

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Report No. 50-354/86-06
Docket 50-354
License CPPR-120
Licensee: Public Service Electric and Gas Company
Facility: Hope Creek Generating Station
Conducted: January 13 - February 9, 1986
Inspectors: R. W. Borchardt, Senior Resident Inspector
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Inspection Summary:

Areas Inspected: Routine onsite resident inspection of the following areas: followup on outstanding inspection items, plant tour, preoperational phase activities, and inspection program status. This inspection involved 410 hours by the inspectors.

Results: This report documents a violation concerning the conduct and results review of preoperational testing (paragraph 4). As discussed in this report and the transmittal letter, the NRC feels that it is imperative that an in-depth technical review be performed on all preoperational tests in order to verify that safety related systems are ready for plant licensing and fuel load activities.

Details

1. Persons Contacted

Within this report period, interviews and discussions were conducted with members of the licensee management and staff and various contractor personnel as necessary to support inspection activity.

2. Followup on Outstanding Inspection Items

2.1 Violations

(Closed) Violation (85-35-01), Failure to test refueling interlocks. Immediate corrective actions taken to address the deficiencies identified by the inspector were documented in Inspection Report 85-35. Steps were added to adequately test the items and interlocks described. At the time the noncompliance was identified the applicant had established a Test Review Board (TRB). The purpose of the TRB is to conduct a detailed technical review of test procedures prior to submission for PORC review. In response to the violation the applicant conducted personalized training for TRB members stressing the need to ensure that all test commitments are met and documented. The inspectors noted an increase in the quality of preoperational test procedures since the institution of the TRB. The inspector had no further questions. This item is closed.

(Closed) Violation (85-35-02), Remote shutdown panel alarm and valve testing. The inspector, in Inspection Report 85-35, reviewed changes made to PTP-SV-1 in response to the violation. The applicant has conducted training sessions with the system test engineers emphasizing the need for thorough review of reference document to ensure that the applicable changes are reflected in the approved test procedure. In addition, licensing personnel have been advised to route all design/operations FSAR change notices through the Public Service Startup Group for their review and incorporation into testing. These actions, in conjunction with the creation of the Test Review Board discussed under item 85-35-01, appear to have increased the general quality of test procedures. This item is closed.

(Closed) Violation (85-42-01), Inadequate design control of 125 VDC control power alarms. The inspector reviewed Design Change Package (DCP) 581 which provides 125 VDC annunciator and computer point power from the Bailey logic panel to interrogate unit substation alarms, rather than existing power from the individual unit substations. This design change ensures that the control room operator will receive adequate indication of loss of control power to the Class 1E 480 VAC unit substations. The inspector reviewed Nuclear Department Work Order (WO) 85-11-19-037-6 issued to authorize implementation of DCP 581. This WO was complete, including functional testing of the affected circuits, on January 13, 1986. The applicant

conducted a design review of alarm circuitry for 7.2KV, 4KV, 480 VAC unit substations and 250 VDC distribution equipment. The inspector reviewed typical configurations for each of the above systems. No additional problems were identified. Based on the reviews conducted, the subject design problem appears to be an isolated case. Corrective action taken in response to the specific problem identified is acceptable. This item is closed.

2.2 Unresolved Items

(Closed) Unresolved Item (85-24-02), Incomplete Procedure OP-IO.ZZ-008(Q) Shutdown from Outside the Control Room, Revision A. The above procedure has been reissued and in Revision 0 of the procedure a listing of the Remote Shutdown Panel (RSP) redundant instrumentation has been added. Also added were the steps necessary to actuate the chilled water system. Revision 1 of this procedure includes attachment 8 which incorporates the results of the spurious signal analysis. This attachment provides the steps necessary to trip the HPCI system by closing the turbine stop valve, governor valve and pump discharge valve. This was necessary for the condition when the HPCI high level trip does not function because of a spurious signal. The action described above satisfactorily addresses the NRC concerns and, therefore, this item is resolved.

(Closed) Unresolved Item (85-24-03), Incomplete Procedure OP-AB.ZZ-135(Q), Loss of Offsite Power, Revision 0. The licensee in Revision 1 of the procedure has included the results of the spurious signal into this procedure. This change includes instructions to manually load and unload the emergency diesel generators to the 4.16 KV vital 1E busses. These actions may be necessary in the event an emergency diesel generator local sequencer malfunctions. The actions taken by the licensee satisfactorily address the NRC concerns. This item is resolved.

2.3 Inspector Follow Items

(Closed) Inspector Follow Item (80-02-03), Mapping of defects in the drywell coating. The inspector reviewed nonconformance report (NCR) 2941. This NCR documents the location and type of defects existing in the drywell coating surface. It further recommends appropriate steps be taken to rework/repair the various types of identified defects. This NCR will track progressing work necessary to complete the remaining drywell coating activities. The inspector has no further questions. This item is closed.

(Closed) Inspector Follow Item (84-23-01), Enhancement of Instrument Indices - Setpoint. During inspection 84-23 the inspector found that the setpoint register was not complete in that it did not list all instruments which require calibration nor did it have all the required information necessary to prepare calibration cards. A review of this area by region based inspectors and NRC consultants indicates

that the licensee has developed and implemented a program to correct the setpoint register and calibration program. In general, the setpoints in use were found to be consistent with the design and safety analysis requirements. The area of instrument calibration and setpoint determination will continue to be inspected during future program reviews. This item is closed.

(Closed) Inspector Follow Item (85-14-01), Followup on CRIDS operations phase - administrative controls and computer alarms. The inspector met with licensee representatives to discuss the final stages of the Control Room Integrated Display System (CRIDS) program development and the administrative controls used to document changes to the CRIDS data base. The inspector is satisfied that the licensee's program and Site Engineering Instruction 4.2 "Design Change Control" adequately control and document all changes to CRIDS and the CRIDS data base. CRIDS is a non-safety related computer information system which provides plant personnel with plant system information via a number of display screens. The inspector has no further questions at this time.

(Closed) Inspector Follow Item (85-14-02), Design changes and development of operating procedures. The inspector reviewed measures established by the applicant to ensure that station procedures are consistent with the as-built plant. The applicant has implemented a computer-based design document cross-reference. Prior to issuance of a later design drawing revision this computer cross reference will be utilized to identify all affected procedures. In accordance with Station Administrative Procedures SA-AP-22-003(Q) a departmental review of affected procedures is conducted. Due to the high flux of design changes during the preoperational test phase of plant life many change authorizing documents (CAD) may be issued between drawing revisions. The applicant has established a group to assess CADs issued for impact on procedures. These CADs, once field implemented, will be incorporated into applicable procedures. Additional review will be conducted when the CADs are incorporated into a drawing/document revision in accordance with the system described above. The applicant informed the inspector of plans to assign additional manpower to ensure procedures are updated and consistent with the as-built plant before fuel load. The inspector concluded that an adequate system is in place to ensure accurate plant procedures. The inspector will follow this procedure development/revision process during routine inspections. This item is closed.

(Closed) Inspector Follow Item (85-21-01), Procedures for controlling backlogs, cleanliness, site training, equipment control and retest control. The inspector reviewed the following approved procedures to verify that the identified concerns had been adequately addressed:

- MD-AP.ZZ-009(Q), Revision 2, Control of Station Maintenance

- MD-AP.ZZ-014(Q), Revision 1, Department Personnel Qualification and Training
- OP-AP.ZZ-108(Q), Revision 0, Removal and Return of Equipment to Service
- SA-AP.ZZ-050(Q), Revision 0, Station Retest Program

The inspector discussed with applicant operations and maintenance personnel the established system for identifying and correcting maintenance backlogs, the system for removal/return of equipment to service, and the system for ensuring adequate retesting. The inspector had no further questions. This item is closed.

(Closed) Inspector Follow Item (85-42-02), Carbon Dioxide Discharge Incident Followup. On January 21, 1986 the licensee briefed the resident inspectors and a Region I fire protection inspector on the carbon dioxide event which occurred on September 24, 1985. The root cause of the event was determined to be a short circuit across contacts on the automatic initiation circuit card. The short circuit was caused by water which had inadvertently entered the electrical boxes during water lancing operations. The licensee has stopped all water lancing, sealed conduit penetrations and placed desiccant in the panels to remove moisture. Since the event of September 24, 1985 the CO2 system has completed preoperational testing. The inspector has no further questions at this time.

(Closed) Inspector Follow Item (85-56-01), Fire alarm identification and response procedures. The inspector reviewed procedures, hard copy alarm information and indices, and drawings available in the control room to assist operators in responding to fire. Field fire alarms indicate as alpha numeric designators on a panel in the control room. A computer monitoring system translates the alpha numeric characters into a verbal alarm description. Hard copy indices of the computer supplied information are provided as part of the fire alarm response procedures. The alarm response procedures detail required operator actions and reference the applicant's prefire plan. The prefire plan provides additional information regarding specific equipment in each fire area. In addition, controlled civil drawings are provided in the control room showing the individual fire areas on each elevation. The inspector also discussed with the applicant the operator training provided in this area. Based on a sampling of the various fire alarm response information and discussion with the operating staff, this item is closed.

(Closed) Inspector Follow Item (85-61-05), Compliance with position 1 of Reg Guide 1.128. A region based specialist reviewed detail test procedure DTP-ZZ-0003, Revision 0, "Battery Room Atmospheric Testing" and verified that it adequately addressed the inspector's concern. On January 27, 1986 the performance of portions of this test were witnessed and at the completion of testing a preliminary review of

the test results was conducted. This review indicated that all acceptance criteria were met as were the guidelines of position C.1 of Reg Guide 1.128 as discussed in SER section 8.3.2.1. Any test exceptions generated during this test will be tracked as part of the preoperational test program results review. The inspector has no further questions and, therefore, this item is closed.

(Closed) Inspector Follow Item (85-64-07), 124 Volt DC Quarterly Battery Surveillance Test. The inspector reviewed surveillance procedure MD-ST.PK-002(Q) "125 VDC Quarterly Battery Surveillance" and verified that the typographical error identified in Inspection Report 85-64 was corrected. The inspector also noted that section 5.2.1 of the surveillance test verifies that the battery room ventilation is operating which by design would limit the hydrogen accumulation in the battery room. The adequacy of the ventilation system is verified during preoperational testing using helium as a test gas. This test was reviewed and found to be in compliance with Reg Guide 1.128. This item is closed.

(Closed) Inspector Follow Item (85-64-08), 4.16 KV system switch and typographical errors. The inspector reviewed on-the-spot change notice P-3 to station procedure OP-SO.PB.001(Q) "4.16 KV System Operation" and verified that it corrected the typographical errors previously noted. Discussions were also held with members of the licensee's staff. The inspector determined that no other changes were needed to the subject procedure. This item is closed.

(Closed) Inspector Follow Item (85-64-10), LPCI Pump Functional Test and Flow Verification. The inspector discussed the licensee's proposed resolution of the item with members of the Operations staff. The licensee agreed to place the Technical Specification (TS) acceptance criteria in the body of the applicable surveillance test procedures. The followup of this commitment has been designated as an inspector follow item in a separate inspection report (50-354/86-02). The inspector had no further questions and this item is closed.

(Closed) Temporary Instruction (25-00-12), Actions Taken in Response to GE SIL No. 402. The substance of this TI and GE SIL No. 402 was also addressed by Information Notice 84-17. The inspector reviewed the applicant's system design and actions taken in response to Information Notice 84-17. This review is documented in Inspection Report 85-14 and paragraph 2.4 of this report. This item is administratively closed.

2.4 IE Bulletins, Circulars and Information Notices

(Closed) IE Bulletin (74-14), BWR Relief Valve Discharge to Suppression Pool. This bulletin was provided to the licensee for information and discussed various problems associated with the extended discharge of safety relief valves. The inspector reviewed Technical Specification 3.6.2.1 and abnormal operating procedure OP-AB.ZZ-121

"Failed Open Safety Relief Valve" to determine that the licensee has addressed the concerns of this bulletin. This item is closed.

(Closed) IE Bulletin (77-07), Containment Electrical Penetration Assemblies at Nuclear Power Plants Under Construction. This bulletin and associated NRC inspector follow item were reviewed and closed in Inspection Report 84-04.

(Closed) IE Bulletin (78-14), Deterioration of Buna-N Components in ASCO Solenoids. This bulletin concerns the deterioration through material aging of Buna-N components in CRD scram pilot valves. The subject was reported in GE Service Information Letters (SILs) 128 (March, 1975), 128 Revision 1 (January, 1976), and 128 Revision 1, Supplement 1 (August, 1978). The Buna-N service life, including any shelf life, is seven years.

The inspector reviewed Environmental Qualification Maintenance and Surveillance Information Sheet (EQMS) M-001-SV-021, Maintenance Procedures MD-AP.ZZ-010(Q) including Attachments 6 and 7, MD-GP-ZZ-033(Q) (Solenoid Valve Maintenance) and MD-PM.BF-005(Q) (Hydraulic Control Unit Scram & Directional Valve P.M.). EQMS M-001-SV-021 specifies the CRD scram solenoid pilot valves (SSPV) must be rebuilt with ASCO Replacement Kit FV-186-495 every 5 years. The remaining procedures listed above specify 1/3 of the SSPVs will be scheduled for rebuilding every refueling outage and provide the detailed instructions for such rebuilding. The inspector had no further questions regarding this bulletin response.

(Closed) IE Bulletin (80-16), Potential Misapplication of Rosemount Models 1151 and 1152 Pressure Transmitters with Either "A" or "D" Output Codes. The subject bulletin was addressed in Inspection Report 85-56. It was left open because of 49 Model 1151 transmitters designated by GE as "passive essential safety related (having no electrical safety function because they are passive devices) and a number of Model 1151 transmitters (determined to be 11 by the inspector) designated as nonessential but Q-listed (no safety function) are in use at Hope Creek.

The inspector met with licensee engineers and reviewed the control room indications provided by Rosemount 1151 pressure transmitters. The licensee's fix is to label control room indications that should not be relied upon during transient/accident conditions. This project is being performed by Bechtel under Design Change Package (DCP) No. 7110.

In a followup inspection outside this report period, the inspector found that implementation in the control room had not commenced. No scheduling information was provided.

DCP 7110 needs to be completed prior to initial criticality; it remains an outstanding item until unit control room labeling is confirmed by NRC Region I (50-354/86-06-03). The subject bulletin, however, is closed.

(Open) IE Bulletin (85-03), MOV Common Mode Failures During Plant Transients Due to Improper Switch Settings. The subject bulletin concerns the need to correctly select, set, and maintain the switch setpoints on safety-related motor operated valves (MOV's). For BWRs, the systems involved are HPCI, RCIC and core spray. The bulletin response schedule for plants with a construction permit is two years from the date of the bulletin.

The inspector reviewed correspondence from Bechtel indicating that the initial response to the NRC will be submitted about May 15, 1986 with detailed information on Item A, regarding the review of the design basis for the operation of each valve, developed after fuel load.

(Closed) IE Circular (77-01), Malfunctions of Limitorque Valve Operators. The subject circular addresses the proper setting of torque limit switches and limit switch bypasses, to assure that bypass functions are not negated prematurely in the opening or closing cycle. This should be verified by procedural requirements to ensure valve operability following maintenance or manual closure.

The inspector had previously observed Motor Operated Valve Analysis and Testing System (MOVATS) testing of a valve as reported in Inspection Report 85-56, page 13. Two of the tests observed at that time were verification of the torque switch setting, by comparison with a standard load cell, and torque limit switch bypass time, by comparison of plot of switch operation versus thrust (movement of the worn gear spring pack). It was concluded that MOVATS testing appears to provide an excellent method to ensure proper overall valve operation, and provides solid baseline data for future use.

This inspection concentrated on procedures necessary to alleviate the circular's concerns. Procedures reviewed were:

- MD-PM.ZZ-004(Q) Revision 1; General Preventative Maintenance for Motor Operated Valves
- MD-GP.ZZ-028(Q) Revision 1; Disassembly and Reassembly of SMB-000 and SMB-00 Limitorque Valve Operators
- MD-GP.ZZ-029(Q) Revision 1; Disassembly and Reassembly of SMD-0 to SMB-4 and SB-3 Limitorque
- MD-GP.ZZ-030(Q) Revision 0; Disassembly and Reassembly of SMB-5 and SMB-5T Limitorque Valve Operators

- MD-GP.ZZ-031(Q) Revision 0; Limitorque Valve Operator Inspection and/or Adjustments
- MD-GP.ZZ-050(Q) Station Retest Program

In reviewing the above disassembly and reassembly procedures, it was noted that precautions involving backseating and band operation were inconsistent and confusing. These procedures have been revised and are undergoing licensee review at this time. The problems with the precaution section are resolved in the new revisions. The inspector had no further questions on this issue.

(Closed) IE Circular (79-07), Unexpected Speed Increase of Reactor Recirculation MG Set. The subject circular relates to possible reactor power increase caused by unexpected speed increase of the recirculation pumps resulting from improper troubleshooting of the MG set; in particular, removal of a control fuse from the circuit. Corrective actions included review of the scoop tube actuator circuit, a warning statement to be placed in troubleshooting guides, a permanent label to the same effect to be placed on the control panel cover and appropriate training on use of vendor's technical manual. The inspector physically observed the two fuses in the scoop tube actuator circuit, the suggested label on the control panel covers, Bailey Product Instructions E 81-2-1 (Electric Control Drive), and the related I&C training. The licensee's actions are responsive to the circular and, therefore it is resolved.

(Update) IE Circular (80-16), Operational Deficiencies in Rosemount Model 510 DU Trip Units and Model 1152 Pressure Transmitters. The subject circular was closed out in Inspection Report 85-56 based, in part, by written statement from Bechtel and GE that no Rosemount Model 1152 pressure transmitters are used in safety related systems at Hope Creek. However, during an EQ inspection, site engineering identified two Model 1152 pressure transmitters classified safety related located in the reactor building. As a result of this finding, GE undertook a complete inspection of all Rosemount transmitters supplied by them and found one additional Model 1152. These Model 1152 pressure transmitters will be replaced prior to fuel load.

This update is provided for information; the circular remains closed.

(Closed) IE Circular (81-14), Main Steam Isolation Valve Failures to Closed. This circular provided information on main steam isolation valve (MSIV) failures and recommended that holders of construction permits evaluate system designs to ensure high reliability. The inspector reviewed the Bechtel analysis of this circular and the station procedures dealing with the MSIV air supply systems and MSIV maintenance. In addition to operating procedures which ensure a clean air supply, the instrument air system contains filters and dryers which are designed to prevent fouling of the MSIV pilot valves. This item is closed.

(Closed) Information Notice (84-IN-17), Problems with liquid nitrogen cooling components below the nil ductility temperature. The inspector reviewed the site specific system design and the applicant's response to the notice in Inspection Report 85-14. During this report period the inspector reviewed station operating procedure OP-SP.GS-001(Q), Containment Atmosphere Control System Operation. This procedure requires that an operator be stationed at the vaporizer to monitor nitrogen temperature. In addition the inspector verified that the setpoint of the nitrogen temperature controller, which stops nitrogen flow on low temperature, has been raised from -20 degrees F to +40 degrees F. The characteristics of the existing design and the actions taken in response to the notice adequately address the problem. This item is closed.

2.5 Construction Deficiency Reports

(Closed) Construction Deficiency 81-00-04, Limitorque Valve Operator Problems. In June, 1981, the applicant reported a potential significant deficiency concerning: 1) fiber shims under contact screws; 2) unidentified terminal blocks; and 3) damaged terminal block in Limitorque valve operators. PSE&G addressed these problems in letters dated July 17, 1981 (original report), November 19, 1981, October 21, 1982 and March 21, 1983. In essence, the licensee's review found items 2 and 3 above on terminal blocks to not be significant. Other defects such as some poor wiring practices included in the review. In addition, the applicant expanded the review to include the motor-to-shaft key problem identified in IE Information Notice 81-08.

To resolve the concerns given above, PSE&G and Bechtel developed Specific Work Plan/Procedure SWP/P-E-18, "Termination Installation" which included a multi-item inspection checklist. To date, 271 Limitorque operators have been inspected and repaired as required including replacing the fiber shims.

The inspector reviewed a number of inspection checklists and the system lists of operators that were inspected. In addition, he observed the control of replacement operators in the warehouse where "Hold" tags were placed on all operators not inspected/repared and a computerized listing maintained for control. No problems were identified.

(Open) Construction Deficiency Report (85-00-10), Missing lockwelds on Anchor/Darling (A/D) 150 lb and 300 lb swing check valves. The subject CDR identified missing lockwelds on the hinge pin set screw and disc nut retaining pin. The hinge pin set screw ensures that the hinge pin will not slide axially, becoming disengaged from the hinge support. The disc nut retaining pin ensures that the disc nut will not loosen. The fix recommended by A/D, was to stake or tack weld the set screw and pin in place. The applicant implemented this recommendation. The inspector reviewed work plan procedure records and

quality control inspection records to verify that required rework had been done. This inspection was documented and the CDR closed in Inspection Report 85-61.

By letter dated December 12, 1985, Anchor/Darling informed Bechtel of additional problems with these same check valves. This letter indicates that valves supplied by A/D may be missing hinge support capscrew lockwelds and hinge support to bonnet lockwelds. Disassembly and examination of several of the sixteen valves in use at Hope Creek has identified examples of missing hinge support capscrew lockwelds. The applicant plans to reopen and update the original CDR. Therefore, previously closed outstanding item 85-00-10 is reopened at this time.

During a tour of the maintenance shop, the inspector examined disassembled core spray pump discharge check valve V014. This A/D swing check had been removed from the system to facilitate placement of the hinge support capscrew lockweld as described above. The inspector noted that the hinge pin had been removed but that the hinge pin set screw remained secured in place. Examination of the hinge pin showed that it could move freely through the hinge support without contacting the set screw. The inspector further noted that no hole had been tapped in the hinge pin to receive the set screw and therefore only a friction fit existed. The inspector questioned shop personnel and maintenance management and determined that they did not have knowledge of the condition. In discussions with the applicant's maintenance and quality assurance management, the inspector questioned the implementation of apparently inadequate corrective action in response to the original CDR. The hinge pin setscrew had been staked in place, however the friction fit between the screw and hinge pin would not be enough to ensure its engagement with the hinge support. The inspector also expressed concern that the applicant had not identified the problem and was not knowledgeable of the problems associated with the original CDR.

2.6 TMI Action Plan Items

(Closed) TAP Item 1.A.1.1. Shift Technical Advisors. This item was previously reviewed and left open in Inspection Report 85-45. During this inspection period the STA course curriculum, the examination and its grading, and the final STA certifications were reviewed. There are currently 7 SRO qualified people who have completed the required STA training and 4 non-SRO qualified people who are currently in STA training program. The licensee's STA training programs was found to meet the requirements of this item and, therefore, this item is closed.

(Open) TAP Item II.E.4.2, Containment Isolation Dependability. This item was reviewed by the inspector in Inspection Report 85-45. The issues remaining open at that time concerned qualification/

control of the primary containment vent and purge valves. To date, the applicant has not qualified these valves to close under accident conditions. The applicant's submittals identified eight unqualified containment vent/purge valves required to be sealed closed in operational conditions 1, 2, and 3. The drywell purge outlet inboard valve may be opened, as discussed in Inspection Report 85-45, to control containment pressure. "Proof and Review" Technical Specifications require these seven valves to be sealed closed and require supplemental leak rate tests on all eight valves to assure no deterioration of the resilient seats. The inspector reviewed surveillance test procedure OP-ST.GS-002(Q), Drywell and Suppression Changer Purge System Valve Verification - Monthly. This procedure describes the method by which the valves will be administratively controlled closed, and prescribes the frequency at which the controls will be verified in place.

While reviewing system configuration drawings the inspector noted that the nitrogen purge supply line branches and penetrates both the drywell and torus purge inlet lines between their inboard and outboard isolation valves. This nitrogen supply line is isolated by a six inch air operated butterfly valve. Because the line penetrates downstream of the outboard isolation valve in each purge inlet line, this six inch nitrogen valve is also a containment isolation valve. The inspector questioned the applicant as to why this valve had not been discussed in the containment vent/purge valve operability submittals, and requested to review the valve qualification reports. The applicant informed the inspector that the nitrogen supply line isolation valve was not qualified. The "Proof and Review" Technical Specifications do not include requirements to seal closed this unqualified valve nor do they address increased leak rate test requirements associated with resilient seat valves. The inspector expressed concern that the valve had not been identified as an unqualified containment isolation valve, and had not been addressed in Technical Specifications or operations procedures. The inspector initiated discussion with NRC:NRR regarding the need for inclusion of the nitrogen supply valve in Technical Specification. This item remains open pending resolution of this issue.

(Closed) TAP Item II.F.1.6 Containment Hydrogen Instrumentation. This item was reviewed in Inspection Report 85-56 and left open for the following concerns:

- Heat tracing of the sample lines was not complete.
- Installation and removal of the sample line flanges penetrating the drywell top hat area was not addressed in appropriate plant operations and maintenance procedures.

The inspector verified heat tracing on all six sample lines by in-plant inspection. The inspector reviewed system drawings and procedures to ensure installation and removal of flanges are adequately addressed in MD-FR.KE-00Z(Q). This item is closed.

(Closed) TAP Item II.K.3.28 Qualification of ADS Accumulators. NRR reviewed and accepted the ADS system design for long and short term post-LOCA operation in the Safety Evaluation Report Supplement 4. The inspector reviewed the applicant's emergency operating procedures and verified that steps had been included to realign the Primary Containment Instrument Gas (PCIG) system to provide long term make up to the ADS accumulators subsequent to a LOCA. The inspector also reviewed PCIG pressure alarm circuit surveillance tests. Short term operability of the ADS accumulators is based on their ability to maintain the stored supply of gas. A total allowable leakage criteria of 1 scfh ensures this short term operability. Results of industry testing verify that SRV pneumatic operator leakage will not exceed 0.5 scfh. The inspector reviewed the applicant's Inservice Test Plan (IST) concerning leak testing of the accumulators. The inspector noted that only accumulator check valve functional and reverse flow testing were planned, and that no periodic leak testing had been included. In response to the inspector's concern the applicant initiated an amendment to the IST adding ADS accumulator periodic leak rate test requirements. The applicant indicated that the accumulator would be tested to verify that leakage was less than 1 scfh. The inspector pointed out that since SRV pneumatic operator leakage was specified as 0.5 scfh, accumulator leakage must be limited to 0.5 scfh in order to meet the total allowable leakage 1 scfh. The applicant committed to perform ADS accumulator leak testing to verify leakage less than 0.5 scfh. The inspector will verify implementation in a future inspection (86-06-01). The inspector reviewed the results of PTP-SN-1, Automatic Depressurization System, to verify that the 0.5 scfh accumulator leakage had been tested. Based on the above this item is closed.

3. Plant Tour

The inspector periodically toured the plant and performed walk-through inspections during this period. Special emphasis was placed in the areas of drywell, reactor building, torus/wetwell, and diesel generator buildings. These inspections were carried out to assess the level of general workmanship in the areas of piping and pipe support; effectiveness of cleanliness and housekeeping program; and general conformance to project procedures in the work progress and completed work. The inspector also toured the control room on regular and backshifts. He interviewed operations personnel regarding testing scheduled or in progress, reviewed logs and night orders, and observed alignment and indications of systems undergoing tests. He checked on tests and operations in progress, observed equipment conditions, and interviewed personnel involved in ongoing activities.

3.1 Construction Related Activities

During a tour of the reactor building the inspector observed that several bolts on HPCI injection valve (HV-F0006) did not have full

thread engagement. The valve motor operator and yoke are secured to the valve body by a two piece collar. The two collar halves are joined and held in place by four bolts. The inspector noted that none of these connections had full stud/nut thread engagement. The inspector reviewed Quality Control Inspection Record (QCIR) 10855/P-1.10 and observed that the step for verifying full thread engagement was designated as not applicable. The inspector questioned the adequacy of the QCIR and the physical condition of the valve. In response to the inspector's concern the applicant initiated deficiency report HQA-86-005.

The inspector also identified that sway strut 1-P-BC-019-H24 on the RIIR minimum flow line was not supporting the pipe. The inspector examined the applicable hanger design drawing and determined that the hanger should carry a design load of 222 pounds. The as found condition did not comply with this specification as demonstrated by the ability to freely rotate the sway strut body. The inspector also reviewed the final quality control inspection report QCIR C-73-P2.00-2-1. Final inspection activity 3.4 stating that the pipe support is supporting the pipe, had been signed as complete on October 16, 1985. In response to the inspector's finding PSE&G QA initiated DR-HQA-86-004.

The inspector noted that the required retaining clips had not been installed on hanger 1-P-FD-224-H07. Retaining rings are installed at each end of the hanger hinge pin to ensure that the pin remains engaged with the hinge support. The inspector observed that QCIR 10855/P-2.10 was reviewed and accepted on June 14, 1985 indicating that this hanger passed its final QC inspection. As a result of the inspector's findings deficiency report HQA-86-003 was written.

The inspector pointed out that these examples are similar to those identified in Notice of Violation 85-61-02. The inspector will review the disposition of deficiency report HQA-86-003, HQA-86-004 and HQA-86-005 in conjunction with the referenced violation. (86-06-04)

3.2 Comparison of As-Built Plant to FSAR Description

The as-built condition of the High Pressure Coolant Injection (HPCI) System was checked against the design drawings and descriptions of the systems contained in the FSAR. This comparison consisted of:

- Verification that the latest copies of system field drawings are in agreement with FSAR Process and Instrumentation Diagrams (P&ID's) and descriptions.
- Verification by field observation that component installation, including control and logic instrumentation, is as described in the design drawings and the FSAR.

- Identification of equipment conditions and items that might degrade performance.

References used were:

- Bechtel Drawing No. M-55-1, Revision 16, High Pressure Coolant Injection.
- Bechtel Drawing No. M-56-1, Revision 12, HPCI Pump Turbine.
- FSAR Section 6.3 and 7.3
- Preoperational Test Procedure PTP-BJ-1, High Pressure Coolant Injection System.

The P&ID's in the FSAR are in substantial agreement with the latest field drawings and the as-built condition of the systems. No violations were identified.

4. Preoperational Phase Activities

4.1 Preoperational Test Procedure Review

The inspector reviewed changes made to PTP-SF-1C and PTP-SF-1B. These tests, as originally written, tested response of the RCCS and RWM to various inputs from the Rod Position Information system (RPIS). Due to ongoing Control Rod Drive (CRD) system work, control rods could not be manipulated to establish the required input from RPIS. The applicant, with concurrence from General Electric, is using a GE Nuclear Test Simulator to simulate input from RPIS. The inspector reviewed the affected tests and other CRD system tests on a sampling basis to assure adequate test overlap. It appears that planned testing demonstrates proper functioning of the entire system.

4.2 Preoperational Test Witnessing

The inspector witnessed testing in progress on regular and backshifts and verified that: 1) testing was conducted using approved procedures by qualified individuals, 2) controlled, calibrated measuring and test equipment was available for required data gathering, 3) adequate quality control coverage was provided, 4) proper coordination between test engineers and operations existed and 5) test exceptions and changes were documented and dispositioned properly.

During the report period the inspector witnessed sections of the following preoperational tests.

- BB-3(Part A) Standby Diesel Generator Loading

- BB-3(Part B) ECCS Integrated Initiation/Loss of Offsite Power
- KL-1 Primary Containment Instrument Gas
- KP-1 Main Steam Isolation Valve Sealing System
- SA-1 Redundant Reactivity Control
- SF-1 Reactor Manual Control System

The inspector also witnessed the following system functional test and post-preoperational retesting.

- BD-1 Reactor Core Isolation Cooling
- BF-1 Control Rod Drive System
- DTP-ZZ-0003 Battery Room Ventilation Test

During preliminary testing in preparation for PT-BB-3, ECCS Integrated Initiation/Loss of Offsite Power, the applicant identified inconsistencies in the operation of all four divisions of core spray system initiation logic. In the event of a LOCA the core spray initiation logic is designed to provide a pump start signal 10 seconds after the LOCA signal is received. If the LOCA signal is coincident with a LOP signal the core spray pump start permissive is provided 6 seconds after the corresponding diesel generator breaker closes, and power is returned to the bus. During a dry run of the LOCA with LOP test it was noted that the core spray pump start permissive for each logic division was received 10 seconds from test start, rather than the design time of 6 seconds. Further investigation revealed that one cable in each logic division between the associated 4160 VAC switchgear auxiliary compartment and diesel generator breaker had not been installed. These cables transmit a diesel generator breaker closed signal to their respective core spray pump start circuits, causing the energization of the six second start timer. Because the cables were not present the pump starts occurred only after the LOCA 10 second time delay.

Bechtel engineering had not scheduled the cables for installation and the cables had not been installed during construction. Component level testing to verify proper installation had been conducted, results reviewed and approved, but had not detected the missing cables. The integrated system preoperational test PTP-BE-1, Core Spray System, had been conducted, results reviewed and approved, but had not detected the condition. PTP-BE-1 as written and run did not adequately test the core spray initiation logic in that those logic portions utilizing the subject cables had not been included in the test as required by FSAR section 14.2.12.1.7. The inspector informed the applicant that this was a violation of 10 CFR 50 Appendix B. (86-06-02)

Also during PTP-BB-3 the applicant identified problems with the Low Pressure Coolant Injection (LPCI) LOCA initiation. During initiation on LOCA with LOP all four LPCI pumps start, with no time delay, subsequent to closure of their respective diesel generator breakers. During initiation on a LOCA only signal the A and B LPCI pumps should start immediately while the C and D LPCI pumps should start after a five second time delay. It was noted during testing that all four LPCI pumps started immediately after simulation of a LOCA condition; no five second delay of the C and D pump start was observed. Investigation identified that the two contacts used in the C and D LPCI pump start logic to monitor diesel generator breaker position, had also been used in the C and D Emergency Load Sequencer logic for the same function. This caused cables from the LPCI Start logics and the Emergency Load Sequencer logics to be terminated on a common point at the contacts, resulting in a direct tie. This previously unidentified tie between the sequencer and LPCI logic caused a continual diesel breaker closed input to the C and D LPCI logics. These inputs bypass the LOCA only five second timers, allowing the immediate start of these pumps observed during testing. The applicant documented the problem as a test exception and initiated a Startup Deviation Report (SDR) to correct the problem.

The inspector noted that numerous problems were encountered during conduct of PTP-BB-3. Several components either did not auto start or did not sequence on at the designed time. During fast bus transfer between offsite sources a number of components tripped off the bus. Several logic problems, including the two specific cases described above, were identified. The LOCA/LOP test is intended to be an integrated test of plant response to the design basis accident. The inspector expressed concern over the number of basic problems encountered in light of the high percentage completion of the involved individual system preoperational tests. The inspector will evaluate the problems identified and their resolution during results review of PTP-BB-3.

Preoperational testing of primary containment isolation valves at Hope Creek is accomplished during testing of individual systems to which these valves are assigned. PTP-SM-2 contains a matrix identifying the various containment isolation valves, and referencing the applicable system preoperational test. The inspector, during observation of system preoperational tests, witnessed functional testing of numerous containment isolation valves.

4.3 Preoperational Test Results Review

The inspector reviewed test results during this inspection to verify that adequate testing had been conducted to satisfy regulatory guidance, licensee commitments and FSAR requirements, and to verify that uniform criteria were being applied for evaluation of completed test results in order to assure technical and administrative adequacy.

For the following tests the inspector verified the licensee's evaluation of test results by review of test changes, test exceptions, test deficiencies, "As-Run" copy of test procedure, acceptance criteria, performance verification, recording conduct of test, QC inspection records, restoration of system to normal after test, independent verification of critical steps or parameters, identification of personnel conducting and evaluating test data, and verification that the test results have been approved.

- BD-1, Revision 0, Reactor Core Isolation Cooling System
- BJ-1, Revision 0, High Pressure Coolant Injection

The inspector reviewed the following test to verify that the testing had been conducted utilizing the approved procedure, that results had been approved and that test changes had been properly implemented:

- BH-1, Revision 0, Standby Liquid Control System

The inspector reviewed the approved results of PTP-BD-1, Revision 0, Reactor Core Isolation Cooling System. The test as approved contains a total of 139 test exceptions, 44 open exceptions at the time of PORC approval. These 44 open exceptions track problems identified during testing, numerous design changes which impact system operation and have not yet been implemented, and several test sections which have not been performed. Thirty seven test change notices and on-the-spot changes were written against the procedure during testing. These changes document correction of procedure inaccuracies, changes to reflect the ongoing implementation of design changes and to document the numerous retests performed prior to PORC approval. At the time of the inspector's review fifteen post preoperational test retest packages had been issued.

The inspector noted that on-the-spot (OTS) changes 32 and 33 documented a large number of test changes made during conduct of the test. The subject changes had been made to the procedure during test conduct without issuance of an OTS. The two referenced OTS were written during the results review process to bring the changes into conformance with the program. The inspector reviewed a sample of the changes addressed by these notices. Section 8.4.15 tests the logic for operation of the RCIC minimum flow valve. The test as written was inadequate, in that the valve auto-open logic was not fully tested. A step to verify valve opening under a certain combination of conditions had been included, but steps to simulate these conditions had not. The step verifying valve operation was deleted rather than correcting the test to establish the proper conditions. This deletion was made without processing a test change and was later documented on OTS-32 as described above. The inspector examined data gathered during the pump/turbine run and determined that the interlock had been functionally demonstrated during operation.

Acceptance criteria for operation of the RCIC high steam flow isolation timer as stated in the preoperational test is from 2.9 seconds to 3.1 seconds. "Proof and Review" Technical Specifications list the requirement as from 3 seconds to 13 seconds. The inspector pointed out to the applicant that these timers would need recalibration to ensure compliance with the Technical Specifications. The inspector further questioned the acceptability of timing a parameter with a small tolerance band using a hand held stop watch.

In examination of pump/turbine performance data, listed in appendix S to the PTP, the inspector noted that several sets of data had been taken. Measuring and test equipment (M&TE) used to take data during the second run had not been identified. M&TE used during the initial run would have been out of calibration at the time of the second run. The inspector questioned the applicant as to the M&TE used to gather the second set of data. The applicant informed the inspector that a second set of M&TE had been used for the second run but had not been recorded. The applicant produced M&TE usage sheets in support of this statement.

The inspector identified two Quality Control Mandatory Witness Points (MWP) which had not been completed by QC, and had not been identified during results review. Steps 8.16.3.31.A and 8.5.2.17.b were designated as MWP but had not been stamped as verified by QC. In response to the inspectors concern the applicant's QC personnel verified proper restoration in accordance with the steps.

The inspector noted Test Exception 98 had been dispositioned by issuance of OTS 31. Testing under OTS 31 had not been completed. Test exception 98 was not listed as open and no SDR had been referenced as tracking this retest. In response to the inspector's question the applicant produced SDR BD-445 which had been written to implement OTS-31. The inspector pointed out that proper documentation of open test exceptions is required to ensure proper completion and adequate review of all test results.

The excessive number of test exceptions and test changes associated with this and many other tests makes a technical review of test results difficult for all parties. Inconsistency in application of program requirements in the area of documenting test exceptions, test changes and retesting makes interpretation of test results heavily dependent on the individual test engineers. The number of design changes being implemented after completion of the preoperational test and the amount of retest/test deferral as a result of incomplete system status requires an especially deliberate approach to the test results review process.

The inspector reviewed the results of PTP-BH-1, Standby Liquid Control, to verify that testing had been conducted in accordance with the approved procedure and that results had been reviewed and approved in accordance with the program. The inspector reviewed the 24

on-the-spot (OTS) changes to the procedure. OTS-5 resulted from a major change to the logic; deleting the LOCA/LOP process start inhibit and sequencer start signals. The inspector reviewed the change and the package and found no unacceptable conditions.

The inspector reviewed the High Pressure Coolant Injection test results package (PTP-BJ-1) and verified the licensee's evaluation of test results by review of test changes, test exceptions, record copy of the test procedure, acceptance criteria, performance verification, recording conduct of test, independent verification of critical steps or parameters, identification of personnel conducting and evaluating test data, and verification that the test results had been approved. The following items were noted in the test results review.

- Test Exception (TE) 45 stated that valve BJ-HV-8278 did not meet the opening and closing time acceptance criteria of GE Specification 22A6237. The test procedure required the valve to open and close in less than 20 seconds, but during the test the valve opened and closed at greater than 20 seconds. The HPCI system is designed to inject rated flow into the reactor vessel in 25 seconds. The FSAR, in Table 6.3-2, states that the maximum allowed delay time from initiating signal to rated flow available and injection valve wide open is 25 seconds. In GE letter GB-85-246, included in the test package, a stroke time of less than 44 seconds was approved as long as the HPCI flow split is satisfactory and the full flow injection time is less than 25 seconds from HPCI initiation. The test exception was dispositioned to perform the actual demonstration during the power ascension testing program and is tracked by SDR-BJ-368. If the acceptance criteria are changed following the power ascension testing, an FASR change may be required.
- Test Exception (TE) 105 stated that the data taken for the combined pump capacity performance curve did not support the design performance curve. Since only auxiliary steam was available for the preoperational test, the TE was dispositioned to perform the performance curve in the power ascension program. The item will be tracked in SDR-BJ-449.

The resolution of the noted Test Exceptions will be reviewed following the startup program testing.

The inspector concluded the review of PTP-BE-1, Core Spray System, begun in Inspection Report 85-61. The inspector discussed with General Electric and PSE&G site engineering the acceptability of conducting a single pump vortex test. System configuration and similarity indicates that a single retest would be representative of the remaining loops. The inspector reviewed the "Proof and Review" copy of Technical Specifications to verify that the applicant's requested lower torus water level limit is applicable only in cold shutdown.

5. Inspection Program Status

Preoperational Test Program Inspection completion status is approximately as follows:

<u>Area</u>	<u>% Inspection Complete</u>
Overall Program	80
Procedure Programs	
Mandatory	100
Primal	100
Test Witness	
Mandatory	75
Primal	100
Results Review	
Mandatory	46
Primal	60

Inspection status is consistent with applicant test program progress. Operational readiness inspection status is approximately as follows:

<u>Area</u>	<u>% Inspection Complete</u>
OPS Staffing & Procedure	90
Tech Spec Review	100
QA	100
Maintenance	60
Fire Protection	100
Surveillance	100
Rad. Controls	85
Rad. Waste	70
Security	100
Emerg. Planning	90

Additional inspection will be done in each area to verify readiness for fuel load.

6. Exit Interview

The inspectors met with applicant and contractor personnel periodically and at the end of the inspection period to summarize the scope and findings of their inspection activities. Written material was not provided to the applicant during the exit.

During the course of this inspection, the licensee was provided written listings of NRC open items from previously issued inspection reports. All of the information provided in the open item list was obtained from publicly available issued inspection reports and was provided to the licensee in order to more effectively address outstanding NRC concerns.

Based on Region I review and discussions with the licensee, it was determined that this report does not contain information subject to 10 CFR 2 restrictions.