March 9, 2004

Mr. George Vanderheyden
Vice President - Calvert Cliffs Nuclear Power Plant
Constellation Generation Group, LLC
1650 Calvert Cliffs Parkway
Lusby, Maryland 20657-4702

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT - NRC INTEGRATED INSPECTION REPORT 05000317/2004002 AND 05000318/2004002

Dear Mr. Vanderheyden:

On January 30, 2004, the NRC completed a team inspection at the Calvert Cliffs Nuclear Power Plant, Units 1 and 2. The enclosed report documents the inspection findings which were discussed on January 30, 2004, with Mr. Bruce Montgomery and other members of your staff.

This inspection examined activities conducted under your license as they relate to plant design activities and compliance with the Commission's rules and regulations. The inspection consisted of system walkdowns, examination of selected calculations, drawings, procedures, modifications, safety evaluations, surveillance tests and maintenance records and interviews with personnel.

Based on the results of this inspection, the team identified three findings of very low safety significance (Green), which were determined to involve violations of NRC requirements. However, because of their very low safety significance and because the issues have been entered into your corrective action program, the NRC is treating the issues as non-cited violations, in accordance with Section VI.A.1 of the NRC's Enforcement Policy, issued May 1, 2000, (65FR25368). If you deny any of the non-cited violations, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Calvert Cliffs facility.

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Sincerely,

/RA/

Lawrence T. Doerflein, Chief
Systems Branch
Division of Reactor Safety

Docket Nos. 50-317, 50-318
License Nos. DPR-53, DPR-69

Enclosure: Inspection Report 05000317/2004002, 05000318/2004002

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos:	50-317, 50-318
License Nos:	DPR-53, DRP-69
Report No:	05000317/2004002 and 05000318/2004002
Licensee:	Constellation Generation Group, LLC
Facility:	Calvert Cliffs Nuclear Power Plant, Unit 1 and Unit 2
Location:	1650 Calvert Cliffs Parkway Lusby, Maryland 20657-4702
Dates:	January 12 - 30, 2004
Inspectors:	C. Cahill, Team Leader J. Schoppy, Sr. Reactor Inspector J. Caruso, Sr. Reactor Inspector J. Benjamin, Reactor Inspector C. Colantoni, Reactor Inspector A. Cerne, NRC Consultant G. Skinner, Contractor
Approved by:	Lawrence T. Doerflein, Chief Systems Branch Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000317/2004-002, 05000318/2004-002; 01/12 - 01/30/2004; Calvert Cliffs Nuclear Power Plant, Unit 1 and Unit 2; Plant Design Team Report.

The inspection was conducted by five Region I inspectors, one NRC consultant, and one contractor. Three Green non-cited violations (NCVs) were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609 “Significance Determination Process” (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC’s program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, “Reactor Oversight Process,” Revision 3, dated July 2000.

A. NRC Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

Green. The team identified a non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion XVII, Quality Assurance Records, related to the licensee’s inability to retrieve records required to furnish evidence of the adequate performance of activities affecting the quality of the high pressure safety injection (HPSI) system. Specifically, quality records, identifiable with both the design change details for a Unit 2 HPSI pipe support snubber installation and the design calculations for the seismic adequacy for structural platforms in the refueling water tank (RWT) rooms in Units 1 & 2, were not retrievable.

The finding was evaluated using Manual Chapter 0612, Appendix E, example 1.b and determined to be more than minor because the records were irretrievably lost. The finding was associated with the attribute of design control (initial design, plant modifications). This issue is considered a very low safety significance finding because, while the required records were not retrievable, an as-built design review was conducted by the licensee which demonstrated the structural adequacy of the existing field configurations. (Section 1R21.b.1)

Green. The team identified a non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, Design Control, for Constellation Energy Group’s (CEG) failure to correctly translate the emergency core cooling system (ECCS) design basis into the HPSI system operating instructions and procedures. Specifically, for short durations during surveillance test activities, the HPSI loop isolation valve was placed in a condition that could impact core cooling if the redundant train of HPSI were to fail.

The finding was more than minor because it affected the Mitigating Systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events (i.e., loss of coolant accidents) to prevent undesirable consequences (core damage). The finding was associated with the attribute of configuration control (operating equipment lineup). The finding was of very low safety significance because it represented the loss of a single train of HPSI for less than the TS 3.5.2.A allowed outage time (72 hours) during each occurrence. (Section 1R21.b.2)

Green. The team identified a non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, Design Control, for CEG's failure to correctly translate the design specifications into the design of the ECCS Mini Flow Valve Indication. Specifically, the control room valve indications on two normally opened and de-energized mini flow valves were not redundant and did not meet single failure criteria.

This finding is more than minor since it is associated with the design control attribute of the Mitigating Systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The finding was evaluated using Manual Chapter 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations." The issue was a design or qualification deficiency, and was determined to be of very low safety significance (Green) because it did not result in an actual loss of safety function of a single train for internal or external event initiated core damage sequences. (Section 1R21.b.3)

B. Licensee-Identified Violations.

None.

Report Details

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

A pilot inspection was performed using inspection procedure (IP) 71111.DS, Plant Design. This procedure combined baseline inspection activities of IPs 71111.02, Evaluations of Changes, Tests, or Experiments; 71111.17, Permanent Plant Modifications; and 71111.21, Safety System Design and Performance Capability. The results of this inspection are documented in a format consistent with the original individual IPs.

1R02 Evaluations of Changes, Tests, or Experiments (IP 71111.02)

a. Inspection Scope

The team reviewed a sample of seven safety evaluations (SEs) required by 10 CFR 50.59 for changes to facility systems, structures, and components or procedures as described in the Calvert Cliffs Nuclear Power Plant Updated Final Safety Analysis Report (UFSAR). The SEs were associated with recently implemented changes and with plant design activities associated with the plant systems reviewed as part of the pilot procedure. The review was conducted to verify that the changes to the facility or procedures as described in the UFSAR, and test and experiments not described in the UFSAR, were properly reviewed and documented by the licensee in accordance with 10 CFR 50.59.

The team also reviewed a sample of nineteen changes and tests for which CEG determined that a safety evaluation was not required. This review was performed to verify that CEG's threshold for performing safety evaluations was consistent with the requirements of 10 CFR 50.59. (See Attachment 1 to this report for a listing of documents reviewed.)

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications (IP 71111.17B)

a. Inspection Scope

The inspectors reviewed twelve permanent plant modifications to verify that the design and licensing bases, and the performance capability of risk significant structure, systems, and components (SSCs) were not degraded through plant modifications. Additionally, in performing Enclosure 1 to the Plant Design procedure, "Safety System Design and Performance Capability," numerous calculations, set point changes and engineering evaluations that met the criteria for inclusion within the scope of "plant modification" were examined by the team. These documents are included in the Attachment to this report.

Plant changes were selected for review based on risk insights for the plant and included SSCs associated with the Initiating Events, Barrier Integrity, and Mitigating Systems cornerstones. The inspectors walked down selected plant systems and components, interviewed plant staff, and reviewed applicable documents including procedures, calculations, modification packages, engineering evaluations, drawings, corrective action documents, the UFSAR, and technical specifications.

The inspectors verified that selected attributes were consistent with the design and licensing bases. These attributes included component safety classification, energy requirements supplied by supporting systems, seismic qualification, instrument set-points, uncertainty calculations, electrical coordination, electrical loads analysis, and equipment environmental qualification. Design assumptions were reviewed to verify that they were technically appropriate and consistent with the UFSAR. For selected modifications the 50.59 screenings or SEs were reviewed as described in section 1R02 of this report. The inspectors verified that procedures, design calculations, and the UFSAR were properly updated with revised design information and operating guidance. The inspectors also verified that the as-built configuration was accurately reflected in the design documentation and that post-modification testing was adequate to ensure that the SSCs were operable.

b. Findings

No findings of significance were identified.

1R21 Safety System Design and Performance Capability (IP 71111.21)

a. Inspection Scope

The team reviewed the design and performance capability of the 4kV and HPSI systems. The SDP worksheets and the individual plant examination (IPE) were reviewed to identify initiating events and core damage sequences where these systems were credited with performing accident mitigation functions. Components selected for detailed review included the HPSI pumps, switchyard interconnections, 4kV breakers, transformers and load tap changers.

The capability of the HPSI system to mitigate a loss-of-coolant accident was reviewed in detail. The HPSI system provides high pressure emergency core cooling at a discharge pressure up to 1275 psia. Three HPSI pumps take suction from two independent headers. Initially, the HPSI pumps are supplied with at least 360,000 gallons from the refueling water tank (RWT). Following a recirculation actuation signal (RAS), HPSI pump suction is swapped from the RWT to the containment sump to recirculate the borated water. Component cooling water (CCW) provides cooling to the HPSI pump bearings and seal cooler heat exchanger. Salt water (SW) provides cooling to the safety injection pump room coolers.

The capability of the offsite electrical distribution system to provide reliable power to the 4kV safety buses for accident and transient conditions was reviewed in detail.

Additionally, the reliability of the offsite and onsite distribution system, was evaluated as they pertain to the initiation of a station blackout. Selected procedures, calculations and engineering evaluations associated with a station blackout event were also reviewed. These reviews included the abnormal operating procedures for station blackout, switchgear room heatup calculations and time critical operator actions.

In evaluating the design and functional capabilities of the selected systems the team reviewed the mechanical, electrical, and instrumentation design features of the primary system and its components. In addition, the team reviewed the adequacy of selected support systems and components that included the CCW and SW systems.

Specific aspects of the mechanical design review included assessing the pressure and flow rate capabilities of the HPSI pumps. The team also reviewed the available net positive suction head to the pumps during alignment to the RWT and the containment sump (post-RAS). Additional mechanical design aspects reviewed for both the 4kV and HPSI systems included design documentation, drawings, operability determinations, and HPSI pump minimum flow protection. The team reviewed the adequacy of room heating and ventilation equipment to provide adequate equipment space environmental conditions during normal and accident conditions. The team performed field walkdowns of the accessible 4kV and HPSI systems equipment to assess the material condition and verify that the installed configuration was consistent with design drawings, operating procedures, and other design and vendor information. The team also assessed the adequacy of freeze protection measures to ensure that important components that were exposed to the elements would not freeze and prevent the systems from performing their safety functions.

The team reviewed the design and performance capabilities of the electrical, and instrumentation and control systems to support the operation of the 4kV and HPSI systems during normal, accident, and transient conditions. These reviews included verification that selected design requirements and commitments contained in the UFSAR, design documents, industry standards, and vendor information had been established and were being maintained. Documents reviewed included drawings, calculations (including instrument setpoint and loop uncertainty calculations), engineering analyses, accident analyses and design changes. The team reviewed associated component electrical testing as well as control circuit logic testing. Selected instrumentation calibration and functional tests were also reviewed. Operating experience information, including vendor information in the form of service information letters (SILs), was reviewed to ensure that CEG properly evaluated and incorporated applicable recommendations.

The team reviewed plant procedures used to operate and test the 4kV and HPSI systems during normal, abnormal, and accident conditions. Procedures reviewed included system operating procedures, abnormal and emergency operating procedures, alarm response cards, surveillance procedures, and maintenance test procedures. The team reviewed the last completed surveillance tests required by plant technical specifications for the selected systems to assess the adequacy of the procedures and to ensure data met procedure requirements or was properly dispositioned.

The team reviewed the operator workaround list, system engineer tracking/trending data, system health reports, temporary modifications, work order backlog, and corrective action database to assess the overall health of the systems. The team also reviewed selected work orders, engineering evaluations, Maintenance Rule functional failure evaluations, operability determinations, and operating experience (OE) responses applicable to these systems. The team conducted several control room instrumentation and in-plant system walkdowns, including a detailed walkdown with the respective system engineers to assess the operational readiness, configuration control, and material condition of these systems. (See Attachment 1 to this report for a listing of documents reviewed.)

b. Findings

b.1 HPSI Design Support/Seismic Structural Record Retrieval

Introduction. The team identified a non-cited violation (NCV) of very low safety significance (Green) regarding the licensee's failure to maintain quality assurance (QA) records for design basis (e.g., seismic) and design change (e.g., pipe support modifications) activities, as identifiable and retrievable documents, as required by 10CFR50, Appendix B, Criterion XVII, Quality Assurance Records.

Description. The team identified, during the conduct of separate field walkdown inspections in both units, some design control questions regarding HPSI components and their field configurations. Among the issues pursued with the licensee were: (1) a question regarding the adequacy of the structural attachment of a snubber (2SNUB2-52-05) hydraulic reservoir to a pipe support for the HPSI 23 pump, and (2) a question regarding the seismic adequacy of platforms in each unit's RWT room. In the first case, the pipe support appeared to have been modified to accommodate the snubber reservoir; and in the second case, safety-related component cable and other structural attachments were found mounted to the RWT room platforms. Team review of the pipe support drawing (13600-0510) on record for snubber 2SNUB-52-05 identified no evidence of approval of the design change that added the hydraulic reservoir. A QA record that would demonstrate the acceptability of the noted field configuration was not retrievable. Similarly, the licensee was unable to retrieve from its QA records (including the "miscellaneous platforms" drawing 63-531-E, and related reference drawings) a design basis document that demonstrated the seismic acceptability of the RWT platforms.

The licensee provided the team with procedural evidence of work package controls (reference: CCI-700 & CCI-200B) and quality assurance program applicability (reference: QAP 14 & 15) that governed the design and design change control activities. These procedures not only provided appropriate reference to ANSI N45.2.11 for the QA commitments for design activities, but also documented the "lifetime" retention requirements for engineering changes and related design records. Since the licensee was unable to retrieve the requested quality records, it performed an "as built" inspection and verification of the subject snubber support and RWT platforms to establish the current adequacy of the field configuration details to the appropriate design (e.g., seismic) and quality criteria. This review verified adequate construction, but could not ascertain the cause of the record retention and/or retrieval concerns.

Analysis. The finding was evaluated using Manual Chapter 0612, Appendix E, example 1.b and determined to be more than minor because the records were irretrievably lost. Also, the impact of inadequate QA records upon potential, related component modifications was considered. The finding was evaluated using Manual Chapter 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations." At issue was not an actual design or qualification deficiency, since "as-built" review of the plant components by the licensee was able to establish the acceptability of the existing field configurations. However, the requisite evidence of adequate control of design and design change activities affecting quality had not been maintained in an identifiable and retrievable manner by the licensee. This finding was determined to be of very low safety significance (Green) because it did not result in an actual compromise or loss of safety system's component functionality.

Enforcement. 10CFR50, Appendix B, Criterion XVII, Quality Assurance Records, requires that sufficient records shall be maintained to furnish evidence of activities affecting quality and that these records shall be identifiable and retrievable. Contrary to this requirement, the licensee failed to retrieve quality records related to a Unit 2 pipe support modification (2SNUB2-52-05) and the seismic qualification of the structural platforms in the RWT rooms of both units. However, because of the very low safety significance of this issue, and because both examples were entered into the corrective action program (IR-008-007 & 008), this finding is being treated as a NCV consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000317, 318/2004002-01, HPSI Design Support/Seismic Structural Records not Retrievable.

b.2 High Pressure Safety Injection System Operation Outside of Design Basis

Introduction. CEG failed to correctly translate the ECCS design basis into the HPSI system operating instructions and procedures. The team determined that this performance deficiency was of very low safety significance (Green) and a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control.

Description. The team identified a condition allowed by plant procedures that placed the plant outside of the ECCS design basis. Specifically, Calvert Cliffs UFSAR Section 6.3.2.1 states "the HPSI pumps are sized to ensure that one high-pressure pump will keep the core covered at the start of recirculation, assuming complete spillage of the maximum flow leg." Contrary to this, CEG engineering evaluation NEU 93-030, dated February 3, 1993, and CCNPP procedure OI 3A, "Safety Injection and Containment

Spray," Section 5.0.S allowed operation with a HPSI loop isolation motor operated valve (MOV) de-energized in the open position without considering the associated HPSI loop inoperable and entering the applicable Technical Specification (TS) action statement (TS 3.5.2.A). In this condition, given a postulated single failure of the unaffected HPSI train, the remaining HPSI pump (without the ability to throttle the failed open MOV post-RAS as required in CCNPP EOPs) may not be able to provide adequate core cooling flow (assuming a cold leg break on the loop with the failed open MOV). For example, in the event of a loss of coolant accident (LOCA), the emergency operating procedures require the operators to throttle closed the loop isolation valves to the RCS loop with the failed pipe. In the condition where the valve is opened and de-energized, the operators may not have the ability to throttle the valves in a timely manner. Therefore, the HPSI loop should have been declared inoperable when the valve testing was in progress.

In response to the team's question concerning the HPSI system alignment, CEG engineering determined that the condition had not been adequately evaluated. Engineering promptly provided appropriate temporary guidance to the operating shift (the associated HPSI train can not be considered operable with a failed open MOV) and initiated IR4-008-006 to document, evaluate, and correct the condition.

The team noted that, in addition to engineering's less than adequate 1993 evaluation, CEG had missed an opportunity in June 2000 when they initially incorporated NEU 93-030 guidance directly into OI 3A using the 10 CFR 50.59 screening process. In June 2000, the extent of engineering's review consisted of the statement "The General Precaution replaces the Tech Spec interpretation 3.5.2 for HPSI and LPSI MOV operability during maintenance."

Analysis. The finding was more than minor because it potentially affected the Mitigating Systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events (i.e., loss of coolant accidents) to prevent undesirable consequences (core damage). The finding was associated with the attribute of configuration control (operating equipment lineup). The team determined that the finding was of very low safety significance (Green) by the SDP Phase 1 screening worksheet for Mitigating Systems because the finding represented the loss of a single train of HPSI for less than the TS 3.5.2.A allowed outage time (72 hours) during each occurrence.

In evaluating the risk significance, the team considered the duration and frequency of the condition. CEG engineering provided information indicating that the HPSI loop isolation MOVs were de-energized in the open position to facilitate MOV VOTES testing for several hours at a time once every four years. The team reviewed maintenance order 2200002831 for 2MOV616, dated January 24, 2001, and noted that the MOV testing took approximately 6 hours and the MOV was de-energized open approximately 12 hours (clearance ID 2200105084). Based on this data (8 HPSI MOVs per unit, 12 hours per MOV, once per every 4 years), there was 24 hours of exposure time per year per unit. Given this information and assuming a 25% probability (1 in 4 chances) of the break being on the cold leg with the failed open MOV, CEG reliability engineering determined that there was a negligible increase in risk (less than 3E-08 CDF per year per unit). In addition, the team noted that the engineering guidance in NEU 93-030 and OI 3A required that maintenance could be performed on only one HPSI loop isolation MOV at a time and that three HPSI pumps remain available. CEG took no credit for operator recovery actions in their preliminary risk assessment; however, it is reasonable to assume that operators can re-energize the failed open MOV or start the 12 (22) HPSI pump within several hours [the 11 (21) and 13 (23) HPSI pumps are normally in standby with the 12 (22) HPSI pump in pull-to-lock].

Enforcement. 10CFR Part 50, Appendix B, Criterion III, Design Control, requires that measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, since February 3, 1993, CEG failed to correctly translate the ECCS design basis into the HPSI system operating instructions and procedures. Because this design control issue is of very low significance and has been entered into the corrective action program (IR4-008-006), this violation is being treated as a NCV, consistent with Section VI.A of the NRC Enforcement Policy, issued May 1, 2000 (65FR25368). NCV 05000317, 318/2004002-02, High Pressure Safety Injection System Operation Outside of Design Basis.

b.3 ECCS Mini Flow Valve Indication not Adequately Translated into Design Specifications

Introduction. The team identified a non-cited violation (NCV) of very low safety significance (Green) regarding the licensee's failure to properly translate design specifications into the design of the ECCS Mini Flow Valve Indication, as required by 10CFR50, Appendix B, Criterion III, Design Control.

Description. The team identified that a design requirement for the ECCS Mini Flow Valve Indication was not properly translated into design specifications, in that the single failure criterion was not met. Specifically, the team reviewed a 10 CFR 50.59 screen for proposed changes to surveillance test procedures (STP) 07 A 1/2 and B 1/2, that tested the engineered safety feature actuation system (ESFAS) on a monthly basis. These procedures tested the RAS logic by verifying that MOVs 659 and 660 go closed when the control room operator removed the hand-switch from the lockout position. These MOVs are the isolation valves for the safety injection mini flow return to the RWT. Failure of either of these valves in the closed direction during operation would cause all of the associated emergency core cooling trains for that unit (i.e., high pressure, low pressure and containment spray) to become inoperable per Technical Specification 3.5.2. In addition, during a small break LOCA, failure of either of these series connected valves in the closed direction could cause failure of the emergency core cooling pumps. To prevent this scenario, the STP was changed to remove the valve closure requirement.

The removal of this requirement from the STP conflicted with the updated final safety evaluation report (UFSAR), section 7.3.7, since these valves were not specifically identified as ESFAS exceptions that could not be completely tested with the reactor at power. The NRC responded back with supplement number 5 to the safety evaluation report (SER), which reviewed and concurred that MOVs-659 and 660 should not be closed during operation. However, to compensate for this change, supplement 5 to the SER required: 1) Revision of the technical specifications to allow the removal of power to the motor operators for these valves with the valves in the open position during normal operation; 2) Power to be restorable to the operators of these valves from the control room to allow the required isolation of the RWT following RAS; and, 3) Redundant indication of the valve position. The last item was satisfied by the licensee by installing separate valve status annunciators in addition to the original valve status lights. Finally, supplement 5 to the SER also required that both items 2) and 3) above meet the criteria established in Chapter 7, Appendix 7A of Standard Review Plans, Branch Position EICSB 18, Application of Single Failure criterion to Manually-Controlled Electrically-Operated Valves.

Branch Position EICSB 18 specifically states, when the single failure criterion is satisfied by removal of electrical power from these valves, these valves should have redundant position indication in the main control room and this valve position indication system should, itself, meet single failure criterion. The team found that installed VPIs were not redundant and would not satisfy the Branch Position EICSB 18, requirement in that both indications shared a common limit switch and therefore did not meet single failure criteria.

Analysis. This finding is more than minor since it is associated with the design control attribute of the mitigating systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The finding was evaluated using Manual Chapter 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations" phase one screening worksheet. The issue was a design or qualification deficiency, and was determined to be of very low safety significance (Green) because it did not result in an actual loss of safety function of a single train for internal or external event initiated core damage sequences. Additionally, the control room operators verify the position of the valves twice each shift.

Enforcement. 10CFR50, Appendix B, Criterion III, Design Control, requires that applicable design basis for structures, systems, and components be translated into design specifications. Contrary to the above, the regulatory requirement was not adequately translated into design specifications. Specifically, the configuration of the valve position indication for 1(2)-MOV-659 and 1(2)-MOV-660 is such that they share a common limit switch. This configuration does not constitute redundant and single failure proof as required by the regulatory requirement. However, because of the very low safety significance, and because the issue was entered into the corrective action program (IR4-008-997), it is being treated as a NCV consistent with Section VI.A.1 of the NRC Enforcement Policy. NCV 05000317, 318/2004002-03, Design Basis for ECCS Mini Flow Valve Indication not Translated into Design Specifications.

b.4 Inadequate Calculations and Procedures for Offsite Power Availability

Introduction. The team identified an issue related to the technical specification requirement for the availability of two independent offsite power sources for the site.

The licensee had not evaluated the bus voltage relay reset setpoints of the degraded voltage relays to include the effects of voltage transients from unit trips, to assure the design would prevent grid separation during these transients. In addition, the licensee had not performed analyses of the bus voltage relay reset setpoints of the degraded voltage relays to support procedures allowing placing voltage regulators in manual control, or bypass. This is an unresolved item pending further licensee calculation and analysis, and NRC review, to determine the adequacy of the existing undervoltage relay reset setpoints.

Description. The team identified several deficiencies relating to load flow calculations and procedures necessary to ensure availability of the preferred offsite source during a unit trip, including trips associated with accidents. The deficiencies included:

- Inadequate documentation of design inputs, methodology and results
- Failure to consider immediate effects of a unit trip on grid voltage
- An apparent non-conservative software error
- Failure to perform adequate analysis for removing voltage regulators from automatic operation

Inadequate Documentation - Calculation E-94-17 did not include sufficient information to enable an independent reviewer to verify inputs to various computer runs performed using the CYMFLOW load flow program. For instance, input data including bus connections, cable impedances, transformer impedances, transformer tap settings, and motor loads was not included in the calculation. In response to the team’s inquiry, the licensee provided partial data for some of the calculation cases. Also, the calculation listed outputs consisting of 15 computer runs but these were described only by a one line title. The calculation did not discuss the purpose, system alignment, status of voltage regulators, etc. for these cases. In addition, the team determined that several of computer printouts provided as part of the calculation were not listed in the tabulation of cases in the calculation. Results of the individual computer runs were not summarized. Therefore, it was not clear what acceptance criteria was intended or satisfied. The licensee has initiated IR4-009-055 to document the inaccurate listing of cases in Calculation E-94-17.

Voltage drop on unit trip not considered - The calculation methodology did not include consideration of a sudden drop in switchyard voltage that could occur following a unit trip. PJM is the independent system operator that has ultimate responsibility and control of the offsite power supplies to CCNPP. PJM Manual M-03, Transmission Operations, specifies a maximum voltage drop of 5% on the 500kV system caused by the occurrence of a single contingency outage, which would include the trip of a generating station. Class 1E safety buses may be susceptible to spurious separation from the grid at the onset of an accident due to voltage drops on the grid resulting from the loss of voltage support from the generating station, combined with voltage dips on the safety buses resulting from the starting of large motors. Calculation E-94-17 did not consider the step voltage decrease that could occur on the trip of a CCNPP unit. This was necessary because CCNPP employs voltage regulators that normalize safety bus voltage during normal operation. In case of a unit trip, switchyard voltage could decrease by several percent. This would be immediately reflected onto the safety buses. In addition, safety bus loading at the onset of an accident would further depress voltage below pre-event levels until the voltage regulators acted to restore voltage. The time delay on the Transient Undervoltage Relay is set at approximately 6 seconds, but the time delay on the voltage regulators is set at approximately 20 seconds. Consequently, separation from the offsite power source could occur before voltage regulators have a chance to respond. In response to the inspectors inquiry, the licensee obtained a grid study from Baltimore Gas and Electric (BGE) that showed a 1.86% drop in switchyard voltage on a trip of a CCNPP unit. Discussions with the licensee indicated that the scenario considered in the BGE study may not have been a reasonable worst case since it did not assume any other existing outages such as the prior loss of a 500kV transmission line. Also, this value has not been recognized by PJM as a limiting constraint. The licensee determined by preliminary calculations that the CCNP could withstand an approximately 2.5% voltage drop without causing spurious separation from the offsite source. This value is less than the PJM specification of 5%. The licensee has initiated IR4-009-053 to document the failure to consider a decrease in switchyard voltage following a unit trip.

Non-conservative Software Error - Computer printouts for Calculation E-94-17 showed bus voltages that indicated as much as an 11.07% boost from the voltage regulators, while the regulators are only capable of a maximum 10% boost. For instance, the case for motor starting with minimum grid voltage and normal alignment showed a voltage at 13.8kV Bus 11 immediately upstream of the Unit 1 voltage regulators of 11,747.9 volts. The voltage downstream of Unit 1 Voltage Regulator 1H1103REG was 13,048.5 volts, representing an 11.07% boost. The other voltage regulators modeled for this case also showed boosts in excess of 10%. This error results in a non-conservatively high voltage on the safety buses. It was not clear whether this error was due to faulty software or input errors by the licensee.

Inadequate Operating Procedures for Voltage Regulators - Operating Procedure OI-27B provides steps for placing voltage regulators under manual control and directs operators to maintain 4160V bus voltage between 4.1kV and 4.35kV. If a voltage regulator serving a safety bus is placed in manual it would not be able to respond to a sudden voltage drop that could occur in case of a unit trip concurrent with an accident (see discussion of Voltage Drop on Unit Trip above). Generic Letter 79-36 required licensees to perform voltage calculations for grid separation vulnerability without taking credit for manual actions after the event. Load flow calculation E-94-17 took credit for full voltage boost from the voltage regulators for grid separation analyses but implicitly assumed that voltage regulators would respond to voltage excursions. Interviews with the licensee indicated that they had not considered sudden voltage excursions such as could occur at the onset of an accident. In these cases, operator action could not be credited to restore voltage. Basic calculations by the team indicated that the Steady State Undervoltage Relay (SUR) may not reset, even with a minimal drop (< 1%) in switchyard voltage following a unit trip with accident loading if a voltage regulator was in manual control. This would result in separation of the safety bus from the offsite source approximately 99 seconds into the event.

Similarly, Procedure OI-2B allowed automatic voltage regulators to be bypassed without adequate analytical basis to assure availability of the preferred offsite power source. In the bypass configuration the affected 13.8/4.16kV transformer serving the safety buses is fed directly from the 13.8kV bus without any voltage boost. OI-2B, Precaution 5.0 H required 500kV bus voltage to be between 495kV and 505kV when a voltage regulator is bypassed. This configuration had not been analyzed in Calculation E-94-17. Basic calculations by the inspectors indicated that the safety buses could become separated from the offsite source even during normal operation with grid voltage at the lower end of the allowable range (495kV). The team estimated that grid separation would be likely with accident loading and even a moderate post trip grid voltage decrease. In response to the inspector's inquiries, the licensee initiated IR4-027-104 and a note was placed in Operations Short Term Notes to not voluntarily place a voltage regulator in manual until Engineering determines the effects on the design basis.

The licensee has not completed calculation revisions to determine the actual risk of grid separation. The failure to perform adequate calculations to demonstrate availability of the preferred offsite power supply, and to translate the results of those calculations into procedures could result in spurious separation of the required preferred offsite power supply during accidents and other transients. This item will tracked as an Unresolved Item pending further evaluation by licensee personnel and the NRC. 05000317/2004002-01, 05000318/2004002-04, Inadequate Calculations and Procedures for Offsite Power Availability.

b.4 Scaffold Erected too Close to 480V Load Center

Introduction. A finding was identified in which the improper erection of a scaffold, in close proximity to a safety-related 4160/480V transformer, could have resulted in the damage of the transformer in a seismic event. This item is unresolved pending the completion of the licensee's operability evaluation.

Description. During a plant tour of the unit 1 switchgear rooms, the inspectors noted a tube and clamp type scaffold erected in close proximity to a safety-related 480V load center 14A transformer. Maintenance Procedure MN-1-203 required that scaffold be installed a minimum of 12 inches away from safety-related equipment or be braced to prevent displacement or sliding in case of a seismic event. The scaffold was erected approximately 4 inches from the cooling fins of 480V load center 14A, and did not appear to be restrained in a manner that would have prevented contact with the transformer. In response to the inspector's inquiries, the licensee remove the scaffold and initiated IR4-007-099 to evaluate the past operability of the installation.

This item will tracked as an Unresolved Item pending further evaluation of the past operability of the 4160/480V transformer by the licensee. 05000317/2004002-05, Improperly Erected Scaffold.

4OA2 Identification and Resolution of Problems (IP 71152)

a. Inspection Scope

The team assessed whether CEG personnel were identifying issues with the 4kV, HPSI, and supporting systems at the proper threshold and entering them in the corrective action program. Specifically, the inspectors reviewed a selection of issue reports (IRs) and associated evaluations to verify that problems were identified, documented, and effectively resolved in a timely manner. (See Attachment 1 to this report for a listing of documents reviewed.)

b. Findings

No findings of significance were identified.

4OA6 Meetings, including Exit

On January 30, 2004, the team presented the inspection results to Mr. B. Montgomery and other members of the licensee's staff. The team verified this inspection report does not contain proprietary information.

ATTACHMENT

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

C. Ashley	Senior Engineer, Mechanical & Civil Engineering
G. Dockstuder	Senior Engineer, 4kV System Engineer
P. Fatka	Senior Engineer, Primary Systems Engineering
P. File	Nuclear Fuel Management Supervisor
P. Furio	Supervisor, Regulatory Matters
J. Ihnacik	MOV Engineer
C. Jones	Operations Procedure Supervisor
K. Miller	Senior Engineer
B. Montgomery	Engineering Services Manager
A. Simpson	Senior Engineer, Regulatory Matters
R. Stark	Senior Engineer
G. Strauss	Senior Engineer, Engineering Programs
H. Velenta	Principal Engineer

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000317, 318/2004002-01	NCV	HPSI Design Support/Seismic Structural Records not Retrievable (Section 1R21.b.1)
05000317, 318/2004002-02	NCV	High Pressure Safety Injection System Operation Outside of Design Basis (Section 1R21.b.2)
05000317, 318/2004002-03	NCV	Design Basis for ECCS Mini Flow Valve Indication not Translated into Design Specifications (Section 1R21.b.3)

Opened

05000317, 318/2004002-04	URI	Inadequate Calculations and Procedures for Offsite Power Availability (Section 1R21.b.4)
05000317/2004002-05	URI	Improperly Erected Scaffold (Section 1R21.b.5)

LIST OF DOCUMENTS REVIEWED

10 CFR 50.59 Applicability Determinations

Change to Procedure STP-M-28-2, Safety Injection Valve Leak Test, Rev. 1, dated 4/23/01

10 CFR 50.59 Evaluations

FCR84-95, FSAR Change Request, "Modification to Flow Test Requirements and Criteria for the HPSI Flow Control Valves"
FCR84-96, FSAR Change Request, "Provide an Alternate, Non-Cross Connected HPSI Lineup"
SE00161, Installation of Bypass Lines Across Upstream Seats of Units 1 and 2 MOV's 651 and 652
SE00465, Steam Generator Surface and Bottom Blowdown Containment Isolation Valve Automatic Isolation Signal
SE00469, Impeller Change on Containment Spray Pumps
SE00485, Unit 2 Cycle 15 Core Reload Issues (Specific to Grid to Rod Fretting)
SE00489, ETP 03-018, SWGR Heat-up during Loss of Ventilation

10 CFR 50.59 Screens

ES199502488-003, Replacement of #22 HPSI Motor, Rev. 0
ES199600580-002, Replace Existing ABB 4kV Breakers w/ Magna Blast.
ES199600580-005, Install Safety-Related ABB Breakers in NSR Cubicles, Rev. 0
ES199700364, Modify LOCI sequencer and performed analysis to support GL 96-06 resolution
ES199800718-000, Evaluate Using a High Capacity HEPA Filter in the ECCS PR Exhaust Filter
ES199800952-000, Change the Setpoint of the Unit 1 and 2 ECCS PR Exhaust HEPA Filter D/P Alarm
ES199900753, Replaced an interposing relay in the closing ckt for the OC DG output breaker.
ES199800861-001, Install Surge Arresters in the 13.8kV Station Distribution System, Rev. 0
ES199800942, HPSI Pump Casing Drains Replaced 3/4 inch Pipe Drain (11, 12, 13, 21 HPSI Pumps)
ES199900949, New Annunciator for R/22 HPSI Pump Handswitch not in PTL
ES20000168, Main Transformer Replacement
ES20000506-0&01, Addition of Vents in the Bonnets of Units 1 and 2 Check Valves SI4148 and SI4149
ES20001008, Equivalent Change Evaluation for 13 HPSI anchor Support HB-23-1060-A65
ES20001152, Evaluate Raising Setpoint to Prevent Inadvertent Leakage for ECCS Code Relief Valves
ES200200241-001, Evaluate Results of ETP 03-018
ES200200374, dated 4/27/02
ES200200738-000, Minimize Time to RAS Changed From 36 to 32 Minutes
ES200200868, dated 3/3/03
NONMOD-92-044, Minimum Flow Valves Locked in the Open Position in the Control Room
STM 522-1, Procedure Change ESFAS Channel E-Bus

Calculations

CA0086, Heat-up of SW Gear Rooms at El. 21' and 45' with consideration of Radiative Cooling
CA01206, Safety-Related 4 kV Undervoltage Protection, Revision 03
CA04079, Comparison of Available and Required NPSH for the Safety Injection and Containment Spray Pumps during Post-RAS Operation, Rev. 0
CA03716, 13kV Voltage Regulator Control Settings, Revision 1
CA05689, Design Basis for the Minimum Performance Acceptance Criteria for the HPSI, LPSI, and Containment Spray Pump Large Flow STPs, Rev. 0
E-90-30, MCC Momentary Voltage Limits, Revision 1
E-90-38, MOV Minimum Voltages Lasting Longer than 5 Seconds, Revision 9
E-90-65, 4kV Bus 11 Protective Devices, Revision 4
E-90-71, 4kV Bus 14 Coordination Study, Revision 5
E-92-10, Emergency Diesel Generator 12 Protective Relays, Revision 1
C-93-158, Portholes for ECCS Exhaust Filter Housing, Revision 0,
E-89-30, Station Blackout Evaluation for Westinghouse Type DS Switchgear
E-89-31, Station Blackout Evaluation for G.E. MC-476 Switchgear
E-94-014, Qualified Life of ECCS Pump Room Exhaust Fan Motors, Revision 0
E-94-017, Plant Electrical AC Loadflow Analysis, Revision 2
Design Basis for the Minimum Performance Acceptance Criteria for the HPSI, LPSI, and Containment Spray Pump Large Flow STPs (CA05689), Rev. 0
Post-RAS Cooling Requirements - HPSI Flow (M-85-3), Rev. 0
Computation of Hydraulic Resistance Loss Across Emergency Containment Cage (Strainer) During Post-RAS ECCS Operation (CA04046), Rev. 0
ECCS Pump Room Air Coolers Performance With Reduced Air and Water Flows (M-94-62), Rev. 0
Evaluation of Minimum Time to RAS (CA04903), Rev. 1
EQ Doses to Auxiliary Building Rooms (NC-95-010), Rev. 0
M-90-166, dated 12/7/92, Internal Plant Flooding for the ECCS Pump Rooms
Setpoint Change, dated 5/7/97, for HPSI Main Header Relief Valve 2RV409 (reference: ES199700969)
Unit 1 CCW Flow Analysis (M-93-37), Rev. 0
Unit 2 CCW Flow Analysis (M-92-43), Rev. 0
Unit 1 SW Flow Analysis (CA03387), Rev. 1
Unit 1 Salt Water Flow Analysis (CA04339), Rev. 0
Calculation of Drain Valve maximum Flow Rate to Validate STP-O-65-J CKV Closure Testing (CA06197), Rev. 0

Cause Determinations

AI IR9303452, 11 CC Pump Failed to Start During STP-O-7A-1 Cause Determination
AI IR9302674, 12 CS PP Failed to Start While Performing STP-O-7B-1 Cause Determination
AIT4B200200093, Review of NRC Information Notice 02-34
AIT4B9400019, Inoperability of General Electric Magne-Blast Breaker Because of Misalignment of Close-Latch Spring
AIT4B199500074, IOER Evaluation : INFON 95-22
AITPD199300121, Breaker 52-2427 (Pressurizer Back-Up Heater Bank), Failed to Trip During STP-07B-2 on a SIAW B4 Signal
AITPD199300122, #12 Containment Spray Pump Failed to Start on SIAW B8 Signal During Performance of STP-07B-1

Completed Surveillance Tests

STP-M-28-2, Safety Injection Valve Leak Test, dated 4/25/01
STP M-522-1, Test ZE Channel UV-11 bistable for PMT, dated 10/28/02
STP M-522-1, 4kV Undervoltage Relay Calibration and Response Time Check, dated 9/19/02
STP M-522-1, 4kV Undervoltage Relay Calibration and Response Time Check, dated 1/31/01
STP M-546-1, ECCS Pump Room Exhaust Filter Test (HEPA), dated 7/31/2003
STP M-546-2, ECCS Pump Room Exhaust Filter Test (HEPA), dated 6/5/2003
STP M-547-1, ECCS Pump Room Exhaust Filter Test (Charcoal), dated 4/21/2003
STP M-547-2, ECCS Pump Room Exhaust Filter Test (Charcoal), dated 12/5/2002
STP-M-661-1, Containment Emergency Sump Inspection, dated 6/12/02
STP-M-661-2, Containment Emergency Sump Inspection, dated 4/18/03
STP O-7A-1, A Train Engineered Safety Features Logic Test, dated 11/25/03
STP O-7B-2, B Train Engineered Safety Features Logic Test, dated 12/11/03
STP O-11-2, ECCS Pump Room Ventilation System Monthly Test, dated 12/21/03
STP M-25-1, Velan Swing Check Valve Inspection, dated 4/23/2002
STP O-62-2, Monthly Valve Position Verification - Unit 2, dated 12/11/03
STP O-67G-2, Safety Injection Check Valve Cold Shutdown Test, Rev. 4
STP O-65J-2, Safety Injection Check Valve Quarterly Operability Test (Including Modified Attachment 3, Check Valve Acceptance Criteria Change, dated 8/22/02)
STP O-65R-1, ECCS Valves Powered From MCC-104R Quarterly Operability Test, dated 11/24/03
STP O-65-1, HPSI and LPSI PP CKV Closure Test, dated 12/9/03
STP O-65-1, HPSI and LPSI PP CKV Closure Test, dated 8/26/03
STP O-65-2, HPSI and LPSI PP CKV Closure Test, dated 9/2/03
STP O-65Q-1, Safety Injection Valve Quarterly Operability Test, dated 8/21/03
STP O-65R-1, ECCS Valves Powered From MCC-104R Quarterly Operability Test, dated 8/18/03
STP O-65R-2, ECCS Valves Powered From MCC-204R Quarterly Operability Test, dated 12/7/03
STP O-65T-2, ECCS Valves Powered From MCC-214R Quarterly Operability Test, dated 8/18/03
STP O-67C-2, Miscellaneous Check Valve Testing, dated 4/29/01
STP O-67E-1, Containment Sump Check Valve Operability Test, dated 4/4/00

STP O-67E-1, Containment Sump Check Valve Operability Test, dated 5/22/02
STP O-65J-2, Safety Injection Valve Quarterly Operability Test, dated 9/4/03
STP O-67I-2, Safety Injection to RCS Loop CKVS Full Stroke Test, dated 5/11/01
STP O-67H-1, SIT Out Check Valve Stroke Test, dated 2/28/2002
STP O-67M-1, SI to RWT Isolation Valve Functional Test, dated 3/17/2000 and 12/27/02
STP O-11-1, ECCS Pump Room Ventilation System Monthly Test, Revision 3, dated 12/27/03
STP O-73I-1, HPSI Pump and Check Valve Quarterly Operability Test, dated 8/19/03
STP O-73I-2, HPSI Pump and Check Valve Quarterly Operability Test, dated 8/22/03 and 12/5/03
STP O-73G-1, HPSI Pump Large Flow Test, dated 4/6/00 and 5/14/02
STP O-73G-2, HPSI Pump Large Flow Test STP, dated 4/16/01 and 4/12/03
STP-M-25-0, Velan Swing Check Valve Inspection, 1-SI-247, dated 3/23/02
STP-M-25-0, Velan Swing Check Valve Inspection, 1-SI-217, dated 3/27/02
STP-M-25-0, Velan Swing Check Valve Inspection, 1-SI-227, dated 4/18/02
STP-M-25-1, Velan Swing Check Valve Inspection, 1-SI-4146, dated 4/6/96 and 3/28/00
STP-M-25-1, Velan Swing Check Valve Inspection, 1-SI-4147, dated 3/12/94 and 4/27/98
STP-M-25-1, Velan Swing Check Valve Inspection, 1-SI-4148, dated 4/6/96 and 3/28/00
STP-M-25-1, Velan Swing Check Valve Inspection, 1-SI-4149, dated 4/26/98 and 4/23/02
STP-M-25-2, Velan Swing Check Valve Inspection, 2-SI-217, dated 4/16/97
STP-M-25-2, Velan Swing Check Valve Inspection, 2-SI-227, dated 4/29/99
STP-M-25-2, Velan Swing Check Valve Inspection, 2-SI-247, dated 4/13/99
STP-M-25-2, Velan Swing Check Valve Inspection, 2-SI-4146, dated 4/6/99 and 4/6/01
STP-M-25-2, Velan Swing Check Valve Inspection, 2-SI-4147, dated 4/13/97 and 4/9/99
STP-M-25-2, Velan Swing Check Valve Inspection, 2-SI-4148, dated 4/27/93 and 3/28/97
STP-M-25-2, Velan Swing Check Valve Inspection, 2-SI-4149, dated 4/13/99 and 3/26/03

Design and Licensing Basis Documents

Supplement No. 5 to the Safety Evaluation by the Office of Nuclear Reactor Regulation U.S. Nuclear Regulatory Commission in the Matter of Baltimore Gas and Electric Company Calvert Cliffs Nuclear Power Plant, Unit 2 Docket No. 50-318, dated 8/6/76
Calvert Cliffs Nuclear Power Plant Unit Nos. 1 & 2 50-317 & 50-318 License Amendment Request; Removal of Component Lists from Technical Specifications per Generic Letter 91-08, dated 8/27/93
Licensing Memorandum, L92-128, dated 4/24/92, “Licensing Basis for the Timing of LOCA/LOOP”
Design Engineering Memorandum, ME931351.059, dated 5/27/93, “Milestone 2B9101466-003 Closeout”
NRC Letter to Calvert Cliffs Nuclear Power Plant, “Methodology For Postulating Passive pipe Breaks - Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 & 2 (TAC Nos. M90502 and M90503),” dated 2/24/95
CCNPP Response to NRC Generic Letter 87-06, “Periodic Verification of Leak Tight Integrity of Pressure Isolation Valves,” dated 7/7/87
Engineering Specification for Piping, Valves and Associated Fittings of the Safety Injection System (6750-M-0310B), Rev. 4

NRC Letter to Calvert Cliffs Nuclear Power Plant, "Request For Relief No. PR-12 Associated With The Third 10-Year Interval Inservice Testing program, Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 & 2 (TAC Nos. MB3782 and MB3783)," dated 5/16/02

Drawings/Change Notices

12103-0002, Piping-BRG & Stuff Box Cooling With Seal Circ., Rev. 1
15715-0005, LTC Schematic Automatic Control, Revision 1
15715-0007, LTC Schematic Motor Control 13.8kV Voltage Regulators, Revision 1
15715-009, Schematic Diagram Accessory Class OA Transf Devices, Revision 1
60617SH0002A, Logic Diagram High Pressure Safety Injection Pump Motor, Revision 8
60617SH0002B, Logic Diagram High Pressure Safety Injection Pump 13, Revision 7
60722SH0001, Auxiliary Building Ventilation Systems
60731SH0001, Safety Injection & Containment Spray Systems, Rev. 76
60731SH0002, Safety Injection & Containment Spray Systems, Rev. 41
60731SH0003, Safety Injection & Containment Spray Systems, Rev. 25
60733SH0001, Auxiliary Building Waste Process Equipment & Area Drains, Rev. 27
61001SH0001, Electrical Main Single Line Diagram FSAR Fig. No 8-1, Revision 42
61-004E, Single Line Meter & Relay Diagram 13kV System, Revision A
61005, Meter and Relay Diagram 4kV System Unit Buses 11 and 14 FSAR Fig. No 8-4, Revision 35
61-005E, Meter & Relay Diagram 4kV System Unit Buses 11 and 14 FSAR Fig. No. 8-4, Revision A
61-009-E, Single Line Meter & Relay Diagram 480V Unit Buses 11A, 11B, 14A & 14B FSAR Fig. 8-3, Revision A
61-017-E Sh. 1, Single Line Diag. Reactor 480V MCC 104R, Revision A
61-017-E Sh. 2, Single Line Diag. Reactor 480V MCC 114R, Revision A
61035, Logic Diagram Diesel Generators FSAR Fig. No. 8-6, Revision 31
61035SH0002, Logic Diagram Diesel Generator 1A, Revision 3
61042SH0002, AC Schematic Diagram 13kV Voltage Regulator Service Bus 11, Revision 3
61052SH0001, AC Schematic Diagram 4kV Unit Bus 11, Revision 24
61052SH0004, AC Schematic Diagram 4kV Unit Bus 14, Revision 2
61058, Logic Diagram Engineered Safety Features Actuation System Unit 1, Revision 35
61058ASH0001, Logic Diagram Engineered Safety Features Actuation System, Revision 44
61059, Schematic Diagram Engineered Safety Features Actuation System Unit-1, Revision 25
61071SH0007, Schematic Diagram 4kV Bus Feeder Breaker 152-1401, Revision 17
61071SH0008, Schematic Diagram 4kV Bus Feeder Breaker 152-1414, Revision 17
61071SH0014A, Schematic Diagram 4kV Buses Fdr. Bkr. 1402 to Serv. Transf. 14A, Revision 1
61071SH0014A, Schematic Diagram 4kV Buses Fdr. Bkr. to Serv. Transf. 11A, 12A, 12B, 13A, 13B, 14B, 15 &16, Revision 8
61071SH0016, Schematic Diagram Bus Load Shedding Verification Relay, Revision 17
61-075-C Sh.23A, Schematic Diagram Charging Pump 12, Revision 20
61-076-B, Schematic Diagram High Press. Safety Inj. Pump-13, Revision 6
61-076-C Sh.21, Reactor Safeguards Motor Operated Valve 656, Revision 12
61076SH0002, Schematic Diagram Low Press. Safety Inj. Pump-12, Revision 17
61076SH0003, Schematic Diagram High Press. Safety Inj. Pump-11, Revision 16
61076SH0004, Schematic Diagram High Press. Safety Inj. Pump-12, Revision 18

61076SH0006, Schematic Diagram High Press. Safety Inj Pump 13, Revision 15
61076SH0007, Schematic Diagram High Press. Safety Inj Pump 13, Revision 15
61076SH0008, Schematic Diagram High Press. Safety Inj Pump 13 Motor Operated Disc. Sw's., Revision 7
61076SH0010, Schematic Diagram Containment Spray Pump-12, Revision 21
61076SH0011E, Schematic Diagram Containment Cooling Fan 13, Revision 2
61076SH0011F, Schematic Diagram Containment Cooling Fan 14, Revision 2
61076SH0015F, Schematic Diagram Reactor Safeguards Containment Filter Unit 12, Revision 2
61076SH0029, Schematic Diagram Reactor Safeguards Refueling Water Tank 11 Discharge 1MOV617, Revision 2
61076SH0031, Reactor Safeguards C.S. & S.I. Pumps Recirc Valve 1MOV659, Revision 17
61076SH0065, Schematic Diagram Reactor Safeguards HPSI to Loop Control Valve 1MOV4142, Revision 13
61076SH0075, Schematic Diagram Reactor Safeguards SI Tank 11A Isolation Valve 1MOV614, Revision 2
61079SH0054B, Schematic Diagram Aux. Feedwater Motor Driven Pump #13, Revision 8
61079SH0054C, Schematic Diagram Aux. Feedwater Motor Driven Pump #13, Revision 7
61080SH0002, Schematic Diagram Service Water Pump-12, Revision 20
61080SH0003, Schematic Diagram Service Water Pump 13, Revision 10
61080SH0004, Schematic Diagram Service Water Pump-13, Revision 22
61080SH0007, Schematic Diagram Salt Water Pump-12, Revision 17
61080SH0008, Schematic Diagram Saltwater Pump 13, Revision 11
61080SH0009, Schematic Diagram Salt Water Pump-13, Revision 13
61080SH0012, Schematic Diagram Component Cooling Pump-12, Revision 11
61086SH0003, Schematic Diagram 4kV Diesel 1B Feeder Breaker 152-1403, Revision 26
61086SH0004, Schematic Diagram 4kV Bus-14 DG OC Feeder Breaker 152-1406, Revision 33
61086SH0013, Schematic Diagram Diesel Generator 1B Engine Control, Revision 42
61086SH0017, Schematic Diagram Diesel Generator #1B Breaker Control Relays, Revision 11
61086SH0019A, DC Schematic Diagram Diesel Generator 1A Protection Relays Control, Revision 10
61087SH0007A, Schematic Diagram Annunciators Engineered Safety Features Control Board 1C09-10, Revision 48
61406SEC104.1SH0002, Installation Standard - Raceway Supports
62731, Safety Injection & Containment Spray Systems, Rev. 70
63-005E, Meter & Relay Diagram 4kV System Unit Buses 21 and 24 FSAR Fig. No. 8-10, Revision A
63-009-E, Single Line Meter & Relay Diagram 480V Unit Buses 21A, 21B, 24A & 24B FSAR Fig. 8-11, Revision A
63-017-E Sh. 1, Single Line Diag. Reactor 480V MCC 204R, Revision A
63-017-E Sh. 2, Single Line Diag. Reactor 480V MCC 214R, Revision A
63042SH0002, AC Schematic Diagram 13kV Voltage Regulator Service Bus 21, Revision 3
63-531-E, Auxiliary Building Miscellaneous Platforms EL. 45'0, Rev. 1
63058ASH0001, Logic Diagram Engineered Safety Features Actuation System, Revision 51
63058SH0001, Logic Diagram Engineered Safety Features Actuation System, Revision 26
63079SH0054B, Schematic Diagram Aux. Feedwater Motor Driven Pump 23, Revision 8
63079SH0054C, Schematic Diagram Aux. Feedwater Motor Driven Pump 23, Revision 4

64307, Unit 1 Component Cooling Water, Rev. 3
64311, Simplified System Drawing Safety Injection & Containment Spray, Revision 7
82656, Elementary Wiring Diagram Potential Circuits Bus 11 & 12 GE 4kV Switchgear, Revision 15
84307, Unit 2 Component Cooling Water, Rev. 4
84311, Safety Injection & Containment Spray System, Rev. 8
87003SH0001, Electrical System Block Diagram ESFAS Unit-1, Revision 7
87003SH0002, Electrical System Block Diagram ESFAS Unit-1, Revision 7
87003SH0003, Electrical System Block Diagram ESFAS Unit-1, Revision 4
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ES199700364, Modify LOCI sequencer and performed analysis to support GL 96-06 resolution
ES199800861-001, Rev. 0, Install Surge Arresters in the 13.8kV Station Distribution System
ES199800942, HPSI Pimp Casing Drains Replaced 3/4 inch Pipe Drain (11, 12, 13, 21 HPSI Pumps)
ES199900753, Replaced an interposing relay in the closing ckt for the OC DG output breaker
ES199900949, New Annunciator for R/22 HPSI Pump Handswitch not in PTL
ES199901048, Rev. 0, Action Value Basis Document for EOP-12.06 (HPSI Flow)
ES20000168, Main Transformer Replacement
ES200000506, Supplements 000 &001, Addition of vents in the bonnets of Units 1 & 2 check valves SI 4148 & SI4149
ES200000516, Issue Engineering to Replace 1PCV3702A (67AFR206) with Fisher 67AFR237 (mech no. 57910)
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ES200001152, Rev. 0, 22 ECCS Pump Room Air Cooler Relief Valve Setpoint Change
ES200200374, Rev. 0, Remove Seal Weld on 1-MOV-4145, and Replace 1-MOV-4145 Fastening Hardware from Carbon/Low Alloy Steel to Stainless Steel (Type 316)
ES200200438, Rev. 0, Allow Modification of Containment Sump Covers
ES200200738, Rev. 0, Evaluation of Minimum Time to RAS
ES200200864, Rev. 0, Evaluate Allowing 1-SI-549 and 550 to Remain Open
ES200200868, Rev. 0, Replace Safety Injection Mini-Flow Check Valves
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IR3-062-145
IR3-063-263
IR3-065-105
IR3-065-106
IR3-065-108
IR3-076-676
IR3-076-959
IR3-077-072
IR3-077-344
IR3-078-641
IR3-079-212
IR3-079-213
IR4-000-170
IR4-000-562
IR4-001-386
IR4-001-408
IR4-001-659
IR4-002-230
IR4-003-093
IR4-005-343
IR4-007-099
IR4-008-004*
IR4-008-005*
IR4-008-006
IR4-008-007
IR4-008-008
IR4-008-001
IR4-009-053
IR4-009-055
IR4-011-590
IR4-014-006*
IR4-014-287
IR4-014-742
IR4-015-026
IR4-017-427
IR4-018-505
IR4-022-141
IR4-022-645
IR4-025-241
IR4-027-103
IR4-027-104
IR4-027-756
IR5-010-756
IR5-014-690
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Note: * indicates Issue Reports issued during or related to this inspection.

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DE03291 D.B. Kettering to M.A. Wright, Seismic Evaluation of 4KV Breakers in “Racked Out” (Test and Disconnect Positions), dated July 25, 1997
Email from Hebrank, Phillip J to Dockstader, Garth D; Simpson, Art L, dated January 14, 2004, ABB Breaker Locations
High Pressure Safety Injection Pump “Unit 2" (VTM #12103-016), Rev. 11
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Memorandum, dated 1/14/04, “NRC Question concerning visible thread length on 1MOV659"
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Setting Sheet U-440-11B, 4.16kV to 480V Xfmr to Load Center 11B, Revision 0
Setting Sheet U-440-14A, 4.16kV to 480V Xfmr to Load Center 14A, Revision 0
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System Health Report SI (052)/CS (061), 3rd Quarter 2003
System Health Report, 4kV Transformer and Buses 3rd Quarter 2003
Vibration Analysis and Trending Information, HPSI Pump 11

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ES199600580-005, Install Safety-Related ABB Breakers in NSR Cubicles, Rev. 0
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ES199800942, HPSI Pimp Casing Drains Replaced 3/4 inch Pipe Drain (11, 12, 13, 21 HPSI Pumps)
ES199900753, Replaced an interposing relay in the closing ckt for the OC DG output breaker.
ES199900949, New Annunciator for R/22 HPSI Pump Handswitch not in PTL
ES20000168, Main Transformer Replacement
ES20001152, Evaluate Raising Setpoint to Prevent Inadvertent Leakage for ECCS Code Relief Valves
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CCI-200B, Maintenance Requests, changes 1 & 2
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FTI - 289, Calibration Check/Calibration of Sigma Indicators, Rev. 1
FTI - 364, Calibration Check/Calibration of Barksdale Pressure Switches, Rev. 1
FTI - 548, Calibration Check/Calibration of Fischer and Porter Electronic Pressure Transmitters, Rev. 0
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NO-1-205, Locked Valves, Rev. 12
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STP O-90-2, AC Sources and On Site Power Distribution System 7 Day Operability Verification, Rev. 22
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LIST OF ACRONYMS

ASME B&PV   American Society of Mechanical Engineers Boiler and Pressure Vessel

CCNPP	Calvert Cliffs Nuclear Power Plant
CCW	Component Cooling Water
CDF	Core Damage Frequency
CEG	Constellation Energy Group
CFR	Code of Federal Regulations
ECCS	Emergency Core Cooling System
ESFAS	Engineered Safety Feature Actuation System
ESP	Engineering Service Package
HPSI	High Pressure Safety Injection
HVAC	Heating Ventilation and Air Conditioning
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IPE	Individual Plant Evaluation
IR	Issue Report (i.e., deficiency document)
LOCA	Loss Of Coolant Accident
MO	Maintenance Order
MOV	Motor Operated Valve
NCV	Non-Cited Violation
NEU	Nuclear Engineering Unit
NRC	Nuclear Regulatory Commission
OE	Operating experience
P&IDs	Piping & Instrumentation Drawings
QA	Quality Assurance
RAS	Recirculation Actuation Signal
RCA	Root Cause Analysis
ROP	Reactor Oversight Process
RWT	Refueling Water Tank
SDP	Significance Determination Process
SE	Safety Evaluation
SIL	Service Information Letter
SSCs	Structures, Systems, and Components
SW	Salt Water
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
VOTES	Valve Operation Test and Evaluation System