron, Resident Inspector B. Desai, Senior Resident Inspector G. Kuzo, Region II Inspector (R1.2, R1.3, R2, R5, and R7) M. Miller, Region II Inspector (M1.2) C. Rapp, Region II Inspector (E8.1 and E8.2)
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Enclosure 2

EXECUTIVE SUMMARY

H. B. Robinson Power Plant, Unit 2
NRC Inspection Report No. 50-261/96-11

This integrated inspection included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a six-week period of inspection; in addition, it includes the results of a maintenance, service water followup, and effluents and radiological transportation inspections by three Region II inspectors.

Operations

- The licensee's preparations for Hurricane Fran were thorough. Although activities were complicated by the considerable amount of equipment and material which had been pre-staged onsite for the start of an upcoming refueling outage, licensee management demonstrated conservative decision making in removing and/or securing this material (Section 01.2).

- The plant shutdown to begin Refueling Outage 17 was controlled and conducted in a safety conscious manner. The operators followed the applicable procedures and appropriately responded to plant problems encountered (Section 01.3).

- The decision to manually trip the reactor after encountering a turbine Electro-Hydraulic Control System malfunction during unit shutdown was justified. Operator response to the trip was good and unit stabilization was accomplished in a controlled manner. The root cause of the trip was adequately identified and corrected. Adequate resolution was performed or was planned prior to restart for other unexpected plant equipment operation during or following the trip (Section 01.4).

- Reactor coolant system drain down activities were conducted in a deliberate and controlled manner. A thorough pre-job briefing was performed prior to the evolution. Important plant indications were closely monitored by the operators (Section 01.5).

- Fuel off-load activities were performed in a controlled manner. Good communications were maintained between the Control Room and fuel building operators (Section 01.6).

- The first example of a violation of Technical Specification (TS) 6.5.1.1.1 was identified for failure to follow foreign material exclusion area (FMEA) procedural requirements resulting in a loss of control of foreign material exclusion inside the Spent Fuel Pool Building during fuel off-load activities. Ineffective supervisory overview contributed to this problem. These deficiencies were similar to previous problems indicating a continuing trend of ineffective FMEA implementation requirements (Section 01.7).

- An Auxiliary Operator was assigned five shifts as a Fire Brigade member with an expired medical examination. Previous corrective actions to ensure that operator medical qualifications were current prior to

individuals standing Fire Brigade and Control Room Shift Supervisor watch duties were inadequate. This issue was identified as a Violation of 10 CFR 50, Appendix B, Criterion XVI, for inadequate corrective actions (Section O1.8).

Maintenance

- The second example of a violation of TS 6.5.1.1.1 was identified when a contractor electrical technician failed to follow modification procedure requirements for obtaining operations permission and tagout clearances prior to cutting power cables to valve SI-866A. This resulted in the cable being cut while still energized. The licensee's stand down to reemphasize work control expectations and requirements following this and one other significant outage related work control error was effective in preventing further serious problems (Section M1.1).

- The maintenance and engineering departments were in the process of implementing a thorough program to identify and correct repetitive equipment failures (Section M1.2).

Engineering

- Investigations of the A Main Steam Isolation Valve failure to close during shutdown were thorough. The root cause was adequately addressed and corrective actions planned were determined to be acceptable (Section E1.1).

Plant Support

- Radiological controls associated with low-level radioactive solid waste stored temporarily on site met 10 CFR Part 20 requirements. Posting, labeling, and physical controls for locked high radiation and very high radiation area doors met regulatory requirements. Occupational radiation exposure controls and evaluations for "hot particles" and for potential internal exposure were adequate (Section R1.1).

- One Non-Cited Violation of TS 6.11 for failure to follow radiation protection procedures was identified. A breakdown in communication among Health Physics technician staff contributed to contamination being released offsite (Section R1.2).

- Transportation and packaging activities for radioactive waste or material shipments met 10 CFR 71.5 and 49 CFR requirements. Revised Department of Transportation (DOT) guidance was properly implemented. Training of personnel on the revised guidance was adequately performed (Sections R1.3 and R5.1).

- Audits of radioactive waste, effluent and transportation program activities were thorough and met TS, 10 CFR Parts 20 and 71 requirements. Quality control activities associated with effluent measurements were technically adequate (Sections R2.2, R7.1 and R7.2).

- Actions to resolve a signal transmission problem with the public warning system sirens following passage of Hurricane Fran were adequate (Section P2.1).

- The third example of a violation of TS 6.5.1.1.1 was identified involving a discrepancy in the emergency procedure for performing off-site dose projections from the Control Room during accident conditions involving releases of radioactive material (Section P3.1).

against high winds, stringing of hand lines for pre-established routes to be used during the hurricane, verifying the operability of plant equipment and components, and testing certain plant equipment such as the emergency and dedicated shutdown diesel generators to ensure their availability in the event offsite power were lost.

The inspectors reviewed the completed procedure attachment and conducted an independent walkdown of the site to verify that preparations were adequately implemented. The inspectors noted that licensee actions to remove or secure items were aggressively pursued. All hurricane preparations were completed on September 5, at 2:45 p.m. These activities were well coordinated and thorough, even though they were complicated by the large amount of material and equipment that had recently been pre-staged for the upcoming refueling outage. Management demonstrated conservative decision making in determining what pre-staged material was removed and/or secured.

Based on weather projections that hurricane force winds would not be expected near the site, management decided that a plant shutdown was not necessary. On September 5, at approximately 8:00 p.m., the hurricane made landfall several hundred miles to the north of the site, traveling north-northwest. Maximum sustained winds of approximately 30-40 mph were observed at the site, however, no significant damage occurred onsite. Offsite power and communications were maintained throughout the storm.

c. Conclusions

The inspectors concluded that the licensee's readiness for the Hurricane's arrival was well coordinated and thorough. Management demonstrated conservative decision making in determining what outage pre-staged material was removed and/or secured onsite.

01.3 Shutdown for Refueling Outage Activities

a. Inspections Scope (71707)

The inspectors monitored shutdown activities that were conducted September 7 to begin RFO-17. The shutdown was performed in accordance with General Procedure GP-006, Normal Plant Shutdown from Power Operation to Hot Shutdown, rev. 27.

Report Details

Summary of Plant Status

Unit 2 remained at essentially full power until August 27, when a coastdown was initiated in preparation for starting Refueling Outage 17 (RFO-17). On September 7, the unit commenced the outage shutdown from 89 percent power. During the shutdown, a manual reactor trip was initiated from 28 percent power after a turbine control system malfunction. Following the reactor trip, the unit was placed in cold shutdown for refueling. On September 17, fuel off-load was completed and fuel remained removed from the core for the remainder of the report period.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

The inspectors conducted frequent control room tours to verify proper staffing, operator attentiveness and communications, and adherence to approved procedures. The inspectors attended daily operations turnover, management review, and plan-of-the-day meetings to maintain awareness of overall plant operations. Operator logs were reviewed to verify operational safety and compliance with Technical Specifications (TSs). Instrumentation, computer indications, and safety system lineups were periodically reviewed from the Control Room to assess operability. Frequent plant tours were conducted to observe equipment status and housekeeping. Condition Reports (CRs) were routinely reviewed to assure that potential safety concerns and equipment problems were reported and resolved.

In general, the conduct of operations was professional and safety-conscious. Good plant equipment material conditions and housekeeping was noted throughout the report period. Specific events and noteworthy observations are detailed in the sections below.

O1.2 Preparations for Hurricane Fran

a. Inspection Scope (71707, 71750)

Between September 4-6, the inspectors reviewed licensee preparations in response for Hurricane Fran. This included a review of Operations Management Manual (OMM) procedure OMM-021, Operation During Adverse Weather Conditions, Rev. 15, and verification that the actions prescribed by the procedure were properly implemented.

b. Observations and Findings

On September 4, at 7:15 a.m., the licensee began preparing for the possible impact from Hurricane Fran. Preparations included completing the actions for a hurricane warning in accordance with OMM-021, Attachment 6.1, Hurricane Warning Check-off Sheet. Major activities performed included: removal or securing loose material around the site

b. Observations and Findings

On September 7, at 8:30 p.m., the licensee commenced the shutdown in accordance with GP-006. The inspectors monitored portions of the shutdown from the Control Room. The inspectors verified that the proper revision of the procedure was being used and that a pre-job brief was performed prior to commencing activities. The inspectors noted that preparations were thorough and that activities were performed in a controlled and deliberate manner. Both the Plant Manager and operations management personnel were present in the Control Room and provided good overview of the activities.

During the shutdown, steam flashing occurred while isolating the four Moisture Separator Reheaters (MSRs). When the first shutoff valve (to the 1A MSR) was closed, all four of the MSR Timer Valves automatically reopened and admitted steam to the MSRs. As result of the sudden increase in MSR pressure due to the introduction of steam, condensate was suddenly introduced to the high pressure feedwater (HPFW) heaters via the high level drain lines which were still open at the time. During this pressure transient, one of the snubber supports on the high level drain line from the 1B MSR to the 6B HPFW Heater was damaged. This pressure transient appeared to be a recurring incident in that GP-006 contained warnings that potential pressure spikes could occur when the MSR shutoff valves were closed. A CR was initiated by the licensee to address this apparent valve coordination problem and a work request was initiated to repair the damaged snubber.

At approximately 30 percent power, the operators received a control room alarm indicating that vibration of the No. 1 turbine-generator bearing had increased to 6 mils. The operators properly referred to the alarm response procedures and followed the appropriate actions. The procedures required that the turbine be tripped if vibration increased to greater than 14 mils. Although vibration remained at 6 mils, the operators remained diligent in monitoring for any subsequent vibration increase.

At approximately 28 percent power, the operators encountered a problem with the Turbine Electro-Hydraulic Control (EHC) System which prevented the turbine from unloading properly. As a result of this problem, the reactor was manually tripped. Following the trip, the operators successfully stabilized the unit and continued the plant cooldown in accordance with GP-007, Plant Cooldown from Hot Shutdown to Cold Shutdown, rev. 41. Further details of the EHC problem and operator response to the trip is discussed in Section 01.4.

c. Conclusions

The inspectors concluded that the shutdown was controlled and conducted in a safety conscious manner. The operators followed the applicable procedures and appropriately responded to plant problems encountered.

01.4 Manual Reactor Trip due to Turbine Governor Valve Failure

a. Inspection Scope (71707, 93702 and 40500)

On September 7, while the plant was being shutdown to start RFO-17, the Turbine EHC System failed to respond in either automatic or manual control modes. As a result of this malfunction, a decision was made to manually trip the reactor. The inspectors monitored the licensee's response to the EHC System problem and discussed the problem and decision to trip the reactor with the operators and plant management personnel. The inspectors observed operator activities associated with the manual trip and unit stabilization. In addition, the inspectors reviewed post-trip plant data and attended the post trip assessment conducted by the Plant Safety Review Committee (PNSC).

b. Observations and Findings

On September 7, the operators were conducting a scheduled shutdown to begin RFO-17. At 10:41 p.m., with the unit operating at 28 percent power, the EHC Turbine Control System malfunctioned in automatic mode, preventing the complete closure of the remaining turbine governor valve #1 (GV-1). After placing turbine control in manual mode, the operators were still unable to close GV-1. Following discussions between the operators and operations management personnel who were present in the control room to monitor the shutdown, a decision was made to manually trip the reactor. This decision was based on xenon buildup in the core and the risk of tripping the turbine if EHC system troubleshooting was attempted.

At 11:13 p.m., the reactor was manually tripped from 28 percent power. The reactor trip caused a turbine trip resulting in the closure of GV-1. Following the trip, the unit was stabilized at no-load temperature and pressure. Operator response to the trip was good; actions to stabilize the unit were performed in accordance with the applicable emergency procedures. The inspectors monitored plant parameters and equipment operation to verify that safety systems responded as expected to the trip. Two minor equipment problems were noted. Immediately following the trip, the A Main Feedwater Pump tripped on low feedwater flow resulting in the start of the motor driven Auxiliary Feedwater Pumps. This was thought to have been caused by the slow opening of the A Main Feedwater Pump recirculation valve to the condenser. In addition, the control rod bottom indication lights associated with rods B-10 and H-8 did not initially illuminate. All control rods were confirmed to be fully inserted, therefore, this was an indication problem only. The inspectors reviewed the licensee's post trip review report completed following the trip and verified that these items were captured and would be resolved prior to unit restart. Following unit stabilization, plant cooldown to cold shutdown was continued. At 11:54 p.m., the licensee notified the NRC of the event. This notification met the 4-hour reporting requirement of 10 CFR 50.72(b)(2)(ii).

The licensee's investigation determined that the cause of the turbine control malfunction was a broken wire in the EHC controls to GV-1. The broken wire interrupted the electrical signal from the EHC System to the valve controller for GV-1. The cause of the broken wire was determined to be from fatigue as a result of repeated termination and de-termination of the wire from its housing terminal block during previous maintenance activities. The broken wire was repaired and the controller housings for all governor valves were inspected to ensure that no other similar wire degradations existed. The inspectors determined that the licensee had adequately addressed the root cause and corrective actions of the EHC control problem.

On September 25, the inspectors attended the PNSC meeting during which the root cause of the EHC control problem was discussed. The system engineer responsible for the EHC system thoroughly discussed the problem with the broken wire in the EHC controller housing, corrective actions to repair the wire and inspections performed on the other valve control housings. The inspectors noted that limited discussions were conducted on details of the post trip review report or other equipment problems identified following the trip. However, a PNSC action item was identified requiring a more thorough review of these items prior to plant startup.

c. Conclusions

The inspectors determined that the decision to trip the unit was justified based on the risk with troubleshooting the EHC malfunction. Operator response to the trip was good and unit stabilization was accomplished in a controlled manner. The licensee adequately determined the root cause of the trip and corrected the equipment related failure. Adequate resolution was performed or was planned prior to restart for other unexpected plant equipment operation following the trip.

01.5 Drain Down of the Reactor Coolant System

a. Inspection Scope (71707)

The inspectors verified readiness and observed Control Room activities associated with the drain down of the reactor coolant system (RCS) to -7 inches (i.e., 7 inches below the reactor vessel flange) in accordance with GP-008, Draining the Reactor Coolant System, rev. 43.

b. Observations and Findings

Prior to the drain down, the inspectors verified the adequacy and use of procedures and controls for the following: risk outage management, RCS temperature and level instrumentation availability, containment closure capability, RCS inventory addition capability, and emergency power availability and protection. Specific details of this review are as follows:

- Shutdown Risk Management Controls:

  The inspectors reviewed PLP-055, Outage Risk Management, rev. 13. This procedure provided administrative controls and personnel responsibilities for ensuring that actions governing safe plant operation during RCS drain down and reduced inventory conditions were conducted. The procedure provided safety system equipment availability requirements for all shutdown conditions. Shutdown safety equipment requirements were summarized on a one page matrix that was updated and distributed twice a day to ensure that personnel were cognizant of current shutdown conditions and equipment requirements. In addition, signs were placed on safety equipment required for current plant conditions warning personnel that the equipment was being "protected." The inspectors performed walkdowns of selected safety equipment to verify proper material conditions and that the warning signs were installed in accordance with PLP-055. No discrepancies were identified.

- Containment Closure Capability for Mitigation of Radioactive Releases:

  Containment closure was maintained and tracked in accordance with Operation Management Manual procedure OMM-033, Implementation of Containment Closure, rev. 3. The inspectors reviewed the procedure and verified that containment penetrations were being properly controlled to ensure timely closure if required. No discrepancies were identified.

- RCS Temperature Monitoring

  The inspectors verified that at least two independent, continuous indications of RCS temperature representative of core exit conditions were operable. The operators planned to continuously monitor the average of the five highest exit thermocouple values via the licensee's ERFIS computer display in the Control Room.

- RCS Level Indication Monitoring

  The inspectors verified that at least two independent, continuous water level indications would be operable during the drain down. Below 5% in the pressurizer, GP-008 required two RCS local standpipe and Control Room level transmitters with alarms be in service. In addition, a continuous local standpipe watch was required inside containment to verify accurate standpipe indication. Once level reached -7 inches, the licensee planned to set-up a camera in the Control Room to monitor the local standpipe level indication. The inspectors verified that the standpipe level transmitters had been calibrated via review of calibration data sheets that were completed on September 4 and 6.

- RCS Inventory Capability

  The inspectors verified that at least two additional means of adding water inventory to the RCS was required to be available. PLP-055 required that at least one charging pump and safety injection (SI) pump with a flowpath from the refueling water storage tank be available prior to initiating drain down of the RCS. The licensee planned to have all charging pumps and one SI pump available for the drain down. The inspectors performed a partial walkdown of these pumps and their flowpaths on September 10 and did not note any conditions which impacted operability.

- Emergency Power Availability

  PLP-055 required both emergency diesel generators (EDGs) to be operable during the drain down. Offsite power was provided through the startup transformer. The inspectors walked down the EDGs and startup transformer. No adverse material conditions were identified. The inspectors verified that there was no work planned in the switchyard during the drain down.

On September 10-12, the inspectors observed operator drain down activities conducted in accordance with GP-008. An extensive pre-job briefing of the evolutions was also performed prior to starting the actual drain down.

During the drain down, a problem was experienced with the pressurizer cold calibration level instrument LI-462 in that at 22%, level stopped trending down even though the drain down was still in progress. The operators secured draining in order to investigate the unexpected instrument response. A decision was made to valve in the two standpipe level instruments (normally performed at 5% pressurizer level) to verify actual level. When the standpipes were valved in, level indicated 96 inches which corresponded to approximately 10-15 percent pressurizer level. A work request was written to investigate the level indication problem with LI-462. The drain down to -7 inches continued with no further problems encountered.

c. Conclusions

The inspectors concluded that drain down activities were conducted in a deliberate and controlled manner. A thorough pre-job briefing was performed prior to the evolution. Important plant parameters such as RCS level and temperature were closely monitored by the operators.

01.6 Reactor Core Off-Load Activities

a. Inspections Scope (71707)

During September 17-19, the inspectors witnessed portions of fuel off-load activities from the Control Room, containment operating floor, and

Spent Fuel Pool Building (SFPB). The inspectors verified that activities were being performed in accordance with GP-010, Refueling, rev. 33, and that applicable TSs for conducting refueling activities were met.

b. Observations and Findings

The inspectors verified that the following TS requirements were met for conducting refueling activities:

- Fuel movement was not initiated prior to 100 hours after shutdown.
- At least one airlock door was properly closed and containment integrity established.
- Two source range neutron monitors were continuously being monitored, each with continuous visual indication in the Control Room and one audible indication in containment.
- At least one Residual Heat Removal Pump was operable.
- Refueling cavity level was greater than 272 feet, 2 inches and average RCS temperature was less than or equal to 140 degrees F.
- Direct communication between the Control Room and refueling cavity manipulator crane was maintained.
- Boron concentration was being checked each shift and maintained above 1950 parts per million, and.
- the SFPB ventilation system was operating when handling fuel.

The inspectors also noted that good foreign material exclusion area (FMEA) controls were setup in containment around the refueling cavity. Physical barriers and signs were erected to ensure that personnel and material were positively controlled. In addition, a monitor had been stationed at the entry point to the FMEA to ensure that personnel adhered to FMEA controls. While FMEA controls in containment were considered good, several problems were identified with FMEA controls in the SFPB. These problems are discussed in Section 01.7.

c. Conclusions

The inspectors determined that fuel off-load activities were performed in a controlled manner that met or exceeded TS requirements. Good communications were maintained between the Control Room and fuel building operators.

O1.7 Foreign Material Exclusion Area Discrepancies in Spent Fuel Pool Building

a. Inspection Scope (71707)

While observing fuel off-load activities from the SFPB, the inspectors noted several FMEA discrepancies. The inspectors reviewed the licensee's FMEA requirements specified in PLP-047, Foreign Material Exclusion Area Program, rev. 8, and discussed the discrepancies with operations management.

b. Observations and Findings

On September 19, the inspectors observed several FMEA problems in the SFPB, the majority of which resulted from an unauthorized change that was made to the FMEA boundary. The FMEA boundary had previously been established around three sides of the Spent Fuel Pool. On September 17, fuel handling personnel changed the boundary to exclude the transfer conveyor control panel from the FMEA. In order to accomplish this, the FMEA entry point was moved back an entire pool length. However, personnel failed to update the FMEA material log to remove the material and items that were logged within the original FMEA boundary. Additionally, FMEA boundary tape had not been extended to cover either the new boundary or entry point created by the change. Also, during review of the FMEA personnel log, the inspectors identified one person who had not signed out from the previous day. This item was not connected to the boundary change problem and appeared to be attributed to a lack of attention to detail on the part of the person exiting the FMEA.

The inspectors brought these items to the attention of the licensee. Immediate corrective actions were implemented to regain control of the FMEA in the SFPB. The boundary was restored to its original location and a complete audit of the FMEA material log was completed. The licensee indicated that several items could not be accounted for, however, following a visual inspection of the pool, it was determined that the items had not been introduced into the pool.

Sections 5.1.1 and 5.2.3 of PLP-047 provide the requirements for establishing FMEA barrier tape and completing the Personnel Log upon exiting. In addition, PLP-047 assigns responsibility for maintaining proper FMEA controls to the Supervisor of the employees working in the FMEA. The inspectors determined that the Shift Supervisors had not been effective in ensuring that FMEA controls were maintained in the SFPB. The inspectors noted that similar FMEA procedure discrepancies were identified in the SFPB during the previous inspection period (See NRC Inspection Report 50-26/96-10), indicating a continuing trend of personnel inattention to detail and ineffective supervisory overview of FMEA requirements.

This issue was considered the first of three examples of a violation of TS 6.5.1.1.1 for failure to follow or inadequate procedures. This item is identified as Violation (VIO) 50-261/96-11-01: Failure to Follow or Inadequate Procedures - Three Examples.

c. Conclusions

The inspectors concluded that personnel failed to follow FMEA procedure requirements and supervisory overview of FMEA requirements was ineffective resulting in a loss of FMEA controls inside the SFPB FMEA. This issue was identified as a violation for failure to follow the requirements of PLP-047. The deficiencies identified were similar to previous problems which indicated a continuing trend of insensitivity to FMEA requirements.

01.8 Operator Assigned to Fire Brigade with Expired Medical Examination

a. Inspection Scope (71707)

The inspectors reviewed the circumstances related to the assignment of an individual to the Fire Brigade with an expired fire protection medical examination (physical). The inspectors reviewed the similarity of this incident to several previous incidents involving expired physicals for operations personnel and discussed the incident with the operations and Health Screening personnel.

b. Observations and Findings

On August 15, 1996, the licensee discovered that an Auxiliary Operator (AO) had been assigned to the Fire Brigade on five previous shifts with an expired fire protection physical. At the time of discovery, the AO was in operator retraining class and was not performing shift duties. On August 20, the AO completed the required physical. The inspectors reviewed the medical report for this physical. The individual was screened for adequate physical and mental conditions required for Fire Brigade members in accordance with standard 1582 B-3.3-1992 of the National Fire Protection Association code. The results of the physical confirmed that the AO was medically qualified to resume Fire Brigade activities. The licensee initiated CR 96-01883 to address the expired physical.

The AOs yearly fire protection physical expired on July 31, 1996. The inspectors reviewed logs and personnel time sheets for the individual, as well as other operations personnel on the same shifts between July 31 and August 9, 1996. The inspectors determined that the AO had stood five shifts during this period and had been assigned to the Fire Brigade each shift. However, even without reliance on the AO with the expired physical, the minimum required qualified Fire Brigade complement (five members) had been available on each of the five shifts.

The licensee's on-site Health Screening organization maintains a database for tracking and scheduling operator physicals. Physicals are required to maintain the qualifications for the Fire Brigade (yearly), respirator certification (18 months), and duties of a licensed operator (bi-annual). The database contains two important fields that are delineated as Expiration Date and Scheduled Date. The Expiration Date field contains the earliest expiration date for any of the three physicals tracked. The Scheduled Date is two months less than the Expiration Date, and is used by Health Screening personnel to provide prior notification to employees that their physical is going to expire.

For the most recent expired physical incident, the Health Screening organization had previously entered the incorrect date in the Expiration Date field. Instead of 7/31/96, a date of 10/31/96 was erroneously entered.

The inspectors reviewed several previous incidents involving similar occurrences where operations personnel were assigned to duties with expired physicals. These incidents were documented in CRs 95-01756, 96-00525, and 96-00744.

CR 95-1756 documented the July 10, 1995, expired physicals of two AOs who were assigned to the Fire Brigade on two consecutive shifts. Corrective actions included development of the Health Screening database discussed above which provided notification to the individuals two months prior their physical expiring.

CR 96-00525 documented a February 1996 Nuclear Assessment Section (NAS) audit of the Fire Protection Program. During this audit it was identified that two AOs were assigned to the Fire Brigade with expired physicals. The root cause of this incident was an erroneous date entered in the Scheduled Date field. The erroneous date was exactly one year later than the required schedule date. As a result of this incident, Health Screening was required to validate that the correct physical expiration dates had been entered for each of the operators. The inspectors noted that this review failed to identify the erroneous physical expiration date for the current incident with the expired AO Fire Brigade physical. The erroneous expiration date for the AO had been entered well before this review was conducted. Other corrective actions included a March 30, 1996 memo sent from the Operations Manager to all Fire Brigade qualified personnel reminding them of their responsibility to maintain their physical requirements current. In addition, operations initiated the creation of a matrix to track operator physical expiration dates due to the unreliability of the Health Screening tracking system.

CR 96-00774 documented a licensed senior reactor operator who stood seven shifts between March 2-12, 1996, without a current bi-annual physical as required by 10 CFR 50.55. This incident was the subject of a Non-Cited Violation (50-261/96-10-01) documented in NRC Inspection Report 50-261/96-10. The contributing cause of this incident was again, a data entry error in the Health Screening database. An expiration date

of 6/14/96 had been entered instead of 2/24/96 for the operator's NRC physical. The 6/14/96 date was the expiration date for the operator's respirator physical. Corrective actions for this incident involved validation that the NRC physical expiration dates for all "licensed" operators were correct. Also, a Night Order was issued April 19, 1996, to reinforce expectations that individuals are responsible for maintaining their qualifications current. On May 6, 1996, the operations training matrix was completed and matrix reports were placed in the Control Room for the operators to review so that they could check on the status of their medical qualifications.

The licensee's investigation of the current incident determined that the AO had not reviewed any of the monthly matrix reports placed in the Control Room beginning in May 1996. The inspectors reviewed the matrix report which was placed in the Control Room on June 26, 1996. The portion of the report that provided the Fire Brigade qualifications showed that the AO's Fire Brigade physical was due on July 31, 1996. The inspectors considered that the AOs failure to review the report was a contributing cause to this incident.

10 CFR 50, Appendix B, Criterion XVI, Corrective Action, requires in part, that measures be established to assure that conditions adverse to quality are promptly identified and corrected. The inspectors concluded this issue was a violation of 10 CFR 50, Appendix B, Criterion XVI, in that the licensee failed to take adequate corrective actions to ensure that qualifications and conditions for standing watch duties are maintained current for operations personnel. This item is identified as VIO 50-261/96-11-02: Inadequate Corrective Actions to Prevent Expired Fire Brigade Medical Physicals.

c. Conclusions

The inspectors concluded that previous corrective actions had not been effective in ensuring that personnel medical requirements were current prior to assigning individuals to watch duties. Data entry errors in the licensee's database for tracking medical requirements were not promptly identified and corrected following initial indications of problems. In addition, individuals failed to meet expectations for maintaining the status of their own physical expiration dates. This issue was identified as a violation of 10 CFR 50, Appendix B, Criterion XVI.

08 Miscellaneous Operational Issues

08.1 (Closed) Licensee Event Report (LER) 50-261/94-16-01, Reactor Trip Due to Loss of Load: On August 2, 1994, with the plant at 100% power the operators initiated a manual reactor trip when they observed rapidly decreasing turbine generator. The licensee initiated an events team to determine the cause of the loss of load. ACR 94-01142 initiated to document the event and the event team findings.

The event team determined that the main turbine governor valves closed with the unit at full power, resulting in a loss of electrical load. An intermittent fuse failure in a control circuit that monitors the main generator output breaker position and closes the governor valve if the output breakers open with the unit at full load. The licensee determined that faulty manufacturing caused the fuse failure. An evaluation of the failed fuse (Bussmann MBO10) revealed that it had a cold solder connection. The licensee concluded that there was no method available to preclude the installation of fuses with cold soldered connections. The licensee determined that Limerick had experienced similar fuse problems with the Bussmann KTN-10 and testing results yielded a 30% failure rate. Bussman redesigned the fuse to provide a larger base to make the soldered connection. The redesigned fuse appears to have solved the manufacturing problem.

The inspectors reviewed the completed ACR 94-01142, including the event team report. The licensee's actions appear to be adequate and this item is closed.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Refueling Outage Contractor Maintenance Discrepancies

a. Inspection Scope (62707)

The inspectors reviewed the circumstances associated with two outage-related contractor field work errors.

b. Observations and Findings

- Failure to Follow Modification Instructions

  On September 16, unit was in Cold Shutdown with the refueling cavity filled and control rod unlatching ongoing. Two contracted electrical technicians were performing cable replacement activities associated with modification Engineering Service Request (ESR) 95-00764. The technicians received turnover from night shift personnel that the cable replacement associated with valve SI-866A was ready to be performed. SI-866A is the RCS Loop 3 SI Pump Discharge Hot Leg Injection Valve. The valve was closed, but was being maintained available for core inventory addition in accordance with the risk management procedure PLP-055. Due to a shift turnover communication error, the technicians believed that the valve had already been tagged out of service (i.e., permission granted from operations to perform the work and clearance tag obtained). Valve tagout was required in accordance with steps 16.1 through 16.4 of ESR 95-00764. The technicians failed to review the "master" copy of ESR 95-00764 which would have alerted them to the fact that these actions had not been signed off and the valve was still energized. The technicians

proceeded to cut the valve cables in accordance with step 16.5 of ESR 95-00764. After cutting the cables, the technicians noticed electrical arcing and realized that the cable had been energized. Immediately following the incident, the licensee stopped all work on ESR 95-00764 to begin an investigation. Later, all electrical work being performed by the contractor was stopped and a "stand down" was performed. The stand down emphasized proper shift turnover communications and management expectations that the "master" modification copy be reviewed prior to starting work each shift.

This issue was identified as the second of three examples of a violation of TS 6.5.1.1.1 for failure to follow procedures. This item is identified as VIO 50-261/96-11-01: Failure to Follow or Inadequate Procedures - Three Examples

- Partial Valve Disassembly Error

  On September 18, an engineer monitoring the progress of Boric Acid (BA) pipe replacement work observed a mechanical contractor worker beginning to disassemble valve MOV-350, the charging pump suction supply from the BA Blender. The engineer noted that red clearance tags were hung on the valve and recognized that it was being maintained part of the clearance boundary for integrity of the cold leg injection flowpath in accordance with PLP-055. Breaching this boundary would have rendered this flowpath inoperable. The engineer directed the worker to stop work. At this time, one body to bonnet stud had been removed and the nuts to another stud had been loosened. The valve was immediately restored to its original condition.

  The inspectors determined that work had not yet progressed to the point of breaching the actual integrity of the boundary. The licensee's preliminary investigations attributed the cause of the incident to worker confusion of his work assignment, miscommunication between the worker and his supervisor, and inattention to detail.

As a result of these significant and other minor outage related work incidents, licensee management ordered a site-wide "Work Stand-Down." The stand-downs were conducted on September 18-19 for all work groups. The inspectors attended the operations stand-down conducted by the Control Room Shift Supervisor with all shift operations personnel. At this meeting, each of the specific work related problems were reviewed including the cause and lessons learned. Proper work practices were re-emphasized regarding communications, attention to detail, and use of STAR (Stop, Think, Act, and Review).

The inspectors judged the effectiveness of this stand-down was good. At the end of the report period, no other significant outage-related work error were identified.

c. Conclusions

The second example of a violation for failure to follow procedures was identified when a contractor cut the power cable to valve SI-866A without first obtaining operations authorization or obtaining a clearance for the work. Another significant contractor work control error involved the unauthorized partial disassembly of a boundary valve for maintaining integrity of the charging pump suction line. The licensee's stand-down to reemphasize work control expectations and requirements following these incidents was considered effective in preventing further serious problems.

M1.2 Equipment Repetitive Failure Program

a. Inspection Scope (62700

The inspectors reviewed plant documentation to identify equipment that had repetitive failures. The repetitive failures were examined to determine the root cause of maintenance problems and the corrective action implemented by the licensee. The plant equipment "Repetitive Failure List" was reviewed to identify the components that had recurring corrective maintenance problems identified during 1994, 1995, and 1996. The Maintenance Department's monthly report "Maintenance Inappropriate Acts" for July 1996 was examined to review the licensee's self-assessment in this area. Several Condition Reports (deficiency reports) were reviewed to determine the adequacy of Engineering evaluations in support of maintenance. In addition, the plants "Top Ten" Equipment Issues List was reviewed to determine if the licensee was addressing and implementing corrective action for components that had recurring maintenance problems.

b. Observations and Findings

The inspectors reviewed 94 work order (WO/JO) for 33 components and systems listed in the "Repetitive Failure List". All the WO/JO reviewed were for corrective maintenance that was performed within six months of the previous work. In most cases, the repetitive work was performed within months of the previous work. The systems with the most repetitive work were Instrument air; HVAC (heating, ventilation, and air conditioning) for the control room; and the Hypochlorite system. The components with the most repetitive failures were instruments (DP transmitters), air filter regulators, leaking valves, gaskets and seals, battery chargers, and electronic instrument modules. The inspectors identified that most of the repetitive failures were caused by aging of the equipment such as the Hagan instrument modules or inadequate design for the installation of the DP transmitters. Repetitive failures for leaks in valve packing and gaskets and seals leaks in pumps were not considered abnormal. The components with the highest rework such as electronic instrument modules, air compressors, filter regulators, air condition equipment, and the Hypochlorite valves and piping have been or are being replaced or upgraded. The licensee has an ongoing program to

replace the capacitors in the existing Hagan instrument modules. The Hagan modules are also being replaced with a new type.

The licensee had identified most of the repetitive failures and was in the process of implementing appropriate corrective action. These repetitive failures were placed on the "Top Ten" Equipment Issues List or identified in the monthly "Maintenance Inappropriate Acts" Report. Both the Hypochlorite and Instrument Air systems were on the "Top Ten list for corrective action. Components listed on the "Top Ten" included DP transmitters and the Hagan electronic instrument modules which have caused most of the repetitive failures in the instrument area.

The "Maintenance Inappropriate Acts" Report covered two areas, 1) maintenance due to personnel errors and 2) inappropriate acts involving rework. Both areas were self assessments to identify and correct maintenance repetitive problems. Both areas had implemented Conditions Reports (deficiencies) that were addressed by System Engineering in support of maintenance. The inspectors reviewed seven Condition Reports that were used for evaluations of personnel errors and thirteen Conditions reports that were used for evaluations for rework caused of by inappropriate acts. Personnel errors were mistakes made during the implementation of specified work. Inappropriate acts were someone performing something not specified on a work order or something maintenance had no control over such as defective parts or wrong vendor information. Some of these rework items for 1996 included items such as five damaged components, three improper designs, three miss adjustments, six inadequate decisions, and five defective replacement parts.

c. Conclusion

The inspectors concluded that Maintenance Department, with Engineering support, was in the process of identifying repetitive failures. In addition, several effective programs such as the "Top Ten List", the "Repetitive WO/JO List", the "Equipment Failure List", and the "Maintenance Inappropriate Acts" have been initiated by the licensee to identify and minimize repetitive failures. The inspectors concluded the licensee has effectively identified repetitive failures and was in the process of implementing appropriate corrective action.

M8 Miscellaneous Maintenance Issues (92902)

M8.1 (Closed) LER 50-261/93-16-00, Ventilation System Outside Design Basis Due to Positive Pressure Condition: During the performance of Operations Surveillance Test OST-411, Emergency Diesel Generator "B" (Twenty Four Hour Load Test), licensee personnel questioned the airflow from the Emergency Diesel Generator (EDG) "B" room to the Reactor Auxiliary Building (RAB) hallway. Investigation revealed that the EDG room recirculation damper was not opening as designed for the ambient air temperature conditions. The EDG room recirculation dampers were designed to change operating modes at an ambient air temperature of 55 degrees F (Winter and Summer modes). The EDG Exhaust Fan operates at low speed and the recirculation damper opens when the ambient

temperature is below 55 F. allowing the warm air to recirculate back to the EDG room. The EDG Exhaust Fan switches to fast speed and the Air Recirculation Return Damper closes when in the summer mode. The outside ambient temperature during the performance was less than 55 degrees.

The as found configuration resulted in the RAB pressure becoming positive. The design of the RAB Ventilation System provides positive control of the potentially contaminated RAB environment. Investigation by the licensee determined that a damper solenoid valve was miswired which resulted in the solenoid not receiving an actuation signal.

This event resulted in the NRC issuing Unresolved Item (URI) 50-261/93-11-04. The URI was closed in Inspection Report 50-261/93-19. The closure of the URI also closes this item.

M8.2 (Closed) LER 50-261/93-21-00, Technical Specification Violation Due to Missed Channel Functional Test: On November 30, 1993, a licensee technician identified that the plant vent monitor (RMS-14) had not had its technical specification required quarterly functional test within the specified time period. The quarterly time limit for the channel functional test was exceeded by nine days. The due date for the test was October 29, 1993. However the plant was in an outage and the licensee decided to reschedule the test until after plant restart. Technical specifications allow the functional test period to be exceeded by 25 percent, thus making its overdue date November 21, 1993. The startup was delayed and the E&RC supervisor did not recognize that the functional test had to be performed before startup.

On November 30, 1993, the licensee successfully performed the plant vent channel functional test. There was no safety significance to the late channel functional test. The licensee instituted a system in which all surveillance/functional tests are scheduled and tracked in a single system. The licensee addresses late surveillances at their morning management meetings which the inspectors observe. There have been no additional examples of overdue surveillances since the licensee implemented their corrective actions. The inspectors have concluded that the licensees corrective action was adequate and this item is closed.

M8.3 (Closed) Inspector Followup Item (IFI) 50-261/94-028-03, Follow Licensee's Activities to Enhance The On-Line Maintenance Scheduling Process: The inspectors concluded that the licensee did not require formal evaluations of increased risk due to on-line maintenance. The licensee has incorporated a matrix which was based on an evaluation the risk of performing maintenance on various combinations of two systems.

The inspectors reviewed Plant Program Procedure, PLP-056, Work Control Process, Revision 11. Section 3.3 states that the matrixes only apply for combinations of one or two system trains at a time. Further analysis is required if three or more system trains need to be unavailable at the same time. Section 5.6.k states that Plant General

Manager approval is required for combinations not allowed by the matrix or not otherwise evaluated as acceptable.

The inspectors have concluded that the licensee's program does require a formal evaluation of risk significant maintenance and this item is closed.

III. Engineering

E1 Conduct of Engineering

E1.1 Main Steam Isolation Valve Failure to Close

a. Inspection Scope (37551)

The inspectors reviewed licensee investigations of the A Main Steam Isolation Valve (MSIV) failure to close during unit shutdown. The inspectors observed valve troubleshooting, visually inspected the valve internals, and discussed with engineering their findings regarding the failure.

b. Observations and Findings

On September 9, at 1:06 a.m., the operators attempted to close all three MSIVs. At the time, unit cooldown was in progress and the RCS was at 221° F. Repeated attempts to close the A MSIV from the control board were unsuccessful. The operators continued the cooldown reaching Cold Shutdown conditions (200° F) at 2:50 a.m. Initial licensee troubleshooting results indicated proper functioning of the MSIV's air operated solenoid valves, actuator, and packing clearances. Following these activities, a more exhaustive troubleshooting plan was developed by engineering for disassembling the valve.

Between September 9-10, the inspectors witnessed portions of the licensee's disassembly of the valve to determine why it would not close. The inspectors noted that activities were well controlled and coordinated by engineering personnel to ensure that root cause data was obtained. No evidence of problems were identified during removal of the valve packing and actuator. When the valve bonnet was removed, the licensee discovered that the outer edge of the valve disk was in contact with the valve body at two locations. This caused the disk to wedge between the disk hinge pin and the two points of contact on the valve body. With only a slight tap on the top of the disk, it slammed closed, indicating that it was not being held tightly.

The inspectors met with licensee engineers on several occasions to discuss their investigations and results. The licensee determined that the disk failed to close because it became thermally bound inside the valve body. The licensee believed that the outer edge of the disk may have been in slight contact with the inside valve body when the valve was open during power operations. Following plant shutdown, the disk and valve body cooled at different rates, resulting in the disk becoming thermally bound.

The licensee believed that the unexpected contact between the disk and valve body was attributed to a combination of effects. In 1978, a heavier disk was installed to address potential dynamic concerns with the closing forces. As a result, this may have changed the closeness of the disk in relation to the top of the valve body. Additionally, in 1993, the valve spindle was replaced. The new spindle was slight shorter than the old. Based on the valve design, a shorter spindle would also have an effect of raising the disk inside the valve body. The licensee believed that the combination of these changes caused the disk to slightly contact the edge of the valve body. The inspectors reviewed the licensee's evaluations and determined that they had adequately determined the reason for the valve failure to close.

The licensee determined that this condition would not have caused a problem at normal operating conditions since the disk and valve body would have been at similar temperatures. Associated with this part of the investigation, the licensee hired a contractor to perform an independent engineering evaluation of the condition. This evaluation was performed by Kalsi Engineering Inc. The inspectors reviewed the preliminary report from the contractor which concurred with the licensee's conclusions. The inspectors concluded that the licensee had adequately resolved whether the valve was capable of fulfilling its required safety function had an isolation signal been generated.

The inspectors reviewed the licensee's corrective actions to eliminate the possibility of recurrence of the valve sticking in the open position. The licensee planned to modify the A MSIV disk by grinding the outer edge to provide greater clearance between the valve body and disk to eliminate the chance of thermal binding. In addition, a longer replacement valve spindle was to be installed, which would lower the position of the disk in the valve body. These actions were going to be performed prior to plant startup. The inspectors determined that these actions were adequate to prevent recurrence. Similar disk to valve body clearance checks were planned for the other two MSIVs. In addition, testing will be performed on all MSIVs prior to startup.

c. Conclusions

The inspectors concluded the licensee had conducted a thorough investigation and analysis of the valve failure. Investigation results supported the licensee's determination that the valve would have closed at operating conditions. Planned licensee actions for correcting the disk to valve body interference problem in the A MSIV were determined to be adequate.

E7 Quality Assurance in Engineering Activities

E7.1 Special UFSAR Review

A recent discovery of a licensee operating their facility in a manner contrary to the Updated Final Safety Analysis Report (UFSAR) description highlighted the need for a special focused review that compares plant

practices, procedures and/or parameters to the UFSAR descriptions. While performing the inspection discussed in this report, the inspectors reviewed selected portions of the UFSAR that related to the areas inspected. The inspectors verified that for the select portions of the UFSAR reviewed, the UFSAR wording was consistent with the observed plant practices, procedures and/or parameters.

E8 Miscellaneous Engineering Issues (37551 and 92903)

E8.1 (Closed) IFI 50-261/95-20-01, Justification of Time Required to Establish Alternate SI Pump Thrust Bearing Cooling: The licensee had taken credit in their plant specific analysis (PSA) for establishing alternate cooling to the Safety Injection (SI) pump thrust bearings to mitigate the consequences of a total loss of service water. The licensee stated this action could be accomplished within 45 minutes; however, there was no justification to support this 45 minute time allowance. The inspectors reviewed the licensee's PSA for a total loss of service water and found that the analysis determined that core uncovery would occur within 2.5 hours. The inspectors determined that this 2.5 hours would be sufficiently bounding to support the 45 minute allowance to establishing alternate cooling to the SI pump thrust bearings.

The inspectors reviewed the assumptions made in the PSA to support the 2.5 hour conclusion. One of the assumptions was that reactor coolant pumps (RCPs) were tripped within one minute after a loss of all cooling; either from seal injection or by the thermal barrier. The inspectors reviewed the applicable plant procedures to determine if the one minute assumption in the PSA was supported by plant procedures. Although specific guidance on the one minute RCP trip was not available, further discussions with the licensee indicated that the operators would enter the Emergency Operating Procedure (EOP) network first due to inability to provide cooling to turbine building loads resulting in a forced manual reactor trip. The necessary guidance to trip the RCPs was contained in the EOPs. Furthermore, the licensee stated that tripping the RCPs was a simplifying assumption and the smallest time step allowed was one minute. Because of the large margin in the time to core uncovery (2.5 hours), the inspectors determined the allowance of 45 minutes to establish alternate cooling to the SI pump thrust bearings was adequately supported.

E8.2 (Closed) IFI 50-261/95-20-02, Evaluation of Air Operated Valves "Smart Failures": This issue addressed the potential for non-conservative valve positioning resulting from failure of non-safety related controllers and positioners rather than a complete loss as addressed in Generic Letter (GL) 88-14. The licensee provided documentation that a safety-related positioner was downstream of any non-safety related controllers or positioners. This ensured the valve positioned correctly even in the event of a failure of a non-safety related device. The presence of this safety-related positioner adequately addressed the concern. Furthermore, the licensee was not required by GL 88-14 to analyze for such failures; only for a loss of instrument air.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls (71750)

R1.1 Tours of the Radiological Control Area

a. Inspection Scope (71750)

The inspectors periodically toured the radiological control area (RCA) during the inspection period. The inspectors reviewed and discussed "hot particle" events and reviewed selected skin dose evaluations associated with the current refueling outage.

b. Observations and Findings

Radiological control practices were observed and discussed with radiological control personnel including RCA entry and exit, survey postings, locked high radiation areas, and radiological area material conditions.

Locked high radiation area controls were verified to be implemented in accordance with TS requirements. Posting of radioactive waste (radwaste) storage areas were proper and containers holding radioactive waste, materials or contaminated equipment were labeled adequately. Within the RCA, general housekeeping was considered acceptable.

The inspectors reviewed four skin dose assessments associated with "hot particle" contaminations during the current outage. The inspector verified that the assessments were conducted in accordance with corporate procedure DOS-NGGC-005, Skin Dose from Contamination, Rev. 0, dated June 7, 1996. For the worker assessments reviewed, a maximum skin dose of 1880 millirem (mrem) was calculated.

c. Conclusions

Posting and labeling of radiation areas or containers of radioactive material were conducted in accordance with 10 Part 20 requirements. Licensee programs to assess "hot particle" skin exposures during the current outage were adequate.

R1.2 Release of Worker from Site with Clothing Contamination

a. Inspection Scope (83750)

The inspectors reviewed the licensee evaluation and corrective actions documented in Condition Report (CR) 96-01983 addressing an August 27, 1996 personal contamination event resulting in a subsequent release of a worker with slightly contaminated clothing from the site were reviewed and discussed in detail.

b. Observations and Findings

Licensee CR 96-01983 documented an August 27, 1996, contamination event involving several individuals and which subsequently resulted in the release of one individual from the site whose clothing was contaminated slightly above background. The evaluation identified that on August 27, 1996, three painters were contaminated during preparation (needle gun paint removal) of the Spent Fuel Pool deck area floor in preparation for painting. Surveys of adjacent areas, and loose contamination and airborne surveys conducted during the job evolution did not indicate any significant contamination for the area. However, upon exiting the Radiologically Controlled Area (RCA) all the painters alarmed the personnel contamination monitors. Following decontamination activities, two of the painters did not clear the monitors nor meet frisker limits, i.e. having contamination greater than 100 corrected counts per minute (ccpm) above background. The clothes of the two painters were confiscated. For the third painter, a senior RC technician conducted a frisk which identified contamination levels of approximately 20-40 ccpm. The RC technician allowed the individual to exit the RCA with the identified counts erroneously attributed to noble gas contamination. Upon leaving the restricted area, the same painter alarmed the portal detectors corresponding to the right foot and leg. The same RC technician responded and allowed the individual to leave the restricted area without a required frisk being conducted based on the individual not having re-entered the RCA. The next day, all painters involved in the needle gun activities were sent for whole body analysis. Upon exiting the restricted area, the same painter who alarmed the portal monitor the previous night, re-alarmed the restricted area portal monitors. Followup surveys conducted in the low radiation background of the restricted area boundary indicated contamination, approximately 120 ccpm, on the painter's shoes. Further, followup whole body analyses identified an intake of Cesium-137 resulting in Committed Effective Dose Equivalent of approximately 1 mrem to each individual.

TS 6.11 requires, in part, procedures for radiation protection to be prepared consistent with the requirements of 10 CFR Part 20 and to be approved, maintained and adhered to for all operations involving personnel radiation exposure. From review of procedure and survey guidance the licensee identified the following examples of failure to follow procedures which contributed directly to release of the contaminated clothing from the site:

- The lead technician improperly identified the contamination as noble gas contrary to guidelines for radon progeny discrimination detailed in Health Physics Procedure-005, Control of Personnel Decontamination Techniques, Rev. 31 and Survey Instrument Calibration Procedure -011, Calibration and Operation of the NE Technology Delta 3 Portable Ratemeter, Rev. 1.

- The lead technician failed to follow Plant Program Procedure-031, Contamination Monitoring Program for Personnel/Personal Effects, Rev. 16, in that, a frisk was not conducted after the individual alarmed the restricted area portal monitor.

In addition, the licensee's evaluation identified a procedure weakness in that fixed-contamination surveys were not conducted prior to initiating needle gun activities although the exact radiological contamination history was unknown and repainting had been conducted for the area. Licensee corrective actions included immediate notification of RC technicians regarding the sequence of events and lessons learned, proposed revisions to procedures for performing fixed contamination surveys prior to conducting abrasive work, evaluation of training needs for the staff, improve documentation by RC personnel regarding unusual/abnormal conditions and evaluation of techniques for abrasive removal of paint to reduce radiological hazards. The inspectors identified the failure to follow procedures as non-cited violation (NCV) 50-261/96-11-03: Failure to follow procedures for personnel contamination surveys, consistent with Section IV of the NRC Enforcement Policy.

c. Conclusions

An NCV was identified for failure to follow procedures for personal contamination control activities in accordance with TS 6.11.

R1.3 Radioactive Waste and Material Transportation Activities

a. Inspection Scope (86750, TI2515/133)

The inspectors reviewed RC program activities associated with packaging and shipping of radioactive material and waste to either vendor processing facilities or directly to a licensed burial facility. The review included evaluation of shipping and packaging activities for the following radioactive material shipments.

- A November 17, 1995, Reportable Quantity (RQ) Radioactive Material, Low Specific Activity, N.O.S. 7, UN2912,
- A December 29, 1995, RQ Radioactive Material, Low Specific Activity, N.O.S. 7, UN2912,
- An August 12, 1996, RQ, Radioactive Material, Fissile, N.O.S. 7, UN2918,
- A September 19, 1996 Radioactive Material Shipment, Low Specific Activity, N.O.S. 7, UN2912,

The inspectors verified and evaluated implementation of revised 49 CFR Parts 100-179 and 10 CFR Part 71 regulations. In addition, the inspectors evaluated licensee response to a simulated accident scenario involving a September 18, 1996 radioactive material shipment.

b. Observations

Licensee shipping paper documentation met the applicable regulatory requirements. One potential weakness for management consideration was restricted visibility of the emergency phone number on some shipping papers reviewed. The inspectors verified that licensee was a registered user of the shipping casks and that the appropriate Certificates of Compliance were maintained at the facility and used to develop the licensee procedures used to conduct the reviewed shipping activities. In addition, the inspectors verified that changes to 49 CFR Parts 100-179 and 10 CFR Part 71 regulations were implemented as required.

The response to the simulated emergency scenario was satisfactory, requiring approximately 15 to 18 minutes for operators in the control room to provide all the required information to the inspectors. Licensee representatives stated that the observed response time resulted from the operators contacting onsite RC supervision prior to completing a full response to the inspector. Further, operators were trained to respond directly to an transportation accident event, as necessary. The inspectors noted that licensee evaluation of this area was continuing and that supplemental training accident scenarios would focus on increasing the operators' timeliness in providing the required emergency response information.

c. Conclusions

Transportation and packaging activities for radioactive waste or material shipments met 10 CFR 71.5 and 49 CFR 100-179 requirements. The licensee was implementing, as required, revised Department of Transportation (DOT) guidance.

R2 Status of Radiation Protection and Chemistry Equipment and Facilities

R2.1 Radiation Monitor System Installation and Operation

a. Inspection Scope (84750)

The inspectors reviewed and evaluated the adequacy of installed process and effluent Radiation Monitoring System (RMS) detectors, particulate and iodine samplers, electronics, sampling lines and flow meters, as applicable, to meet UFSAR commitments and to implement Offsite Dose Calculation Manual (ODCM) and 10 CFR Part 20 requirements. The evaluation included, as applicable, RMS equipment walk-downs with comparisons against configuration control documents, design change notices and vendor design specifications. Further, the installed sample line bend radii and piping specifications were evaluated against recommendations detailed in American National Standards Institute (ANSI) N13.1-1969, American National Standard Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities. General comparisons were made between radiation monitor local and remote readout data, where possible.

The following RMS samplers or detectors (Rs), and associated equipment were included in the review: Spent Fuel Pool area (R-5); Drumming Room area (R-8); Failed Fuel process (R-9); Containment Atmosphere particulate (R-11) and gas (R-12); Plant vent gas, particulate and iodine (R-14); Service Water header (R-16); Component Cooling water process (R-17); Liquid Waste effluent discharge (R-18); Fuel Handling Building lower (R-20) and upper (R-21) exhaust; Steam Line discharge (R-31 A, B & C); and Containment High Range Monitor (R-32 A&B).

b. Observations and Findings

For the RMS equipment reviewed, no significant issues regarding design specifications, installed system equipment and sample line configurations, and operating parameters were identified. Housekeeping practices associated with RMS equipment skids, cabinets and general areas were appropriate.

No significant differences were identified for comparisons of data supplied at local and remote, e.g., Main Control Room, RMS readouts. Sample flow rates were within limits specified within vendor manuals.

c. Conclusions

The RMS equipment was designed, installed, operated and maintained appropriately.

R2.2 Radiation Monitor System Calibrations

a. Inspection Scope (84750)

Approved guidance and resultant data for selected RMS detector calibrations were reviewed and discussed. For each detector reviewed, source calibration Environmental and Radiation Control (E&RC) Surveillance Test Procedure (STP) packages for the previous two surveillances conducted prior to the onsite inspection were reviewed, evaluated and discussed with licensee representatives. The following RMS detectors and associated electronics were included in the review: Main Control Room area (R-1); Spent Fuel Storage Pool area (R-5); Containment Atmosphere particulate (R-11) and gas (R-12); and Containment High Range Monitor (R-32B).

The RMS source calibration guidance and results were evaluated against applicable sections of the UFSAR, Technical Specification (TS) and ODCM requirements. In addition, STP guidance for the R-32 monitor was compared against special calibration requirements specified in NUREG 0737, Clarification of Three Mile Island (TMI) Action Plan Requirements, Table II.F.1-3 Containment High Range Monitors (CHRMs).

b. Observations and Findings

From the RMS detector source calibration reviewed, no concerns nor issues were identified. Further, the inspectors verified completion of

in situ special calibrations by electronic signal for the CHRMS in accordance with TMI Action Item II.F.I-3 specifications. No significant trends in the calibration data were observed and all surveillances were conducted at the required frequencies. Traceability of calibration sources and calibrator equipment to National Institute of Standards and Technology (NIST) was demonstrated.

c. Conclusions

The RMS detector source calibrations were technically adequate, conducted at required frequencies and results were within established limits.

R5 Staff Training and Qualifications in Radiation Protection and Chemistry

R5.1 Training of RC Staff on Transportation Requirements

a. Inspection Scope (86750, TI 2515/133)

The training provided to RC staff to meet the requirements of 49 CFR Part 172 Subpart H were reviewed and discussed with licensee representatives. Further, training details provided to staff regarding implementation of recent Department of Transportation (DOT) changes to 49 CFR Parts 100-179 were evaluated.

From discussion with applicable RC staff members, the inspector evaluated the training effectiveness regarding recent DOT changes implemented for 49 CFR Parts 100-179.

b. Observations and Findings

Review of training records verified that RC staff members involved in handling and packaging of radioactive materials were receiving hazardous material (hazmat) training within the required frequencies. From review of training material presented to staff in March 1996, the inspectors verified that recent DOT changes to shipping and packaging requirements were covered in the course material. From discussion of shipping procedures and shipping papers, the inspectors determined that responsible licensee representatives were knowledgeable of the recent DOT changes.

c. Conclusions

Hazmat training provided to personnel handling radioactive materials was conducted at the appropriate frequency, and included recent changes to DOT regulations. The training provided was effective.

R7 Quality Assurance in Radiation Protection and Chemistry Activities

R7.1 Radiological Measurement Quality Control

a. Inspection Scope (84750)

The inspectors reviewed implementation of the counting room quality control (QC) activities to meet the intent of Regulatory Guide (RG) 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment. Specifically, the results of the following cross-check radiological analyses were reviewed and discussed with cognizant licensee representatives:

- 1995 quarterly cross-check analysis results for strontium (Sr)-89, Sr-90, and iron (Fe)-55 Vendor Analyses
- 1995 quarterly and 1996 first quarter cross-check analysis results for gamma-spectroscopy analyses
- Selected 1996 Daily Gamma Spectroscopy System Performance Data.

The use of correction factors, as applicable, for RMS sample line particle deposition and iodine plate-out were reviewed and discussed. The review included calculations and actual test data used to evaluate particle deposition and iodine plate-out in RMS sample lines. Finally, the licensee evaluation of design limitations for the plant vent gaseous effluent monitor under accident conditions as identified in NRC Information Notice 86-30, was reviewed and discussed.

b. Observations and Findings

No significant concerns nor negative trends were identified from review of the counting room gamma-spectroscopy QC performance data. In addition, no issues regarding inter-laboratory cross-check analyses were noted.

From discussions with licensee representatives, the inspectors were informed that airborne effluent measurement data did not include correction factors for iodine plate-out nor for particulate deposition in sample lines. The inspectors noted that particulate and iodine radionuclides are routinely monitored by the Containment Atmosphere (R-11) and the Plant vent (R-14) sampling systems. Licensee representatives provided a March 1987 study which compared results from a particulate filter and charcoal cartridge on the R-11 RMS to a containment grab sample. For the particulate radionuclides, the ratio of R-11 sampler to Containment Volume (C-11/CV) grab sample values ranged from .8 to 1.4. For the iodine radionuclides, the C-11/CV ratios ranged from 1.10 to 1.13. For the R-14 monitor, a preliminary evaluation of changes to the system indicated that the monitor upgrade would not affect sample line deposition with approximately 100 percent of particulates transmitted to the sample collector. However, no calculations were provided with the evaluation nor were any estimates of

iodine plate-out provided. Subsequent evaluation of sample line deposition using Deposition Software for Characterizing Aerosol Particle deposition in Sampling Lines, Revision 2, calculated a transmission factor of approximately 99.5 percent. The inspectors noted either calculations or test studies evaluating RMS sample line particulate deposition and iodine plate-out needed to be formally documented and approved.

In addition, the licensee was unable to provide data prior to the end of the onsite inspection, regarding qualifications of the R-14 electronic equipment for doses expected during accident conditions. A preliminary calculation indicated that expected doses, approximately 850 rads, would be less than the 1000 rads operating limit specified by the vendor.

The inspectors informed licensee representatives that calculations ensuring the R-14 monitor was qualified to expected doses during accident conditions, as well as data associated with evaluation of sample line particulate deposition and iodine plate-out, would be reviewed during subsequent inspections.

c. Conclusions

Gamma spectroscopy and inter-laboratory cross check QC activities were implemented appropriately and met the intent of RG 4.15. A need to review documentation associated with sample line particulate and iodine plate-out calculations and qualification of the R-14 monitor to expected doses during accident conditions was identified as IFI 50-261/96-11-04.

R7.2 Licensee Self-Assessment Activities

a. Inspection Scope (84750, 86750)

During the inspection period, the following audit reports regarding Chemistry, RC; and Radioactive Waste (Radwaste) processing, packaging and transportation program activities required by TS, 10 CFR Part 20, and 10 CFR Part 71 were reviewed and discussed with licensee representatives.

- R-ERC-94-02, Environmental and Radiation Control Assessment, dated January 10, 1995
- R-ERC-95-01, Environmental and Radiation Control Assessment, dated January 05, 1996

In addition, the experience of the individuals conducting audits of the subject E&RC program areas was reviewed and discussed.

b. Observations and Findings

The audits met TS required frequencies and addressed ODCM, effluent, Chemistry, RC, radwaste and transportation program guidance and implementation. Both compliance-based and performance-based strengths,

issues, weaknesses and recommendations were documented. The audits included review and followup of previously identified items.

From discussions with licensee management, the inspectors determined that auditor teams included experienced individuals from outside of the H.B. Robinson facility.

c. Conclusions

Audits for the E&RC program activities were thorough and comprehensive, and met TS, 10 CFR Part 20, and 10 CFR Part 71 requirements.

P2 Status of Emergency Preparedness Facilities, Equipment, and Resources

P2.1 Testing of Public Warning System Following Hurricane

a. Inspection Scope (71750)

The inspectors reviewed the licensee's actions to test the Public Warning System sirens located in the surrounding counties following Hurricane Fran.

b. Observations and Findings

On September 6, the licensee conducted a silent test of the Public Warning System sirens to ensure that there was no damage as a result of the strong storm winds from Hurricane Fran.

This test involved sending a test actuation signal to each of the sirens from the primary activation point. Receipt of the signal, and therefore affirmation that the sirens would actuate, was confirmed by reading a local counter at each of the sirens.

During this test, the licensee identified that a significant number of sirens in Darlington County did not receive the test signal. As a result of the potentially inoperable siren conditions, the licensee implemented their offsite emergency management procedures for backup public warning in the affected areas. Also, in accordance with 10 CFR 50.72(b)(1)(v), the licensee provided a 4-hour NRC notification due to meeting the criteria for a major loss of offsite communication capability. Later that same day, another silent test was conducted from the alternate activation location. The results of this test confirmed that all but one siren was operating properly.

Subsequent licensee investigations determined that the cause of the original failures was a malfunctioning tone encoder used to transmit the test signal from the primary activation location. In that the alternate activation equipment had been operable, the sirens could have been actuated during the time that the primary tone encoded equipment had failed. The primary tone encoder was later replaced and an acceptable silent test was performed to demonstrate siren operability.

c. Conclusions

The inspectors concluded that licensee actions to test and address potential problems with the Public Warning System following the aftermath of Hurricane Fran were adequate.

P3 Emergency Preparedness Procedures and Documentation

P3.1 Discrepancies in On-shift Dose Assessment Procedure

a. Inspection Scope (71750)

The inspectors reviewed the licensee's capability to conduct on-shift dose assessments during accident situations. This included a review of emergency procedures and discussions with operators, emergency preparedness (EP), and computer support personnel.

b. Observations and Findings

10 CFR 50.47 requires that licensees have the capability to perform dose assessments at all times in order to support emergency response efforts during accident situations involving actual or potential releases of radioactive material. This requirement makes it necessary to have personnel on-shift who are capable of performing dose assessment calculations.

The inspectors reviewed emergency procedure EPRAD-03, Dose Projections, rev. 0. The Control Room operators are responsible for performing dose projections until the Dose Projection Team, who are part of the Emergency Response organization, arrive onsite and are prepared to provide this function. The procedure provided instructions for accessing a dose calculation computer program called "HBRDOSE" via several different options. The first and primary option included accessing the program via an Emergency Response Facility Information System (ERFIS) terminal computer. If the ERFIS link was operational, the system would retrieve the input data automatically. If this link was not operational, the operators would be required to enter the input data manually. If for any reason that the program access through ERFIS was unable, the procedure indicated that a computer with the program installed on its hard drive could be used.

In order to ensure that the operators were capable of accessing the program, under worst case conditions, the inspectors requested the Control Room operators to demonstrate use of the program assuming that ERFIS was out-of-service. The operators indicated that the dose program was installed on several of their non-ERFIS Control Room computers. When the operators attempted to access the program via the backup method in accordance with step 1.1.8 of the procedure, they were unsuccessful. The Information Technology (IT) Manager, who's organization provides computer support, was contacted to discuss the problems encountered. After a lengthy discussion, the operators were able to eventually access the dose program from a different computer subdirectory than that

specified by EPRAD-03. The licensee indicated that the procedure would be revised to correct the steps for backup access to the program.

Also, during the unsuccessful attempts to access the program, the Shift Supervisor produced a computer disk that was stored in his desk that contained the dose program. This disk was loaded into a Control Room computer and the program was successfully run, however, the inspectors noted that the program was not the correct revision. The Shift Supervisor indicated that the disk had been in the desk for a considerable time. The disk was later confirmed to be an uncontrolled copy of the program and was subsequently removed from circulation and destroyed. The licensee's search for other uncontrolled disks did not result in any being found. A site wide memo was later distributed reminding personnel that unauthorized or uncontrolled computer disks should not be in circulation. The inspectors determined that adequate corrective actions were taken or planned for this uncontrolled disk issue.

The inspectors determined that the instructions contained in EPRAD-03 were inadequate for accessing the dose projection program using the backup method from the Control Room. While the inspectors agreed that it was highly unlikely that the ERFIS related access to the program would be unavailable, it was a possibility. As such, the operators needed to have a reliable backup method for accessing the program and performing the necessary dose calculations in a timely manner (i.e., prior to Emergency Response Team arrival). This issue was identified as example three of Violation VIO 50-261/96-11-01: Failure to Follow or Inadequate Procedures - Three Examples.

c. Conclusions

The inspectors concluded that the licensee had established procedures and controls for the capability to conduct on-shift dose assessments during accident situations. A procedure discrepancy was identified with the backup method for accessing the computer software for calculating dose projections in the Control Room. This issue was identified as example three of a violation for inadequate procedures.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on October 8, 1996. Interim exits were conducted on August 23, 28, and September 20, 1996. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. Clements, Manager, Site Support Services
D. Crook, Senior Specialist, Licensing/Regulatory Compliance
C. Hinnant, Vice President, Robinson Nuclear Plant
J. Keenan, Director, Site Operations
R. Krich, Manager, Regulatory Affairs
B. Meyer, Manager, Operations
G. Miller, Manager, Robinson Engineering Support Services
R. Moore, Manager, Outage Management
J. Moyer, Manager, Maintenance
D. Stoddard, Manager, Operating Experience Assessment
R. Warden, Acting Manager, Nuclear Assessment Section
T. Wilkerson, Manager, Environmental Control
D. Young, General Manager, Robinson Plant

NRC

J. Zeiler, Acting Senior Resident Inspector
P. Byron, Resident Inspector, Surry

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 62700:	Maintenance Implementation
IP 62707:	Maintenance Observation
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 83750:	Occupational Radiation Exposure
IP 84750:	Radioactive Waste Treatment, and Effluent and Environmental Monitoring
IP 86750:	Solid Radioactive Waste Management and Transportation of Radioactive Materials
IP 92902:	Followup - Maintenance
IP 92903:	Followup - Engineering
IP 93802:	Prompt Onsite Response to Events at Operating Power Reactor
TI2515/133:	Implementation of Revised 49 CFR Parts 100-170 and 10 CFR Part

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

Type	Item Number	Status	Description and Reference
VIO	50-261/96-11-01	Open	Failure to Follow or Inadequate Procedures - Three Examples (Sections O1.7, M1.1, and P3.1)
VIO	50-261/96-11-02	Open	Inadequate Corrective Actions to Prevent Expired Fire Brigade Medical Physicals (Section O1.8)
NCV	50-261/96-11-03	Open	Failure to follow procedures for personnel contamination monitoring (Section R1.2)
IFI	50-261/96-11-04	Open	Review Licensee RMS Sample Line Particulate Deposition and Iodine Plate-out Evaluations; and R-14 Qualification to Expected Accident Doses (Section R7.1)

Closed

Type	Item Number	Status	Description and Reference
LER	50-261/94-16-01	Closed	Reactor Trip Due to Loss of Load (Section O8.1)
LER	50-261/93-16-00	Closed	Ventilation System Outside Design Basis Due to Positive Pressure Condition (Section M8.1)

Type (cont'd)	Item Number	Status	Description and Reference
LER	50-261/93-21-00	Closed	Technical Specification Violation Due to Missed Channel Functional Test (Section M8.2)
IFI	50-261/94-028-03	Closed	Follow Licensee's Activities to Enhance The On-Line Maintenance Scheduling Process (Section M8.3)
IFI	50-261/95-20-01	Closed	Justification of Time Required to Establish Alternate SI Pump Thrust Bearing Cooling (Section E8.1)
IFI	50-261/95-20-02	Closed	Evaluation of Air Operated Valves "Smart Failures" (Section E8.2)
NCV	50-261/96-11-03	Closed	Failure to follow procedures for personnel contamination surveys (Section R1.2)