

May 5, 2006

Mr. James A. Spina, Vice President
Calvert Cliffs Nuclear Power Plant, Inc.
Constellation Generation Group, LLC
1650 Calvert Cliffs Parkway
Lusby, Maryland 20657-4702

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT - NRC INTEGRATED
INSPECTION REPORT 05000317/2006002 AND 05000318/2006002

Dear Mr. Spina:

On March 31, 2006, the US Nuclear Regulatory Commission (NRC) completed an inspection at your Calvert Cliffs Nuclear Power Plant Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on April 6, 2006, with you and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents three findings of very low safety significance (Green) which were determined to involve violations of NRC requirements. However, because of the very low safety significance and because these issues were entered into your corrective action program, the NRC is treating these violations as non-cited violations (NCV) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Calvert Cliffs Nuclear Power Plant.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of

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Sincerely,

/RA/

Brian J. McDermott, Chief
Projects Branch 1
Division of Reactor Projects

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

Enclosure: Inspection Report 05000317/2006002 and 05000318/2006002
w/Attachments: Supplemental Information
Inspection Requirements for Temporary Instruction 2515/160

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos. 50-317, 50-318

License Nos. DPR-53, DPR-69

Report Nos. 05000317/2006002 and 05000318/2006002

Licensee: Constellation Generation Group, LLC

Facility: Calvert Cliffs Nuclear Power Plant, Units 1 and 2

Location: Lusby, MD

Dates: January 1, 2006 through March 31, 2006

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SUMMARY OF FINDINGS

IR 05000317/2006-002, 05000318/2006-002; 01/01/06 - 03/31/06; Calvert Cliffs Nuclear Power Plant, Units 1 and 2; Maintenance Effectiveness, Refueling and Other Outage Activities, Occupational Radiation Safety, and cross-cutting areas.

The report covered a 3-month period of inspection by resident inspectors and announced inspections performed by regional reactor inspectors, and a regional health physicist. Three Green findings were identified which were non-cited violations (NCVs). The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (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: Initiating Events

- Green. A self-revealing non-cited violation of Technical Specification 5.4.1 occurred when requirements contained in plant procedure NO-1-112, Safety Tagging, were not adequately implemented prior to maintenance on the 12A reactor coolant pump. Specifically, on February 22, 2006, while in Mode 5, a component cooling water system containment isolation valve was stroked open while performing a surveillance test which resulted in a level decrease of about 20 inches in the component cooling water head tank. The cause of the event was due to an incomplete tagout boundary which had been established for the 12A reactor coolant pump seal replacement maintenance activity. The licensee documented this performance deficiency in their corrective action program for resolution. The inspectors determined that a contributing cause of this finding was related to the cross-cutting area of human performance in that licensed operators did not establish adequate tagout boundaries.

This finding was more than minor because it was associated with the Initiating Event Cornerstone attribute of configuration control and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown operations. The event did not involve an actual loss of shutdown cooling (SDC). As a result, this finding was determined to be of very low safety significance (Green) in accordance with a risk assessment performed using the NRC Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," Appendix G, "Shutdown Operations". (Section 1R20)

Cornerstone: Mitigating Systems

- Green. The inspectors identified a non-cited violation (NCV) of 10CFR50.65 ("the Maintenance Rule") paragraph (a)(2) in that the licensee failed to demonstrate that the performance of service water turbine building isolation valves were being effectively controlled through preventive maintenance. The licensee did not fully evaluate repetitive valve test failures and their impact on the performance demonstration that justified monitoring under paragraph (a)(2) of the Maintenance Rule. Upon evaluation, the licensee determined that the repetitive functional failures should have caused the effected valves to be monitored in accordance with Maintenance Rule paragraph (a)(1) requirements. The licensee entered the performance deficiency regarding Maintenance Rule program implementation into their corrective action program for resolution. Specific corrective actions were taken to address the individual valve test failures when they occurred. The inspector identified that a contributing cause of this finding was related to the cross-cutting area of human performance due to the incorrect performance determination by plant staff.

This finding is greater than minor, because it affected the reliability objective of the Equipment Performance attribute under the Mitigating Systems Cornerstone. Specifically, the licensee did not demonstrate effective control of the performance of the isolation valves by failing to place the affected structure, system, component (SSC) in a Maintenance Rule (a)(1) category due to its failure to demonstrate acceptable performance. The finding is of very low safety significance, because the isolation valve failures did not result in a loss of operability, did not represent a loss of a system or train safety function, and did not involve an external event. Specifically, the service water isolation capability was maintained due to the operability of redundant isolation valves that are in series with the valves that failed. (Section 1R12)

Cornerstone: Occupational Radiation Safety

- Green. A self-revealing non-cited violation (NCV) associated with the alternate access control requirements established in accordance with 10 CFR 20.1601 (c), was identified. Specifically, the licensee failed to control and properly post a high radiation area with dose rates greater than 1,000 millirems per hour. On January 18, 2006, a nondestructive examination (NDE) worker's electronic personnel dosimeter unexpectedly alarmed when the worker was exposed to unanticipated radiation levels of up to approximately 3,000 millirems per hour. The area was not adequately surveyed by a radiation protection technician to establish the dose rate levels in the area and to properly post the area, and the worker was not made aware of the actual dose rate levels prior to entry into the area while wearing an alarming electronic personnel dosimeter. The licensee determined that the worker received less than ten millirems. This performance deficiency was entered into the licensee's corrective action program for resolution. The inspectors determined that a contributing cause of this finding was related to the cross-cutting area of human performance in that access to a high radiation area was not properly controlled.

This finding is more than minor because it is associated with the Occupational Radiation Safety attribute of exposure control and affected the cornerstone objective in that not controlling the locked high radiation area could increase personal exposure. Using the Occupational Radiation Safety Significance Determination Process, the inspectors determined that the finding was of very low safety significance (Green) because it did not involve: (1) as low as is reasonably achievable planning and controls, (2) an overexposure, (3) a substantial potential for overexposure, or (4) an impaired ability to assess dose. (Section 2OS1)

B. Licensee-Identified Violations

None

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at 100 percent reactor power and remained unchanged until February 4, 2006, when the licensee began its end of the cycle coast down to support a scheduled Unit 1 refueling outage (RFO). On February 16, 2006, at 93 percent power, testing of the main steam safety valves was completed and the reactor was shutdown to begin the RFO. The RFO was in progress for the remainder of the inspection quarter.

Unit 2 began the inspection period at 100 percent reactor power and remained unchanged until reactor power was reduced to less than 5 percent, Mode 2, on January 27, 2006, due to a condenser tube leak in 21B Waterbox. Following maintenance activities, reactor power was restored to 100 percent.

1. REACTOR SAFETY

Cornerstone: Initiating Events, Mitigating Systems, Barrier Integrity

1R04 Equipment Alignment

.1 Partial Walkdown (71111.04Q - 4 samples)

a. Inspection Scope

The inspectors verified that selected equipment trains of safety-related and risk significant systems were properly aligned. The inspectors reviewed plant documents to determine the correct system and power alignments, as well as the required positions of critical valves and breakers. The inspectors verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or potentially impact the availability of associated mitigating systems. The applicable documents used for this inspection are located in the Attachment. The inspectors performed a partial walkdown for the following four systems:

- Unit 1 Component cooling water (CCW) system alignment walkdown during inspection and cleaning of the 12 CCW heat exchanger;
- 21 and 22 Emergency core cooling system (ECCS) exhaust fans during and after HEPA filter and damper linkage replacement and inspection;
- 12 ECCS train during inspection and replacement of 11 ECCS pump room air cooler duplex strainers; and
- Unit 2 Saltwater system (SWS) walkdown after a leak was discovered downstream of the strainer flush control valve (2CV5151A).

.2 Complete Walkdown (71111.04S -1 sample)

a. Inspection Scope

The inspectors performed a complete system walkdown of the accessible portions of the Unit 2 auxiliary feedwater system (AFW). The inspector determined the correct system lineup using OI-32A, Attachment 1B, "AFW System Valve Lineup (Unit 2 Valves)," as

well as appropriate piping and instrument drawings. The inspectors reviewed the open maintenance work requests on the system for any deficiencies that could affect the ability of the system to perform its function. Unresolved design issues such as temporary modifications, operator workarounds and items tracked by plant engineering were also reviewed to assess their collective impact on system operation. In addition, the inspectors reviewed the condition report database to verify that equipment alignment problems were being identified and appropriately resolved.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05Q - 12 samples)

.1 Fire Protection - Tours

a. Inspection Scope

The inspectors conducted a tour of accessible portions of the eleven areas listed below to assess the licensee's control of transient combustible material and ignition sources, fire detection and suppression capabilities, fire barriers, and related compensatory measures when required. The inspectors assessed the material condition of fire protection suppression and detection equipment to determine whether any conditions or deficiencies existed which could impair the availability of that equipment. The documents reviewed during this inspection are listed in the Attachment. The eleven areas are as follows:

- Unit 1 Component cooling water (CCW) pump room;
- Unit 2 Emergency core cooling system (ECCS) HVAC room;
- Unit 1 Service water (SRW) pump room;
- Unit 2 Emergency core cooling system (ECCS) east pump room;
- Unit 2 Emergency core cooling system (ECCS) west pump room;
- Unit 1 Auxiliary feedwater (AFW) pump room;
- Unit 2 Service water (SRW) pump room;
- 1B Emergency diesel generator (EDG) room;
- 1A Emergency diesel generator (EDG) room;
- 2B Emergency diesel generator (EDG) room; and
- Unit 2 Auxiliary feedwater (AFW) pump room.

b. Findings

No findings of significance were identified.

.2 Fire Brigade Observations

The inspectors observed the fire brigade on January 13, 2006, during an underground electrical cable high-impedance fault fire located in the tank farm area. The inspectors observed the verification of the fire and initiation of response, including identification of

the fire location, dispatching the fire brigade, and sounding alarms. Once the fire brigade responded to the location, the inspectors observed the fire brigade leader performing an assessment of the fire, communicating with team members and the control room supervisor. The documents reviewed during this inspection are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance

Biennial Heat Sink Performance (71111.07B - 4 samples)

a. Inspection Scope

Based on safety significance and prior inspection history, the inspector selected the following heat exchangers to evaluate the licensee's means (inspection, cleaning, maintenance, and performance monitoring) of ensuring adequate heat sink performance:

- Unit 1 Service water heat exchangers;
- Unit 2 Service water heat exchangers;
- Unit 1 Component cooling water heat exchanger; and
- Unit 2 ECCS room cooler.

The inspectors assessed the external condition of accessible heat exchangers in the field, reviewed the eddy current, surveillance test and inspection results, and reviewed the applicable system health reports to confirm that results were acceptable and that design basis assumptions for flow rate, plugged tube percentage, and heat transfer capability had been met. The inspectors discussed heat exchanger practices, including the specifications and procedures for heat exchanger maintenance, with the heat exchanger component engineer, applicable system engineers, non-destructive testing evaluators, and chemistry personnel. In addition, the inspectors reviewed the licensee's commitments regarding Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment" to confirm that current inspection, cleaning, and testing practices were consistent with commitments and also reviewed applicable condition reports to confirm that identified problems and degraded conditions had been resolved properly.

The chemical treatment programs for the intake water from the Chesapeake Bay (ultimate heat sink) were reviewed to verify that potential bio-fouling mechanisms were being addressed, including on-going treatment and monitoring as specified in the chemistry manual. The review included discussions with chemistry personnel and the salt water system engineer. The documents reviewed during this inspection are listed in the Attachment.

b. Findings

There were no findings of significance identified.

1R08 Inservice Inspection (71111.08 - 2 Samples)

a. Inspection Scope

The inspection assessed the effectiveness of the licensee's Inservice Inspection (ISI) program for monitoring degradation of the reactor coolant system boundary, risk-significant piping system boundaries, and the containment boundary. The inspectors assessed welding and non-destructive examination (NDE) activities using the criteria specified in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Code, Section XI. The inspectors also assessed the licensee's implementation of their boric acid corrosion control (BACC) program.

The inspectors reviewed documents and observed portions of selected NDE activities, including those that were associated with the repair and replacement of components. The sample selection was based on the inspection procedure objectives and risk significance. Specifically, the inspectors focused on components and systems where degradation could potentially result in an increase in risk of core damage. These reviews were conducted to verify the activities were performed in accordance with ASME Code requirements. The inspectors reviewed a sample of examination reports and ISI-related condition reports to evaluate the licensee's effectiveness in the identification and resolution of problems.

The NDE activities observed by the inspectors included volumetric, surface and visual examinations. The inspectors also reviewed a pressure boundary welding activity.

The inspectors reviewed the following specific examination activities:

- Visual examinations for boric acid detection (pressurizer upper head, lower head, and mid-level nozzle penetrations);
- Ultrasonic test (UT) examination of CC-11-1003, nozzle to safe end, pressurizer spray line;
- UT examination of 12-PSL-2, safe end to pipe weld, pressurizer surge line; and
- Liquid penetrant test (PT) examinations (1-TE-111X-NDE-430-00; 1-TE-111X-NDE-470-00; 1-TE-111X-NDE-270-00; 1-TE-111X-NDE-220-00).

For the weld examination activities, the inspectors interviewed examination personnel and engineers to assess the planning and preparation for the activities. The inspectors reviewed training and qualification records to verify the licensee's personnel qualification process adequately prepared the assigned staff to perform the examination. Selected examination procedures and results were reviewed to determine whether they provided adequate guidance and examination criteria to implement the examination plan. Examination documents were reviewed for indications that required corrective action.

The inspectors reviewed the welding and NDE activities associated with a pressure

boundary weld on a Class 2 system. Specifically, the inspectors reviewed the replacement of a subsection of 16" DBI-1019 feedwater system piping on the downstream side of valve 1CKFW-130 (Maintenance Order 1199701648). The inspectors evaluated the maintenance package to determine whether the weld and NDE examinations were performed in accordance with the ASME Code. The associated NDE activity records reviewed included the following:

- Examination Report CC06-BR-06-002, Radiographic Examination for Feedwater Piping to #12 Steam Generator (Valve to Pipe Weld FW-13); and
- Examination Report CC06-BR-06-003, Radiographic Examination for Feedwater Piping to #12 Steam Generator (Pipe to Pipe Weld FW-20).

Also, the inspectors assessed the licensee's ability to identify boric acid corrosion and leaks. The licensee's boric acid inspection procedures were reviewed to determine if they provided adequate scope and guidance on examination criteria and corrective actions when boric acid deposits are found. The inspectors conducted a boric acid walkdown of containment to verify that there were no active boric acid leaks, and reviewed the licensee's boric acid walkdown results for indications of active boric acid leaks or boric acid corrosion of carbon steel components. The documents reviewed during this inspection are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11Q - 1 samples)

a. Inspection Scope

The inspectors observed a licensed operator simulator training scenario conducted on January 26, 2006, in order to assess operator performance and the adequacy of licensed operators training program. The training scenario involved an unanticipated mode change and a ruptured saltwater header. During this inspection, the inspectors focused on high-risk operator actions performed during implementation of the abnormal and emergency operating procedures, emergency plan implementation, and classification of the event. The inspectors evaluated the clarity and formality of communications, the implementation of appropriate actions in response to alarms, the performance of timely control board operations and manipulations, and the oversight and direction provided by the shift supervisor. The inspectors also reviewed simulator fidelity to evaluate the degree of similarity to the actual control room, especially regarding recent control board modifications. The documents reviewed during this inspection are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

.1 Quarterly Review (71111.12Q - 2 samples)

a. Inspection Scope

The inspectors reviewed the licensee effectiveness in performing routine maintenance activities. This review included an assessment of the licensee's practices pertaining to the identification, scoping, and handling of degraded equipment conditions, as well as common cause failure evaluations, and the resolution of historical equipment problems. For those systems, structures, and components (SSC) scoped in the maintenance rule per 10 CFR 50.65, the inspectors verified that reliability and unavailability were properly monitored and that 10 CFR 50.65 (a)(1) and (a)(2) classifications were justified in light of the reviewed degraded equipment condition. The inspectors conducted this inspection for the following equipment issues:

- Unit 1 Service water (SRW) turbine building isolation valves CV-1600, 1637; and
- Unit 2 Service water (SRW) turbine building isolation valves CV-1600, 1637.

b. Findings

Introduction. The inspectors identified a green, non-cited violation (NCV) of 10CFR50.65 ("the Maintenance Rule") paragraph (a)(2) in that the licensee failed to demonstrate that the performance of service water turbine building isolation valves is being effectively controlled through preventive maintenance. The licensee did not fully evaluate repetitive valve test failures and their impact on the performance demonstration that justified monitoring under paragraph (a)(2) of the Maintenance Rule.

Description. On February 24, 2005, a Unit 2 service water turbine building isolation valve (2CV1600) did not fully close during its stroke test. This safety-related valve is part of two pairs of valves on each unit which isolate the non-safety related, turbine building loads of the service water system from the remaining safety-related portion of the system during a safety injection actuation. The stroke tests occur once each operating cycle during the outage in the as-found condition. Corrective actions were taken to repair the valve, including needed planned preventive maintenance activities to replace the valve packing and liner.

On April 11, 2004, during the previous outage, the identical valve on Unit 1 (1CV1600) had failed its stroke test. During the troubleshooting and repair of the valve, the licensee had determined that hardening of the valve packing and liner had caused increased stem friction, which resulted in the stroke test failure. Corrective actions included instituting preventive maintenance to replace the packing and liner on an 8-year frequency.

The licensee's procedure ER-1-103, Maintenance Rule Program Implementation, Step 5.6.A.3 specifies that the maintenance rule coordinator "review the monthly list of Repetitive Functional Failures and provide recommendations to the affected SES PE [System Engineering Services Principal Engineer] for (a)(1) classification of

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components.” Absent an acceptable basis for continued monitoring under (a)(2), the repetitive functional failures of these valves should have resulted in a change in categorization under the maintenance rule (MR) program, i.e., from an (a)(2) categorization for continuing the existing maintenance to an (a)(1) categorization involving goal setting and monitoring.

The licensee had concluded that both stroke test failures were functional failures and had listed one repeat failure in the Unit 1 Service Water System Health Report (Q4 - 2005). One performance criterion of the service water system was that no repetitive functional failures occur. The licensee had determined that both stroke test functional failures were not repetitive, however, upon further inspector review and discussion with station engineers, the station incorrectly had determined that these failures were not repetitive.

Following identification by the inspector on February 8, 2006, the licensee initiated CRs IRE-011-450 and IRE-011-454 to evaluate the correct categorization and applicable MR program consequences. In CR IRE-011-450 the licensee determined that the repetitive functional failures should have caused the effected valves to be categorized as (a)(1).

Analysis. The issue represented a performance deficiency since licensee personnel evaluating the repetitive functional failures of safety-related service water isolation valves did not properly evaluate performance demonstration nor apply the MR program performance criteria to the valve test failures. This resulted in the valves not being effectively monitored within the maintenance rule program, and resulted in not meeting the requirements of 10 CFR 50.65 (a)(2). The finding is greater than minor, because it is associated with the equipment performance attribute and affected the Mitigating Systems Cornerstone objective of ensuring the reliability of systems that respond to initiating events. Specifically, the licensee did not demonstrate effective control of the performance of the isolation valves by failing to place the affected structure, system, component (SSC) in a 50.65 (a)(1) category due to its invalid performance demonstration. The finding is of very low safety significance, because the isolation valve failures did not result in a loss of operability per Generic Letter 91-18, did not represent a loss of a system or train safety function, and did not involve an external event. Specifically, the valves are in series in pairs, and only one of each pair experienced testing failures; the remaining valve would have performed the isolation function.

The inspector identified that a contributing cause of this finding was related to the cross-cutting area of human performance. The incorrect performance determination and application of performance criteria to the repetitive valve functional failures represented a human performance error.

Enforcement. 10 CFR 50.65 (a)(1) requires that licensees monitor the performance of SSC(s) within the scope of the rule defined by 10 CFR 50.65 (b), against licensee-established goals in a manner sufficient to provide reasonable assurance that such SSC(s) are capable of fulfilling their intended safety function.

10 CFR 50.65 (a)(2) requires that monitoring as specified in 10 CFR 50.65 (a)(1) is not

required where it has been demonstrated that the performance of an SSC is being effectively controlled through the performance of preventive maintenance, such that the SSC remains capable of performing its intended safety function.

Contrary to the above, the licensee failed to demonstrate that the performance or condition of the service water isolation valves had been effectively controlled through the performance of appropriate preventive maintenance and did not monitor against licensee-established goals. Specifically, despite having repetitive functional failures of service water turbine building isolation valves on April 11, 2004, and February 24, 2005, The licensee did not categorize the valves as being (a)(1) status when performance demonstrated that these isolation valves were not being effectively controlled through preventive maintenance and, as a result, that goal setting and monitoring was required. This violation existed between the incorrect evaluation in March 2005 and the inspector's identification in February 2006. However, because the finding was of very low safety significance and has been entered into the corrective action program, this violation is being treated as an NCV, consistent with Section IV.A.1 of the NRC Enforcement Policy: **NCV 05000317/2006002-01, Failure To Perform Evaluation For Repetitive Functional Failures** . Condition reports IRE-011-450 and IRE-011-454 were written on these issues.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 - 7 samples)

a. Inspection Scope

The inspectors reviewed the licensee's assessments concerning the risk impact of removing from service those components associated with the work items listed below. This review primarily focused on activities determined to be risk significant within the maintenance rule. The inspectors compared the risk assessments and risk management actions performed by station procedure NO-1-117, "Integrated Risk Management," to the requirements of 10 CFR 50.65(a)(4), the recommendations of NUMARC 93-01, Revision 2, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Section 11, "Evaluation of Systems to Be Removed From Service," and approved station procedures. The inspectors compared the assessed risk configuration to actual plant conditions to evaluate whether the assessment was accurate and comprehensive. In addition, the inspectors assessed the adequacy of the licensee's identification and resolution of problems associated with maintenance risk assessments and emergent work activities. The documents reviewed during this inspection are listed in the Attachment. The inspectors reviewed the following selected work activities:

- 22A Reactor coolant pump (RCP) power supply transfer after post maintenance testing of RCP alternate feeder bus breaker 252-22P02;
- 21 ECCS exhaust fan during and after HEPA filter and damper linkage replacement and inspection;
- 22 ECCS exhaust fan during and after HEPA filter and damper linkage replacement and inspection;
- 12 CCW heat exchanger inspection and cleaning;
- 21 LPSI pump quarterly flow test;

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- 4kV Bus inspection and cleaning; and
- 1A EDG room recirculation damper failed shut.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15 - 7 samples)

a. Inspection Scope

The inspectors reviewed seven operability determinations to verify that the operability of systems important to safety were properly established and that affected components or systems remained capable of performing their intended safety function. The inspectors reviewed the selected operability determinations to verify they were performed in accordance with NO-1-106, "Functional Evaluation - Operability Determination," and QL-2-100, "Issue Reporting and Assessment." The documents reviewed during this inspection are listed in the Attachment. The following operability evaluations were reviewed:

- Ultrasonic examination of weld CC-10-1006 (W1), pressurizer relief line, identified an indication that does not meet ASME Section XI acceptance criteria;
- Unit 2 Saltwater (SW) piping elbow leak downstream of the 21 service water strainer flush control valve;
- Unit 2 SW piping pin hole leak downstream of the saltwater header;
- 2A Emergency diesel generator pre-lube pump timer relay replacement;
- 1B Emergency diesel generator governor replacement activities;
- Unit 1 Main steam safety valve lift settings found above technical specification limits; and
- Halon suppression system with an excessive door sweep gap to the turbine building 45' elevation.

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications (71111.17 - 1 sample)

a. Inspection Scope

The inspectors reviewed engineering service package (ESP) No. ES200600115, Supplements 000 through 006, which was initiated to eliminate interferences between the new Unit 1 thimble support plate and the associated control element assemblies. These interferences resulted in the inability to properly seat the thimble support plate on the upper guide structure. In particular, the ESP provided guidance and acceptance criteria specific to the grinding and cutting of small amounts of metal material from specific thimble support plate openings to allow proper fit-up. The ESP also modified the original method by which the thimble support plate would be vertically supported on

the upper guide structure.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19 - 8 samples)

a. Inspection Scope

The inspectors observed and/or reviewed post-maintenance tests associated with the following eight work activities to verify that equipment was properly returned to service, and that appropriate testing was specified and conducted to ensure that the equipment was operable and could perform its intended safety function following the completion of maintenance. Post-maintenance testing activities were conducted as specified in station procedure MN-1-101, "Control Of Maintenance Activities." The documents reviewed during this inspection are listed in the Attachment. Post-maintenance test results associated with the maintenance activities listed below were reviewed.

- 21 ECCS exhaust fan during and after HEPA filter and damper linkage replacement and inspection;
- 22 ECCS exhaust fan during and after HEPA filter and damper linkage replacement and inspection;
- 22A Service water (SRW) heat exchanger inspection and cleaning;
- 12 CCW heat exchanger inspection and cleaning;
- 22A RCP bus breaker cubicle alignment;
- 1B EDG governor replacement activities;
- 2A EDG pre-lube pump timer relay replacement; and
- 12 containment spray (CS) pump overhaul following pump bearing failure.

b. Findings

No findings of significance were identified.

1R20 Refueling and Other Outage Activities (71111.20 - 1 sample)

a. Inspection Scope

The inspectors evaluated Unit 1 outage activities to ensure that the licensee considered risk in the development of outage schedules; the adherence to administrative risk reduction methodologies developed to control plant configuration; developed mitigation strategies for losses of key safety functions, and adhered to operating license and TS requirements that ensure defense in depth. The documents reviewed during this inspection are listed in the Attachment. The following specific areas were reviewed:

- Review of outage plan;
- Monitoring of shutdown activities;
- Licensee control of outage activities;

- Reduced inventory and mid-loop conditions; and
- Refueling activities.

b. Findings

Introduction. A Green self-revealing NCV was identified because the licensee did not establish adequate physical boundaries when performing maintenance on the 12A Reactor Coolant Pump while concurrently conducting a component cooling water (CCW) system containment isolation valve surveillance test. As a result, the component cooling water head tank loss inventory which could have ultimately degraded the shutdown cooling (SDC) system. This event occurred because the licensee did not adhere to the requirements contained in station procedure NO-1-112, "Safety Tagging," as required by Appendix A of Regulatory Guide 1.33, Revision 2, February 1978.

Description. On February 22, 2006, while in Mode 5, the licensee was performing maintenance on the 12A RCP while concurrently conducting a CCW system containment isolation surveillance test. When the CCW containment isolation valve was stroked open, the Unit 1 control room operators received two unexpected alarms: a containment sump alarm and a low discharge pressure alarm on the CCW pumps. The alarms were due to the CCW head tank level dropping approximately 20 inches. The cause of this event was due to an inadequate tagout boundary which had previously been established to support replacement of the 12A reactor coolant pump seal. The tagout was inadequate because the isolation valves for the reactor coolant drain tank heat exchanger were not included on the original tagout, and were not closed during the surveillance test. When the CCW containment isolation valve was stroked open, a leak path was created that drained 20 inches of the CCW head tank to the normal containment sump. The event was terminated as soon as control room operators closed the associated valve.

At the time the event occurred, the estimated time to boil was 19 minutes and cooling water for the shutdown cooling (SDC) heat exchangers was being provided by the component cooling water system. The licensee documented this in their corrective action program as IRE-011-762.

Analysis. The inspectors determined that a performance deficiency existed because the licensee did not properly follow approved station procedures by ensuring that the clearance boundary was adequate to support the planned maintenance activity. Specifically, NO-1-112, "Safety Tagging," stated that reviews of the clearance stubs shall ensure that clearance controls (especially boundaries) that have been, or are to be set by the associated clearance orders indicated on the stub, are adequate for the work to be performed under the stub.

This finding was more than minor because it was associated with the Initiating Event Cornerstone attribute of configuration control and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown operations. The event did not involve an actual loss of SDC. As a result, this finding was determined to be of very low safety significance (Green) in accordance with a risk assessment performed using the NRC Inspection Manual

Chapter (IMC) 0609, "Significance Determination Process," Appendix G, "Shutdown Operations because this did not degrade pump performance nor result in loss of the component cooling water system or shutdown cooling which was in service.

The inspectors identified that a contributing cause of this finding was related to the cross-cutting area of human performance. The relevant causal factor was personnel because licensed operators did not follow plant procedures and determine if boundaries specified in the clearance order were adequate for the maintenance activities being performed.

Enforcement. Technical Specifications 5.4.1.a. requires, in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978. Specifically, Appendix A of Regulatory Guide 1.33, Section 9, Procedures for Performing Maintenance, includes procedures for properly preplanning and performing maintenance that can affect the performance of safety-related equipment. Contrary to this requirement, the licensee did not properly follow approved station procedures and adequately ensure that the clearance boundary for 12A RCP seal replacement was appropriate to support the maintenance which is required by NO-1-112, "Safety Tagging," which stated that reviews of the clearance stubs shall ensure that clearance controls (especially boundaries) that have been, or are to be set by the associated clearance orders indicated on the stub, are adequate for the work to be performed under the stub. Because the failure is of a very low safety significance and has been entered into the corrective actions program as IRE-011-762, this violation of TS 5.4.1.a is being treated as an NCV consistent with Section VI.A.1 on NRC Enforcement Policy: **NCV 05000317/2006002-02, Failure To Establish Adequate Physical Boundaries For RCP Maintenance.**

1R22 Surveillance Testing (71111.22 - 9 samples)

a. Inspection Scope

The inspectors observed and/or reviewed the nine surveillance tests listed below associated with selected risk-significant SSCs to verify TS compliance and that test acceptance criteria was properly specified. The inspectors also verified that proper test conditions were established as specified in the procedures, no equipment preconditioning activities occurred, and that acceptance criteria had been satisfied. The documents reviewed during this inspection are listed in the Attachment.

- STP O-11-2, ECCS pump room ventilation system monthly test;
- STP O-56A-1, Engineered safety feature actuation signal (ESFAS) equipment response time;
- STP O-73J-2, LPSI pump operability test;
- STP M-3A-0, On-line main steam safety valve testing;
- STP O-225-1, AFAS Steam Generator Levels Functional Test;
- STP O-8A-2, Test of 2A EDG and 4 kV bus 21 LOCI sequencer;
- STP O-66E-1, Service water turbine building header isolation valve operability test (Modes 5 - 6);

- STP O-88-1, TSP Volume Determination; and
- STP-O-65-2, HPSI and LPSI Ckv Closure Test.

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness (EP)

1EP6 Drill Evaluation (71114.06 - 1 sample)

Simulator Exercises

a. Inspection Scope

The inspectors observed control room simulator training exercises conducted on January 26, 2006, to assess licensed operators' performance in the area of emergency preparedness. This training exercise focused on equipment failures and operator challenges that would typically exist during total loss of saltwater and a loss of shutdown cooling in Mode 5. The required procedural transitions and associated event classification was observed and evaluated by the inspectors.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety (OS)

2OS1 Access Control to Radiologically Significant Areas (71121.01 - 7 samples)

a. Inspection Scope

The inspector reviewed radiological work activities and practices and procedural implementation during observations and tours of the facilities and inspected procedures, records, and other program documents to evaluate the effectiveness of the licensee's access controls to radiologically significant areas. This inspection activity represents the completion of seven (7) samples relative to this inspection area (i.e., inspection procedure sections 02.01, 02.02.a thru c, and 02.04.a thru c) and partially fulfills the annual inspection requirements. The documents reviewed during this inspection are listed in the Attachment.

Inspection Planning (02.01) (one (1) sample)

The inspector reviewed the licensee performance indicator (PI) for the Occupational Exposure Cornerstone for followup of any occurrences. The official website showed that there were no occurrences for the Occupational Exposure Control Effectiveness PI

for the eight quarters of 2004 and 2005. However, based on information received from the resident NRC inspector and from licensee radiation protection management, on January 27, 2006, and after, the inspector followed up on an event at the site involving an electronic personnel dosimeter alarm in a high radiation area.

Plant Walk Downs and RWP Reviews (02.02.a, b, and c)

The inspector identified several exposure significant work areas within radiation areas, high radiation areas (less than 1 rem per hour), and airborne radioactivity areas in the plant and reviewed associated licensee controls and surveys of these areas and determined that controls (e.g., surveys, postings, barricades) were acceptable. With a survey instrument, the inspector walked down some of these areas or their perimeters and determined that prescribed Special Work Permit (SWP), procedure, and engineering controls were in place, that selected licensee surveys and postings were complete and accurate, and that air samplers were properly located. The inspector reviewed selected SWPs used to access these and other high radiation areas and identified what work control instructions or control barriers had been specified. The inspector examined electronic personal dosimeter (EPD) alarm set points (both integrated dose and dose rate) for conformity with survey indications and plant policy. The inspector verified that workers knew what actions were required when their EPD noticeably malfunctions or alarms.

Job-In-Progress Reviews (02.04.a, b, and c)

Based on the licensee's schedule of work activities, the inspector selected several jobs being performed in radiation areas, airborne radioactivity areas, or high radiation areas (less than 1 rem per hour) for observation. The inspector concentrated on work activities that presented the greatest radiological risk to workers. The activities included in-service inspection/nondestructive examination support for Unit 1 refueling outage (dissimilar metal inspections), reactor path minor maintenance, demolition of the Unit 1 old reactor head, diving operations in the Unit 1 refuel pool for upper guide structure modifications, movement of the old thimble support plate and old reactor head to elevation 45 in containment, half-nozzle replacements on the reactor coolant system hot legs, and the mechanical stress improvement process. The inspector reviewed the radiological job requirements (i.e., SWP requirements and work procedure requirements). The inspector attended update SWP job briefings for the decontamination of the south refueling cavity and for the initial removal and lifting of the old reactor head. The inspector observed selected job performance with respect to these requirements and determined that radiological conditions in the work area were adequately communicated to workers through briefings and postings.

During job performance observations, the inspector verified the adequacy of radiological controls, such as: required surveys (including system breach radiation, contamination, and airborne surveys), radiation protection job coverage (including audio and visual surveillance for remote job coverage), and contamination controls. For high radiation work areas with significant dose rate gradients (factor of 5 or more), the inspector reviewed the application of dosimetry to effectively monitor exposure to personnel. The inspector focused on the underwater diving activities, where the dose rate gradients are

severe, thereby increasing the necessity of providing multiple dosimeters and/or enhanced job controls. The inspector verified that the licensee controls were adequate.

Related Activities

The inspector performed a selective examination of documents (as listed in the List of Documents Reviewed section) to evaluate the adequacy of radiological controls.

The review in this area was against criteria contained in 10 CFR 19.12, 10 CFR 20 (Subparts D, F, G, H, I, and J), Technical Specifications, and procedures.

b. Findings

Introduction: A Green, self-revealing non-cited violation (NCV) was identified for the failure to comply with the alternate access control requirements established in accordance with 10 CFR 20.1601(c). A nondestructive examination (NDE) worker was exposed to unanticipated radiation levels of up to approximately 3,000 millirems per hour because the licensee's radiation protection technicians failed to identify and control an existing high radiation area with dose rates greater than 1,000 millirems per hour on the top of a dry shielded canister (DSC).

Description: On January 18, 2006, a NDE worker proceeded to the top of a DSC to perform a NDE helium leak test inspection of the vent and siphon port fittings. The worker's electronic personnel dosimeter (EPD) unexpectedly alarmed when the worker was exposed to unanticipated radiation levels of up to approximately 3,000 millirems per hour. Subsequent surveys at the source of radiation around the siphon and vent ports measured 10,000 on contact and 3,000 millirems per hour at 30 centimeters at the vent port and 5,000 on contact and 1,500 millirems per hour at 30 centimeters at the siphon port. The area was not controlled or posted as a locked high radiation due to inadequate radiation surveys. The licensee determined that the NDE worker received less than 10 millirems of whole body dose and determined a preliminary conservative estimate of 85 millirems of extremity dose for the worker.

Analysis: The failure to control access to a high radiation area is a performance deficiency. The finding is more than minor because it is associated with the occupational radiation safety cornerstone attribute of exposure control and affected the cornerstone objective, because not controlling locked high radiation areas could increase personal exposure. This finding did not meet the criteria for traditional enforcement.

Since this occurrence involved a worker's unplanned, unintended dose and the potential for the dose to have been significantly greater as a result of a single minor, reasonable alteration of circumstances, this finding was evaluated using IMC 0609, Appendix C, "Occupational Radiation Safety Significance Determination Process." The inspectors determined that the finding was of very low safety significance (Green) because it did not involve (1) ALARA planning and controls, (2) an overexposure, (3) a substantial potential for overexposure, or (4) an impaired ability to assess dose. The inspector verified that this finding was entered into the licensee's corrective action program.

Enclosure

The inspectors determined that a contributing cause of this finding was related to the cross-cutting area of human performance in that access to a high radiation that was not controlled or posted as a locked high radiation due to inadequate radiation surveys.

Enforcement: The alternate access control requirements, established in accordance with 10 CFR 20.1601(c) in the licensee's procedure, RSP 1-104, Rev. 19, Area Posting and Barricading, state, in parts, the following: (1) that, for individual high radiation areas with radiation levels greater than 100 millirems per hour, entry by a worker into such areas with an alarming electronic personnel dosimeter shall be made only after the dose rate levels in the area have been established and after personnel are made aware of them; and (2) that, for individual high radiation areas with radiation levels greater than 1,000 millirems per hour, the area shall be posted as a locked high radiation area (LHRA). On January 18, 2006, the licensee violated these requirements when it did not properly control the high radiation area with dose rates greater than 1,000 millirems per hour for a period of at least several hours. When the EPD alarm revealed the presence of the unanticipated elevated dose rates, the area was properly surveyed and then posted and controlled as a locked high radiation area.

Because the failure to control a high radiation area was determined to be of low safety significance (Green) and was entered into the licensee's corrective action program as Condition Report No. IRE-010-870, this violation is being treated as a NCV, consistent with Section VI.A of the NRC Enforcement Policy, NUREG-1600. **NCV 05000317, 05000318/2006002-03, Failure To Properly Control Access To A High Radiation Area.**

2OS2 ALARA Planning and Controls (71121.02 - 4 samples)

a. Inspection Scope

The inspector reviewed the effectiveness of the licensee's program to maintain occupational radiation exposure as low as is reasonably achievable (ALARA). This inspection activity represents the completion of four (4) samples relative to this inspection area (i.e., inspection procedure sections 02.01.b, 02.02.a and b, and 02.04.a.1) and partially fulfills the biennial inspection requirements.

Inspection Planning (02.01.b)

The inspector reviewed the refueling outage work scheduled during the inspection period and associated work activity exposure estimates or previous work activity history data. The inspector selected a number of work activities which were likely to result in the highest personnel collective exposures. The activities included in-service inspection/nondestructive examination support for Unit 1 refueling outage (dissimilar metal inspections), reactor path minor maintenance, demolition of the Unit 1 old reactor head, diving operations in the Unit 1 refuel pool for upper guide structure modifications, movement of the old thimble support plate and old reactor head to elevation 45 in containment, half-nozzle replacements on the reactor coolant system hot legs, and the mechanical stress improvement process.

Enclosure

Radiological Work Planning (02.02.a and b)

The inspector obtained from the licensee a list of work activities ranked by actual/estimated exposure, including those mentioned above, that were in progress or that were scheduled during the current outage. The inspector selected the work activities of highest exposure significance.

The inspector reviewed the ALARA work activity evaluations, exposure estimates, and exposure mitigation requirements for these work activities. The inspector determined that the licensee had established procedures, engineering and work controls, based on sound radiation protection principles, to achieve occupational exposures that were ALARA. The inspector determined that the licensee had reasonably grouped the radiological work into work activities, based on historical precedence, industry norms, and/or special circumstances.

Job Site Inspections and ALARA Control (02.04.a.1)

Based on scheduled work activities and associated exposure estimates, the inspector selected several work activities in radiation areas, airborne radioactivity areas, or high radiation areas for observation. The inspector concentrated on work activities that presented the greatest radiological risk to workers. The inspector evaluated the licensee's use of ALARA controls for these work activities by evaluating the licensee's use of engineering controls to achieve dose reductions, the consistency of implemented controls with the ALARA reviews, and the amount of shielding provided for radiation sources.

Related Activities

The inspector performed a selective examination of documents (as listed in the List of Documents Reviewed section) for regulatory compliance and for adequacy of control of radiation exposure.

The review was against criteria contained in 10 CFR 20.1101 (Radiation protection programs), 10 CFR 20.1701 (Use of process or other engineering controls), and procedures.

b. Findings

No findings of significance were identified.

2OS3 Radiation Monitoring Instrumentation and Protective Equipment (71121.03 - 2 samples)

a. Inspection Scope

The inspector reviewed the program for health physics instrumentation and protective equipment to determine the accuracy and operability of the instrumentation and

equipment. This inspection activity represents the completion of two (2) samples relative to this inspection area (i.e., inspection procedure sections 02.01 and 02.02) and partially fulfills the biennial inspection requirements.

Inspection Planning (02.01)

The inspector reviewed the plant's Updated Final Safety Analysis Review (UFSAR) and identified applicable radiation monitors associated with transient high and very high radiation areas including those used in remote emergency assessment. The inspector identified the appropriate installed area and process radiation monitors, emergency assessment instrumentation, and portable radiation instruments that are used to identify changing radiological conditions such that actions to prevent an overexposure may be taken. The identified monitors, instrumentation, and instruments will be examined in future inspections.

Identify Additional Radiation Monitoring Instrumentation (02.02)

The inspector identified the types of portable radiation detection instrumentation used for job coverage for high radiation area work, of temporary area radiation monitors currently used in the plant, and of continuous air monitors associated with jobs with the potential for workers to receive fifty millirems of committed effective dose equivalent (CEDE). The inspector also reviewed the types of whole body counter equipment in place and the types of radiation detection instruments utilized for personnel release from the radiologically controlled area.

Related Activities

The inspector performed a selective examination of documents (as listed in the List of Documents Reviewed section) for regulatory compliance and adequacy.

The review was against criteria contained in 10 CFR 20.1501, 10 CFR 20 Subpart H, Technical Specifications, and procedures.

b. Findings

No findings of significance were identified.

Cornerstone: Public Radiation Safety (PS)

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems

.1 Review of Items Entered into the Corrective Action Program

The inspectors performed a daily screening of items entered into the licensee's corrective action program as required by Inspection Procedure 71152, "Identification and Resolution of Problems." The review facilitated the identification of potentially

repetitive equipment failures or specific human performance issues for follow-up inspection. It was accomplished by reviewing each issue report and attending daily screening meetings, and accessing the licensee's computerized database.

.2 Identification and Resolution of Problems - Occupational Radiation Safety

a. Inspection Scope

During this inspection, the inspector selected five issues identified in the Corrective Action Program (CAP) for detailed review (i.e., Issue Report (IR) Nos. IRE-010-005, -010-219, -010-870, -011-064, and -011-278). The issues were associated with an indication of tritium in an on-site shallow monitoring well, elevated noble gas levels in the reactor coolant, a dose alarm during a helium leak test, insufficient dose allowance on scaffolding work, and documentation of a performance indicator occurrence, respectively. The documented reports for the issues were reviewed to determine whether the full extent of the issues was identified, an appropriate evaluation was performed, and appropriate corrective actions were specified and prioritized.

b. Findings

No findings of significance were identified.

40A5 Other Activities

.1 5R01 Reactor Vessel Head Replacement Inspection (71007 - 1 sample)

a. Inspection Scope

The scope covers activities reviewed during in-office review of fabrication and design and planning documentation, as well as onsite inspection of rigging and installation activities during the refueling outage. Installation and post-modification testing will be inspected and documented for the 3rd quarter integrated inspection report. The documents reviewed during this inspection are listed in the Attachment.

Fabrication/Design Review (Con't. From IR 2005-005)

Construction performed at the vendor facility in Japan, as described in Certified Material Test Reports for the head dome forging, flange forging and the weld overlay, was verified by the Babcock & Wilcox (B&W) Authorized Nuclear Inspector (ANI) to conform to ASME Code Section III, Division I 1995/1996 addenda (class 1). The control element drive mechanism (CEDM) and in-core instrumentation (ICI) guide-tubes and the vent pipe were manufactured in Canada and inspected by that vendor's ANI to have been in compliance with the ASME Code and the vendor's Quality Assurance program. In addition, attachment of the CEDMs to the reactor vessel head and seal welding were performed at the Calvert Cliffs site and controlled by Constellation procedures.

The inspector reviewed the design specification for the new head, detailed in BWC TS-2955, Rev. 2, as well as reconciliation information that was documented in accordance with ASME Section XI (1998) IWA-4220 in the design report. The "Replacement RVCH for Unit 1 ASME Design Report" complied with the requirements of the ASME Boiler and Pressure Vessel Code, Section III ('95 Edition/'96 Addenda). The inspector reviewed the design report's list of non-conformances for reconciliation of the as-built reactor head to Code requirements. The inspector verified that the ANI Code inspector confirmed the new reactor vessel head conforms to the rules of construction of the ASME Code, Section III, Division I. The inspector also reviewed applicable 10 CFR 50.59 screening evaluations for selected modifications related to head replacement, using the guidance contained in NRC inspection procedure IP 71111.02, "Evaluation of Changes, Tests, or Experiments," dated July 7, 2003.

Lifting/Rigging Activities

The following were reviewed by the inspector to assess preparations for rigging and lifting of the old and new heads: a heavy loads assessment; an engineering service package; weight calculations by the vendor; the project execution plan; and, load handling procedures. The inspector checked that Constellation had analyzed the containment polar crane and Bigge rigging equipment, completed a full-load test on the crane and effectively set up safe load paths and a lay-down area. The 45' elevation in containment was used to lay down cribbing, the bottom head shield and the old TSP (thimble support plate) and was analyzed to be able to support this weight. The weight of the old head was supported above the 45' elevation by the polar crane. Also, the old head, which was lifted with only some nuts, studs and washers removed, weighed more than the new head, which was lifted without any of those items. Thus, the new loads were analyzed to be well within previously tested limits. The new head and ESS (Enhanced Service Structure), without the weight of the studs, nuts and washers, were calculated to be less than 90% of the design load for the crane.

The inspectors reviewed activities associated with lifting and rigging including: polar crane inspections (both daily checkout and mechanical and electrical tests); qualifications and training of vendor riggers and polar crane operators; and, procedures used during lift activities. The pre-job brief and risk assessment/management strategies for the transportation of the old head in containment was also reviewed. The inspectors directly observed movement of the old head from the head stand to the 45' elevation in containment, as well as transportation of the new head from the warehouse storage area, through the security barrier to the protected area.

The head lift activities were performed while Unit 1 was in Mode 6 (Refueling). Because the reactor was completely defueled prior to moving the old head from the head stand to the hatch, and also during movement of the new head and ESS from the hatch to the headstand, the risk impact of dropping the load onto components of safety-related systems was greatly reduced.

Constellation's commitments to maintain safety of heavy loads included ensuring proper inspection and testing of the lifting equipment, training and qualification of operators,

load handling procedures and establishment of a safe load path, which are described in the NRC SER and Constellation's procedure, MN-1-104, "Load Handling." Their response to NRC Bulletin 96-02, "Movement of Heavy Loads Over Spent Fuel, Over Fuel in the Reactor Core, or Over Safety-Related Equipment," and the resolution of IR# IRE-007-158, "[RV Head Weights]" were reviewed by the inspectors.

Radiation Protection

The inspector reviewed the radiation protection program activities for the reactor vessel head replacement for Unit 1 during the Unit 1 refueling outage. This review included the planning, preparation, and implementation of radiological controls. The inspector conducted interviews, performed observations and tours of the facilities, and inspected procedures, records, and other program documents to evaluate the effectiveness of the licensee's radiological controls.

The following areas of the radiation protection program for the reactor vessel head replacement were reviewed while utilizing applicable portions of the baseline inspection procedures IP 71121.01 and 71121.02 as guidance:

- as Low As Reasonably Achievable (ALARA) planning;
- job dose estimates and dose tracking;
- exposure controls including temporary shielding;
- airborne and contamination controls;
- radioactive material controls and management;
- radiological work plans and controls;
- emergency contingencies;
- project staffing and training plans; and
- evaluation of radiological source term including presence of hard-to-detect radionuclides including transuranics.

The inspector reviewed the implementation of radiation protection controls during selected portions of the replacement process. The inspector also discussed the steps in the removal process with the health physics lead for the project. Steps included the radiological safety plans for removal of the old reactor head from containment, its transport to the pre-assembly facility (PAF), storage at the PAF, placement in the shipping container, and transport and storage at the independent spent fuel storage facility.

Security

The inspector reviewed the physical protection program activities for the reactor vessel head replacement for Unit 1 during the Unit 1 refueling outage. Specifically, the inspector reviewed the access control considerations associated with bringing the new reactor vessel head into the protected area. The inspector reviewed the planning, search and escort activities that were to take place during the move into the protected area and assessed Constellation's process for maintaining the integrity of the search during the head transport. The inspector conducted a walk-down of the path that the replacement head was to traverse inside the protected area, conducted interviews and

performed observations of the physical barriers and other security features.

In addition, the inspector reviewed the licensee's plans to control and minimize any adverse impact on Unit 2 and any common systems during this evolution.

Replacement Activities Status

At the time this report feeder was submitted, Constellation and their vendor were aligning the new thimble support plate (TSP) onto the upper guide structure in the vessel. Constellation documented a condition report on the installation process in their corrective action program (IRE-012-607). Inspection of the design issues, installation and testing activities related to this TSP replacement is ongoing. Also remaining in the head replacement inspection is the review of post maintenance testing (crane and head components) and review of the RCS leakage testing and procedure adherence (reference IP 71007). The final feeder for this inspection will be in IR 2006-003.

b. Findings

No findings of significance were identified.

.2 Temporary Instruction 2515/160 - Pressurizer Penetration Nozzles and Steam Space Piping Connections In U.S. Pressurized Water Reactors (NRC Bulletin 2004-01)

a. Inspection Scope

This inspection assessed the licensee's effectiveness in detecting leakage from the pressurizer penetration nozzle and steam space piping connections. The inspectors interviewed examination and engineering personnel to assess their knowledge of these activities. The examination personnel's training and qualification records were reviewed to verify the licensee's personnel qualification process adequately prepared the assigned staff to perform the examinations and analyze the results. The inspectors reviewed the examination and boric acid corrosion control program procedures to determine whether they provided adequate guidance and examination criteria to implement the examination plan. Completed examination reports were reviewed. In addition, the inspectors independently toured the upper and lower portions of the pressurizer to look for the presence of small boron deposits. The documents reviewed during this inspection are listed in the Attachment.

The specific reporting requirements of TI 2515/160 are documented in Attachment 2.

b. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On April 6, 2006, the resident inspectors presented the inspection results to you and other members of your staff who acknowledged the findings. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENTS:

1. ATTACHMENT 1: SUPPLEMENTAL INFORMATION
2. ATTACHMENT 2: Inspection Requirements for Temporary Instruction 2515/160

ATTACHMENT 1: SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

J. Adams, Constellation, TSP Engineering/Installation
 K. Burroughs, Plant Health Physicist (Waste Management)
 R. Conaster, Chemist
 J. Detchemendy, Health Physics Technician
 A. Dewhurst, Framatome, Haul Path/Rigging, Engineering
 B. Downs, NDE Level III
 S. Etnoyer, Plant Health Physicist
 H. Evans, Health Physics Work Leader (Dosimetry)
 K. Hoffman, Senior Engineer, Engineering Programs
 J. Johnson, Engineering Analyst
 P. Jones, Senior Plant Health Physicist
 G. Khouri, Component Replacement Engineer
 T. Konerth, Fab PM/Project Engineer
 G. Knull, Unit Coordinator
 J. Lenhart, Health Physics Work Leader (Operations)
 K. Prescott, Command Center
 G. Quinn, Installation TM
 A. Reed, NDE Consultant, Engineering Programs
 J. Remenuik, ESS Task Manager/P.C., PMP
 E. Roach, General Supervisor of Health Physics
 B. Rudell, Principal Engineer, Engineering Programs
 B. Rudell, Task Manager, RVH/CEDMS
 S. Sanders, General Supervisor of Chemistry
 A. Simpson, Licensing
 A. Simpson, Senior Engineer, Regulatory Matters
 M. Saul, System Engineer
 D. Taylor, Command Center
 B. Tench, Acting Director, RVH Project
 J. York, Health Physics Supervisor (Support)
 M. Yox, Engineering Analyst

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened and Closed

05000317/2006002-01	NCV	Failure To Perform Evaluation For Repetitive Functional Failures (Section 1R12)
05000317/2006002-02	NCV	Failure To Establish Adequate Physical Boundaries For RCP Maintenance (Section 1R20)

05000317, 05000318/2006002-03 NCV Failure To Properly Control Access To A High Radiation Area (Section 2OS1)

LIST OF DOCUMENTS REVIEWED

Section 1R04: Equipment Alignment

Unit 1 Component Cooling Water (CCW) Alignment

Operating Instructions (OI) – 16-1, Component Cooling Water System
Nuclear Operations (NO) – 1-112, Safety Tagging
Clearance Order - 1200501108
Maintenance Order (MO) – 1200502681
Maintenance Order (MO) – 1200502711
Maintenance Order (MO) – 1200503041
DWG No. - 60722SH0001

21 and 22 Emergency Core Cooling System (ECCS) Exhaust Fans Walkdown

Operating Instructions (OI) – 3A-2, Safety Injection and Containment Spray
Nuclear Operations (NO) – 1-112, Safety Tagging
Clearance Order - 2200500675
Maintenance Order (MO) – 2200502123
Maintenance Order (MO) – 2200502140
Maintenance Order (MO) – 2200502145
DWG No. - 60722SH0001

11 Emergency Core Cooling System (ECCS) Train Walkdown

Operating Instructions (OI) – 3A-1, Safety Injection and Containment Spray
Nuclear Operations (NO) – 1-112, Safety Tagging
Clearance Order - 1200600016
Maintenance Order (MO) – 1200502877
Maintenance Order (MO) – 1200503422
DWG No. - 60708SH0002
DWG No. - 60712SH0003

Unit 2 Saltwater System (SWS) Walkdown

Operating Instructions (OI) – 29, Saltwater System
Nuclear Operations (NO) – 1-112, Safety Tagging
Clearance Order - 2200600029
Maintenance Order (MO) – 2200600400
DWG No. - 62708SH0002
DWG No. - 62708SH0003
IRE-011-292

Complete System Walkdown

OI-32A, "Auxiliary Feedwater System"

Plant Drawing 60583SH0002, "Auxiliary Feedwater System (Condensate)"

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22A Reactor Coolant Pump (RCP) Bus Breaker 252-22P02

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Maintenance Nuclear (MN) – 1-100, Conduct of Maintenance
Maintenance Order (MO) – 2200600064
IRE-010-498

21 and 22 ECCS Exhaust Fans HEPA Filter and Damper Linkage Replacement and Inspection

Nuclear Operation (NO) - 1-117, Integrated Risk Assessment
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12 CCW Heat Exchanger Inspection and Cleaning

Nuclear Operation (NO) - 1-117, Integrated Risk Assessment
Clearance Order - 1200501108
Maintenance Order (MO) – 1200502681
DWG No. - 60722SH0001

21 Low Pressure Safety Injection (LPSI) Pump Test

Nuclear Operation (NO) - 1-117, Integrated Risk Assessment
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4kV Bus Inspection and Cleaning

Nuclear Operation (NO) - 1-117, Integrated Risk Assessment
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DWG No. - 61001SH0001

1A EDG Room Recirculation Damper Failed Shut

IRE-010-752

Section 1R15: Operability Evaluations

Unit 2 Saltwater (SW) Piping Elbow Leak

ES200600064
IRE-011-292
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IRE-012-837
Maintenance Order (MO) – 2200600854

2A Emergency Diesel Generator Pre-lube Pump

IRE-012-723
IRE-013-115
Maintenance Order (MO) – 2200600965

Operating Instructions (OI) – 21A, 2A Diesel Generator

1B Emergency Diesel Generator

IRE-010-866

IRE-012-406

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IRE-012-606

IRE-013-196

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Section 1R19: Post-Maintenance Testing

21 and 22 ECCS Exhaust Fan Replacement and Inspection

Operating Instructions (OI) – 3A, Safety Injection and Containment Spray

Clearance Order - 2200500675

Maintenance Order (MO) – 2200502123

Maintenance Order (MO) – 2200502140

Maintenance Order (MO) – 2200502145

DWG No. - 60722SH0001

22A Service water (SRW) heat exchanger inspection and cleaning

Operating Instructions (OI) –15-2 , Service Water System

Clearance Order - 2200600029

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DWG No. - 62708SH0003

22A RCP Bus Breaker Cubicle Alignment

Maintenance Nuclear (MN) – 1-100, Conduct of Maintenance

Maintenance Order (MO) – 2200600064

IRE-010-498

12 CCW Heat Exchanger Inspection and Cleaning

Operating Instructions (OI) – 16-1, Component Cooling Water System
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1B EDG Governor Replacement Activities

IRE-010-866
IRE-012-406
IRE-012-476
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Maintenance Order (MO) – 1200601104
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PM Basis 241

2A EDG Pre-lube Pump Timer Relay Replacement

IRE-012-723
IRE-013-115
Maintenance Order (MO) – 2200600965
Operating Instructions (OI) – 21A, 2A Diesel Generator
PM Basis 241

12 containment spray (CS) pump overhaul following pump failure

IRE-013-389
Maintenance Order (MO) – 1200601519
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STP O-73K-1, Containment Spray Pump Operability Test
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Section 1R20: Refueling and Other Outage Activities

Nuclear Operations (NO) – 1-112, Safety Tagging
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IRE-011-762
Clearance Order - 1200500616
Maintenance Order (MO) – 12002
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Section 1R22: Surveillance Testing

21 and 22 ECCS Ventilation Monthly Test

EN-4-104, Surveillance Testing
Clearance Order - 2200500675
Maintenance Order (MO) – 2200502123
Maintenance Order (MO) – 2200502140
Maintenance Order (MO) – 2200502145

21 LPSI Pump Operability Test

EN-4-104, Surveillance Testing
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Unit 1 Main Steam Safety Valve Testing

EN-4-104, Surveillance Testing
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U1 AFAS Sensor Channel Power Supply Inspection and Replacement

EN-4-104, Surveillance Testing
Maintenance Order (MO) – 1200500011
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2A EDG and 4 kV Bus 21 LOCI Sequencer Test

IRE-012-723
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SRW Turbine Building Header Isolation Valve Operability Test

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IRE-012-118
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20061311, Rev. 0, Reactor path minor maintenance
20061350, Rev. 2, Demolish the Unit 1 old reactor head
20061353, Rev. 0, Diving operations in the Unit 1 refuel pool for upper guide structure modifications
20061354, Rev. 0, Move thimble support plate and old reactor head to elevation 45 in containment
20061370, Rev. 0, Demolish the Unit 1 old reactor head (contingency) with radiological high risk activity 10
20061420, Rev. 2, Half nozzle replacements on the reactor coolant system hot legs
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Upend and Set on Stand
Bigge Document No. 2095-P4, Procedure to Downend Old Head in Containment, Transfer to
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RV-77, Reactor Vessel Closure Head Removal
RV-78, Reactor Vessel Closure Head Installation
ORVH Move, Integrated High Risk Brief
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Temporary Instruction 2515/160 - Pressurizer Penetration Nozzles and Steam Space Piping
Connections In U.S. Pressurized Water Reactors (NRC Bulletin 2004-01)

MN-3-105, Qualification of Nondestructive Examination Personnel and Procedures, Rev. 4
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Examination Report CC06-IV-097, Visual Examination for Boric Acid Detection (Pressurizer
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Mid-Level MNSA Nozzle), 3/4/06
NDE Certificate of Personnel Qualification and Certification (various)

LIST OF ACRONYMS

ALARA	As Low As Reasonably Achievable
ANI	Authorized nuclear inspector
ASME	American Society of Mechanical Engineers
BACC	Boric Acid Corrosion Control
BMV	Bare Metal Visual
CAP	Corrective Action Program
CCW	Component Cooling Water
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
CHD	Cantilever handling device
CMTRs	Certified Mill Test Reports
DSC	Dry Shielded Canister
EPD	Electronic Personal Dosimeter
IMC	Inspection Manual Chapter
IR	Inspection Report
ISI	Inservice Inspection
LHRA	Locked High Radiation Area
MNSA	Mechanical Nozzle Seal Assembly
NCV	Non-Cited Violation
NDE	Non-Destructive Examination
OA	Other Activities
OECE	Occupational Exposure Control Effectiveness
ORVH	Old reactor vessel head
OS	Occupational Safety
PAF	Pre-Assembly Facility
PI	Performance Indicator
PT	Penetrant Test
SWP	Special Work Permit
TI	Temporary Instruction
TSP	Thimble support plate
UFSAR	Updated Final Safety Analysis Report
UT	Ultrasonic Test
VT	Visual Test

ATTACHMENT 2

Inspection Requirements for Temporary Instruction 2515/160 - Pressurizer Penetration Nozzles and Steam Space Piping Connections in U.S. Pressurized Water Reactors (NRC Bulletin 2004-01)

The items listed in the Inspection Requirements for TI 2515/160 specific to the Bare Metal Visual Examination (Section 02.03) are addressed below.

At Calvert Cliffs Unit 1, a bare metal visual (BMV) examination was performed on 100% of the bottom head pressurizer heater sleeve penetration nozzles fabricated from Alloy 82/182/600 material to verify the absence of boric acid crystals and to verify the integrity of the pressurizer shell. Similarly, a BMV examination was performed on the upper- and mid- level mounted instrumentation penetration nozzles. There are two relief valve and one spray penetration nozzles that received their respective ASME Section XI ultrasonic examinations. The only impediment to the BMV examinations was the installed insulation around the penetrations and associated piping. After removing the insulation, the observed penetrations were free of material that could adversely affect viewing the pressurizer penetrations. No evidence of boric acid leakage or material deficiencies (i.e., cracks, corrosion, etc.) were identified at any penetration nozzle, including any associated mechanical nozzle seal assemblies (MNSA). The inspections conducted at Calvert Cliffs Unit 1 by qualified NDE technicians were consistent with the licensee's bulletin response dated July 27, 2004.

- a. The BMV examination was performed by qualified and knowledgeable personnel with certification to ASME, Section XI, Level II and Level III for visual examiners. In addition, the Level II and Level III examiners had received training in this type of inspection. The training included a review of industry experience, lessons learned, inspection results and procedure requirements. The examination was performed in accordance with demonstrated procedures and was able to identify, disposition and resolve deficiencies. The examination was capable of identifying potential leakage in pressurizer penetration nozzle or steam space piping components, as discussed in NRC Bulletin 2004-01.
- b. The pressurizer penetration nozzle and steam space piping components were free of dirt, debris, significant oxidation, or any other material that could adversely affect the examination.
- c. The visual inspection performed was the direct visual type. Examination personnel used mirrors and flashlights as visual aids.
- d. The examination personnel were able to conduct a full 360° inspection of all penetrations and steam space connections. The inspectors did not directly observe the licensee's performance of the VT examinations. However, a subsequent independent walkdown confirmed the accessibility and condition of selected penetrations.
- e. Small boron deposits could be identified and characterized by the visual techniques used. No boron deposits were noted.
- f. No material deficiencies were identified during the BMV examination that required

repair.

- g. There were no significant impediments to prevent effective examinations. However, the examinations required insulation removal and the installation of scaffolding. In addition, several of the instrument penetration nozzles had MNSA devices installed. They were also visually examined, and no deficient conditions were identified.
- h. Volumetric or surface examinations were not required for augmented examinations, although the relief valve and spray penetration nozzles (three penetrations) were examined with UT techniques in accordance with ASME, Section XI.
- i. The licensee did not perform follow-up examinations as there were no indications of boric acid leaks from pressure-retaining components in the pressurizer system.