UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

May 7, 2010

Mr. Joseph Pollock, Site Vice President
Entergy Nuclear Operations, Inc.
Indian Point Energy Center
450 Broadway, GSB
P.O. Box 249
Buchanan, NY 10511-0249

SUBJECT: INDIAN POINT NUCLEAR GENERATING UNIT 2 – NRC TRIENNIAL FIRE PROTECTION INSPECTION REPORT 05000247/2010006 & 05000286/2010006

Dear Mr. Pollock:

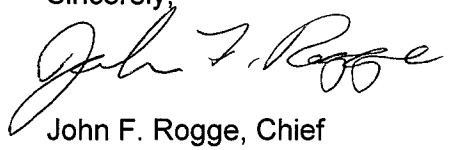
On February 11, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed a Triennial Fire Protection Inspection at the Indian Point Nuclear Generating Unit 2. The inspectors also reviewed mitigation strategies for addressing large fires and explosions at both Units 2 and 3. The enclosed inspection report documents the inspection results, which were discussed on April 7, 2010, with Mr. T. Orlando 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. In conducting the inspection, the team reviewed selected procedures, calculations and records, observed activities, and interviewed station personnel.

Based on the results of this inspection, two findings of very low safety significance (Green) were identified. These findings were also determined to be violations of NRC requirements. However, because of their very low safety significance, and because they were entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a written 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 D.C. 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Senior Resident Inspector at Indian Point Nuclear Generating Unit 2. In addition, if you disagree with the characterization of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I, and the Senior Resident Inspector at Indian Point Nuclear Generating Unit 2. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

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 the NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,



John F. Rogge, Chief
Engineering Branch 3
Division of Reactor Safety

Docket Nos. 50-247, 50-286
License Nos. DPR-26, DPR-64

Enclosure: Inspection Report No. 05000247/2010006 & 05000286/2010006
w/Attachment: Supplemental Information

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Sincerely,

/RA/
John F. Rogge, Chief
Engineering Branch 3
Division of Reactor Safety

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos.:	50-247, 50-286
License Nos.:	DPR-26, DPR-64
Report No.:	05000247/2010006 & 05000286/2010006
Licensee:	Entergy Nuclear Operations, Inc.
Facility:	Indian Point Nuclear Generating Units 2 & 3
Location:	450 Broadway, GSB Buchanan, NY 10511-0249
Inspection Period:	January 25 – February 11, 2010
Inspectors:	D. Orr, Senior Reactor Inspector, Division of Reactor Safety (DRS), Team Leader W. Cook, Senior Reactor Analyst, DRS J. Richmond, Senior Reactor Inspector, DRS J. Lilliendahl, Reactor Inspector, DRS
Approved By:	John F. Rogge, Chief Engineering Branch 3 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000247/2010006, 05000286/2010006; 01/25/2010 – 02/11/2010; Indian Point Nuclear Generating Unit 2; Triennial Fire Protection Inspection.

This report covers a two week on-site triennial fire protection team inspection by specialist inspectors. Two findings of very low significance were identified. These findings were determined to be non-cited violations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, "Significance Determination Process" and the cross-cutting aspect was determined using IMC 0305, "Operating Reactor Assessment Program." Findings for which the significance determination process (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 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The team identified a Green, Non-Cited Violation (NCV) of 10 CFR 50, Appendix R, III.G.3, in that Entergy failed to provide one train of reactor coolant system makeup free of fire damage for the control room, cable spread room, and cable tunnel fire zones for postulated fire scenarios. Specifically, Entergy failed to assure that one charging pump would remain free of fire damage for alternate shutdown fire scenarios that could produce a spurious closure of the volume control tank motor operated outlet valve. Entergy initiated condition report CR-IP2-2010-00720 for long term resolution and promptly initiated hourly fire watches in all affected fire areas except for the cable tunnel as an interim compensatory measure. The cable tunnel was evaluated as not requiring an hourly fire watch and being sufficiently protected with installed fire detection and automatic fire suppression in addition to administrative controls that limit personnel access.

  This finding is more than minor because it is associated with the External Factors attribute (fire) of the Mitigating Systems Cornerstone and adversely affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e. core damage). Specifically, the availability of the charging system was not ensured for postulated fires in alternative shutdown areas. The team used Phase 1, 2, and 3 risk assessment tools of IMC 0609, Appendix F, Fire Protection Significance Determination Process, to determine that this finding was of very low safety significance (Green), with an estimated total core damage frequency in the low to mid E-7/year range. A cross-cutting aspect was not identified. (Section 1R05.01.1)

- Green. The team identified a Green, Non-Cited Violation of 10 CFR 50, Appendix R, III.G.3, in that Entergy failed to provide one train of reactor coolant system makeup free of fire damage for the control room, cable spread room,

electrical switchgear room, and cable tunnel fire zones for postulated fire scenarios. Specifically, Entergy failed to assure that one charging pump would remain free of fire damage for alternate shutdown fire scenarios that could produce a spurious trip of a component cooling water (CCW) pump. Entergy initiated condition report CR-IP2-2010-00751 for long term resolution and promptly initiated hourly fire watches in all affected fire areas except for the cable tunnel as an interim compensatory measure. The cable tunnel was evaluated as not requiring an hourly fire watch and being sufficiently protected with installed fire detection and automatic fire suppression in addition to administrative controls that limit personnel access.

This finding is more than minor because it is associated with the External Factors attribute (fire) of the Mitigating Systems Cornerstone and adversely affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the availability of the charging system was not ensured for postulated fires in alternative shutdown areas. The team used Phase 1, 2 and 3 risk assessment tools of IMC 0609, Appendix F, Fire Protection SDP, to determine that this finding was of very low safety significance (Green), with an estimated total core damage frequency in the low to mid E-7/year. A cross-cutting aspect was not identified. (Section 1R05.01.2)

B. Licensee-Identified Violations

None

REPORT DETAILS

Background

This report presents the results of a triennial fire protection inspection conducted in accordance with NRC Inspection Procedure (IP) 71111.05T, "Fire Protection." An objective of the inspection was to assess whether Entergy Nuclear Operations, Inc. (Entergy) has implemented an adequate fire protection program and that post-fire safe shutdown capabilities have been established and are being properly maintained at the Indian Point Nuclear Generating Unit 2 (IP2). The following fire zones (FZs) were selected for detailed review based on risk insights from the IP2 Individual Plant Examination of External Events:

- FZ 14,
- FZ 23,
- FZ 32A, and
- FZ 74A.

Inspection of these four fire zones fulfills the inspection procedure requirement to inspect a minimum of three samples.

The inspectors evaluated Entergy's fire protection program (FPP) against applicable requirements which included Unit 2 Operating License Conditions 2.K. and 2.N., Unit 3 Operating License Condition 2.AC., NRC Safety Evaluations, 10 CFR 50.48, and 10 CFR 50, Appendix R. The inspectors also reviewed related documents that included the Updated Final Safety Analysis Report (UFSAR), the Fire Protection Program Plan, the Fire Hazards Analysis (FHA), and the Safe Shutdown Analysis Report.

Specific documents reviewed by the inspectors are listed in the attachment.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R05 Fire Protection (IP 71111.05T)

.01 Post-Fire Safe Shutdown from Outside Control room (Alternative Shutdown) and Normal Shutdown

a. Inspection Scope

Methodology

The team reviewed the safe shutdown analysis, operating procedures, piping and instrumentation drawings (P&IDs), electrical drawings, the UFSAR and other supporting documents to verify that hot and cold shutdown could be achieved and maintained for fires that rely on shutdown from outside the control room. This review included

verification that shutdown from outside the control room could be performed both with and without the availability of offsite power. Plant walkdowns were also performed to verify that the plant configuration was consistent with that described in the safe shutdown and fire hazards analyses. These inspection activities focused on ensuring the adequacy of systems selected for reactivity control, reactor coolant makeup, reactor decay heat removal, process monitoring instrumentation, and support systems functions. The team verified that the systems and components credited for use during this shutdown method would remain free from fire damage. The team verified that the transfer of control from the control room to the alternative shutdown locations would not be affected by fire-induced circuit faults (e.g., by the provision of separate fuses and power supplies for alternative shutdown control circuits).

Similarly, for fire areas that utilize shutdown from the control room, the team also verified that the shutdown methodology properly identified the components and systems necessary to achieve and maintain safe shutdown conditions.

Operational Implementation

The team verified that the training program for licensed and non-licensed operators included alternative shutdown capability. The team also verified that personnel required for safe shutdown using the normal or alternative shutdown systems and procedures are trained and available onsite at all times, exclusive of those assigned as fire brigade members.

The team reviewed the adequacy of procedures utilized for post-fire shutdown and performed an independent walk through of procedure steps to ensure the implementation and human factors adequacy of the procedures. The team also verified that the operators could be reasonably expected to perform specific actions within the time required to maintain plant parameters within specified limits. Time critical actions, which were verified included restoration of alternating current electrical power, establishing the remote shutdown panel, establishing reactor coolant makeup, and establishing decay heat removal.

Specific procedures reviewed for alternative shutdown, including shutdown from outside the control room included the following:

- 2-AOP-SSD-1, Control Room Inaccessibility Safe Shutdown Control, Rev. 15;
- 2-SOP-ESP-001, Local Equipment Operation and Contingency Actions, Rev. 4; and,
- 2-SOP-27.6, Unit 2 Appendix R Diesel Generator Operation, Rev. 6.

The team reviewed manual actions to ensure that they had been properly reviewed and approved and that the actions could be implemented in accordance with plant procedures in the time necessary to support the safe shutdown method for each fire area. The team also reviewed the periodic testing of the alternative shutdown transfer capability and instrumentation and control functions to ensure the tests are adequate to ensure the functionality of the alternative shutdown capability.

b. Findings

.1 Spurious Closure of Volume Control Tank Outlet Valve Results in Loss of Credited Charging Pump

Introduction: The team identified a Green, Non-Cited Violation (NCV) of 10 CFR 50, Appendix R, III.G.3, in that Entergy failed to provide one train of reactor coolant system makeup free of fire damage for the control room, cable spread room, and cable tunnel fire zones, which require use of the alternate shutdown path. Specifically, Entergy failed to assure that one charging pump would remain free of fire damage for alternate shutdown fire scenarios that could produce a spurious closure of the volume control tank (VCT) motor-operated outlet valve (112C), which would isolate the normal suction flow path to the operating charging pump.

Description: While evaluating the alternative shutdown capability for Indian Point Unit 2, the team questioned Entergy's evaluation and associated operator actions to cope with a fire in the control room or cable tunnel that could spuriously close 112C. Closure of 112C would isolate the normal suction path to an operating charging pump and likely cause damage in a short time period. The 23 charging pump is the only charging pump credited in the alternate shutdown path for high-head makeup to the reactor coolant system (RCS) (i.e., the only charging pump powered from the alternate shutdown power supply). The team noted that an alternate suction source to the charging pumps is the refueling water storage tank (RWST) via normally closed valve 112B. Valve 112B automatically opens if 112C is not full open. However, the team noted that IP-RPT-05-0071, "Indian Point Unit 2 Safe Shutdown Analysis Report (SSAR)," Rev. 1, Section 3.2.1, states that credit is not taken in the systems and circuit analyses for the actuation of any automatic safety features to assist in the operation of components to achieve safe shutdown.

Entergy reviewed the circuit for 112C and concluded that a spurious closure of 112C could occur due to fire damage in several Indian Point Unit 2 alternative shutdown fire areas: control room, cable spread room, cable tunnel, and several fire zones in the primary auxiliary building. Spurious closure of 112C, coincident with the assumptions of the SSAR, would cause the 23 charging pump to operate without a suction source. Entergy contacted the charging pump vendor to evaluate the impact of pump operation without a water suction source. The vendor indicated that damage to the internal valves, seats, springs, and packing assembly of the positive displacement pump may occur. The team considered that the 23 charging pump under such conditions may not be able to perform its intended safety function (provide makeup to the RCS in hot shutdown conditions following a fire requiring use of alternate shutdown equipment).

Appendix R to 10 CFR 50, Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979, Section III.G.3 requires in part that alternative shutdown capability and its associated circuits, independent of cables, systems or components in the area, room, zone under consideration should be provided where the protection of systems whose function is required for hot shutdown does not satisfy the requirement of paragraph III.G.2. Entergy did not meet this requirement and failed to protect the 23 charging pump, required for hot shutdown, from a circuit failure causing a

spurious closure of 112C. Entergy initiated condition report CR-IP2-2010-00720 for long term resolution and promptly initiated hourly fire watches in all affected fire areas except for the cable tunnel as an interim compensatory measure. The cable tunnel was evaluated as not requiring an hourly fire watch and being sufficiently protected with installed fire detection and automatic fire suppression in addition to administrative controls that limit personnel access.

Finally, the inspectors noted that Entergy had previously evaluated this issue in 2001 and documented the issue in CR-IP2-2001-02366. As a corrective action, Entergy revised its alternate shutdown procedure regarding alignment of the RWST suction in a more timely manner. However, Entergy did not appropriately correct the issue such that damage to the 23 charging pump would not occur for all postulated fire scenarios.

Analysis: Entergy's failure to ensure the 23 charging pump was not made unavailable due to a spurious closure of the VCT outlet valve is a performance deficiency. This finding is more than minor because it is associated with the External Factors attribute (fire) of the Mitigating Systems Cornerstone and adversely affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the availability of the charging system was not ensured for alternative shutdown fire areas.

The team used Phase 1, 2 and 3 risk assessment tools of IMC 0609, Appendix F, Fire Protection SDP, to determine that this finding was of very low safety significance (Green), with an estimated total Core Damage Frequency (CDF) in the low to mid E-7/year range. Following the Phase 1 screening criteria, a Phase 2 review was necessary because the issue involved post-fire shutdown and was assigned a high degradation rating. The high degradation rating was assigned because Entergy did not ensure that a charging pump would be available to makeup to the RCS given a potential fire scenario in alternative shutdown fire areas. Specifically, the scenarios of concern involve fires in areas that necessitate control room evacuation and the use of alternate safe shutdown paths, with the following assumptions:

- The circuits of concern include the power and control cables for valves 112C and 112B.
- The fire areas of concern (based upon team walkdowns) are the control room, cable spreading room, and cable tunnel because power and control cabling for the 112C and 112B motor-operated valves are routed through these areas.
- All circuits of concern are treated as thermoplastic cables. This is a conservative assumption because a large percentage of Unit 2 thermoplastic cables are covered with a glass asbestos braid that affords some additional protection from fire and related heat damage.
- The worst case scenario is having the 23 charging pump in service at the time of the fire. However, the team identified that the operations staff balances the charging pump run times. Accordingly, there is a 1-in-3 probability that the 23 charging pump is operating at the time of the postulated fire event.
- Due to fire induced cable damage, valve 112C spuriously closes.

- The RWST outlet valve (112B) fails to open, although interlocked to open with the closing of 112C.
- The fire induced isolation of the suction source to the running 23 charging pump causes pump damage, and makes the 23 pump unable to perform its safety function from the alternate shutdown panel.

To gather the information necessary to complete the Phase 2 and 3 evaluations, the team walked down the affected areas with the assistance of the licensee's fire protection engineering staff. The team noted the placement of fire detection and suppression system equipment. The team also recorded distances from ignition sources to target combustibles and actual cable routing for circuits of concern.

Using the data gathered from the walkdowns of the affected areas and based upon the postulated fires outside of the control room, the team only considered fire damage state 1 (FDS1) scenarios. FDS1 scenarios involve fire damage that occurs to unprotected components or cables located in close proximity of the fire ignition source. The fire damage is caused by the fire plume and direct radiant heating. The team concluded that fire damage state 2 (FDS2) scenarios (involving widespread fire damage) were too slow moving for the fire areas of concern and not applicable to the postulated alternate safe shutdown protected charging pump train fire damage assumption (i.e., loss of a suction path at the onset of the fire due to immediate cable damage to the 112C and 112B control and power circuits). Procedure 2-AOP-SSD-1, "Control Room Inaccessibility Safe Shutdown Control," Rev. 15, includes an operator action at Step 4.38 to open a manual bypass valve, No. 288, and provide an alternate suction path to the charging pumps from the RWST. The team judged that opening bypass valve No. 288 during a FDS2 scenario would likely be successful and occur prior to widespread fire damage that would affect both the 112C and 112B cables.

The team concluded that a Phase 2 analysis was sufficient for all affected fire areas except for the cable tunnel and control room. A Phase 3 analysis was needed for the cable tunnel to address unique aspects of the Indian Point Unit 2 cable tunnel and the only ignition source being self-ignited cables (transient combustible fires were screened out because of stringent administrative controls and the height of the cable trays from the cable tunnel floor). A Phase 3 analysis was needed for control room fires to address the potential for control cabinet fires and spurious valve operations as the operators transfer control to alternate safe shutdown systems prior to control room evacuation. Control room evacuation conditions include habitability concerns due to smoke or heat, and postulated equipment loss-of-control scenarios due to fire damage.

Cable Spread Room – Phase 2

The team noted that all ignition sources of concern would produce no more than a 200kW heat release rate in accordance with the Phase 2 fire modeling tools. Using Table 2.3.2 of IMC 0609, Appendix F, Fire Protection Significance Determination Process (SDP), thermoplastic cables within a 7.3 foot vertical height above and 3.0 foot radial distance to an ignition source are assumed damaged from plume or radiant heating respectively. Based upon the walkdowns, the ignition sources of concern within the cable spread room only included electrical switchgear cabinets. Consistent with the

SDP guidelines, an electrical cabinet's fire origin is assumed 1 foot below the top of electrical cabinets. The team noted that one cable (CK1-JB5/1), which included conductors for both circuits of concern (112C and 112B), was in a horizontal cable tray within the ignition sources zone of influence for plume heating. The target cable tray is approximately 5 feet above the top of several rod drive power supply vertical cabinet sections. Additionally, another horizontal cable tray exists 1 foot below the target cable tray. As inputs to the IMC 0609, Appendix F, Attachment 7, SDP fire modeling tool, the team used a 12 square foot area for the top of an electrical cabinet section and assumed the fire was 1 foot below the top of an electrical cabinet. At the lower horizontal cable tray, a 200kW ignition source would result in 450°F. Based upon IMC 0609, Appendix F, Table A7.2, the team determined that the lower cable tray would ignite at about 20 minutes. IMC 0609, Appendix F, Attachment 3, "Guidance for Identifying Fire Growth and Damage Scenarios," provides rules for development of cable tray fire scenarios and states that the target tray above will ignite 4 minutes after the first tray or 24 minutes into the fire scenario.

The team concluded that 24 minutes was sufficient time for operators to establish an alternate suction path to the 23 charging pump. Specifically, 2-AOP-SSD-1, "Control Room Inaccessibility Safe Shutdown Control," Rev. 15, includes an operator action at step 4.38 to open a manual bypass valve, No. 288, and provide an alternate suction path to the charging pumps from the RWST. The team concluded that a FDS1 scenario within the cable spread room would screen as very low safety significance, in the low E-7 range.

Cable Tunnel – Phase 3

Because the cable tunnel's only ignition source is self-ignited cables, the cable tunnel contribution to risk was developed using a Phase 3 approach with risk insights outlined in IMC 0609, Appendix F, Attachment 5, "Characterizing Non-Simple Fire Ignition Sources," and NUREG 6850, "Fire Probabilistic Risk Assessment (PRA) Methodology for Nuclear Power Facilities." Based upon the inspection team's plant walkdowns and examination of the affected fire area, the team identified there are relatively few cable trays (16) running through the cable tunnel and these trays have relatively low loading (average 35 percent cross-sectional area fill).

The SRA used the following assumptions and associated values in analyzing the cable tunnel fire risk contribution:

- A cable tunnel fire frequency value of 1.77E-4 was used. This value includes a cable weighting factor of 0.135, and is a licensee derived value used in the support of the licensee's ongoing development of an External Fire PRA. This value accounts for the cumulative fire frequency of all sixteen cable trays routed through the cable tunnel.
- From Table P-3 of NUREG 6850, a non-suppression probability of 0.03 was selected because this value conservatively bounds the automatic detection and pre-action fire suppression systems in the cable tunnel.
- The worst case fire scenario assumes the 23 charging pump is in service. The team identified that the operations staff balances charging pump run times.

Accordingly, there is a 1-in-3 probability that the 23 charging pump is operating at the time of the postulated fire event.

The Phase 3 analysis yielded a conservative delta CDF value in the low E-7 range. Accordingly, a self-igniting cable fire in the cable tunnel has a very low chance of compromising the alternate safe shutdown charging train by adversely impacting the 112C and 112D control circuits.

Control Room – Phase 3

Two control room fire scenarios were evaluated: a small fire limited to the control cabinets where both the switched for the 112C and 112B valves are installed; and a large fire that engulfs the adjacent control room cabinets and results in a control room evacuation. The SRA used generic control room fire frequency and non-suppression probability values from NUREG 6850 and IMC 0609, Appendix F.

Small Fire

The SRA identified that generic control room evacuation frequencies for a small fire (impacting only a single control room cabinet housing the affected circuits) are in the low E-7/year range. However, it is reasonable to conclude that a small control room fire would be manually suppressed prior to propagation to adjacent cabinets and subsequent need for evacuation. The control room is continuously manned and protected by an automatic detection system. Based upon the team's control room walkdown, a smoke detector was noted in the affected main control board cabinet and in close proximity to the affected valve 112C and 112B control circuits. Accordingly, a small control room fire leading to a control room evacuation was not considered plausible.

Large Fire

For a large control room fire (postulated to impact the affected control circuits and with an ignition source sufficient to involve multiple adjacent cabinets and associated circuits) leading to a control room evacuation, the SRA estimated (using generic fire frequency and non-suppression probabilities) the evacuation frequency to be conservatively an order of magnitude greater than a postulated small control room fire (low E-6/year range, involving 4-5 control room cabinets). Assuming charging pump run times are equalized, the probability of the 23 charging pump being in-service is 1-in-3. Based upon these conservative assumptions, the SRA evaluated the increase in core damage frequency associated with a postulated control room evacuation event, to be in the low E-7/year range. The SRA concluded that although the postulated scenario is plausible, the likelihood of a fire-induced control room evacuation that impacts the identified circuits and results in a loss of reactor coolant pump seal cooling and subsequent seal loss of coolant accident (LOCA) is sufficiently small to not pose a significant challenge to reactor safety.

The finding was also evaluated for large early release frequency in accordance with IMC 0609 Appendix H. Since Indian Point Unit 2 has a large dry containment and the event

did issue did not include a steam generator tube rupture, large early release frequency was not a significant contributor.

Cross-Cutting Aspects

The team determined that no cross-cutting aspects were associated with this finding. Entergy evaluated this issue in 2001 (CR-IP2-2001-02366) and did not adequately resolve the issue of protecting the 23 charging pump for all postulated fire scenarios. Because the error occurred more than three years ago, the cross-cutting aspect is not indicative of current licensee performance.

Enforcement. Appendix R to 10 CFR 50, Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979, Section III.G.3 requires in part that alternative shutdown capability and its associated circuits, independent of cables, systems or components in the area, room, (or) zone under consideration should be provided where the protection of systems whose function is required for hot shutdown does not satisfy the requirement of paragraph III.G.2. Contrary to the above, on February 9, 2010, the NRC identified that Entergy did not meet this requirement for several alternative shutdown fire zones and failed to protect the 23 charging pump from a postulated fire-induced circuit failure resulting in the spurious closure of the VCT outlet valve, 112C. Because this finding was of very low safety significance (Green) and has been entered into Entergy's corrective action program (CR-IP2-2010-00720), this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy). **(NCV 05000247/2010006-001, Fire Scenario Resulting in Loss of Charging Pump Suction)**

.2 Spurious Trip of Component Cooling Water Pump Results in Loss of Credited Charging Pump

Introduction. The team identified a Green, Non-Cited Violation (NCV) of 10 CFR 50, Appendix R, III.G.3, in that Entergy failed to provide one train of reactor coolant system makeup free of fire damage for the control room, cable spread room, electrical switchgear room, and cable tunnel fire zones for postulated fire scenarios. Specifically, Entergy failed to assure that one charging pump would remain free of fire damage for alternate shutdown fire scenarios that could produce a spurious trip of a component cooling water (CCW) pump.

Description: While evaluating the alternative shutdown capability for Indian Point Unit 2, the team questioned Entergy's evaluation of a fire in the control room, electrical switchgear room, or cable tunnel that could spuriously trip the running component cooling water pump. The CCW pumps provide cooling water to all of the charging pump motors and reactor coolant pump (RCP) seal thermal barriers. If CCW is lost during a postulated control room evacuation fire scenario, the consequential failure of the operating charging pump, in conjunction with the loss of CCW for RCP seal cooling, will result in a RCP seal LOCA event. The team noted that IP3-CALC-CVCS-393, "Calculation of Allowable Time for Operating Charging Pumps without Cooling Water," Rev. 0, (a Unit 3 calculation also applicable to Unit 2 charging pumps) states that a

charging pump operating at minimum speed would reach its maximum recommended operating temperature of 180° F within 4 minutes. Entergy did not evaluate the continued heatup of the charging pump or determine the time to failure above 180°F, so it is conservatively assumed that the pump fails at 180°F.

The team noted that under typical conditions, redundant CCW pumps automatically start on a low CCW flow signal. However, per IP-RPT-05-0071, "Indian Point Unit 2 Safe Shutdown Analysis Report (SSAR)," Rev. 1, Section 3.2.1, credit is not taken in the systems circuit analyses for the actuation of any automatic safety features to assist in the operation of components to achieve safe shutdown. Accordingly, it would take operator action to restore CCW flow and prevent damage to an operating charging pump.

Entergy conducted a detailed review of the circuits for the CCW pumps and concluded that a spurious trip of an operating pump could occur due to fire damage in any of the following Unit 2 alternate shutdown fire areas: control room, cable spread room, electrical switchgear room, cable tunnel, and a few fire zones in the primary auxiliary building. Appendix R to 10 CFR 50, Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979, Section III.G.3, requires that alternate shutdown capability, and its associated circuits, independent of cables, systems or components in the area, room, or zone under consideration, should be provided where the protection of systems whose function is required for hot shutdown does not satisfy the requirement of Section III.G.2. The inspection team identified that Entergy did not meet this requirement and failed to ensure the Appendix R protected 23 charging pump train remains free of fire damage. Entergy initiated condition report CR-IP2-2010-00751 for long term resolution and promptly initiated hourly fire watches in all affected fire areas as an interim compensatory measure. The cable tunnel was evaluated as not requiring an hourly fire watch and being sufficiently protected with installed fire detection and automatic fire suppression in addition to administrative controls that limit personnel access.

Finally, the inspectors determined that operators and engineers had a legacy interpretation that nominally one hour existed to restore cooling water to a charging pump. As such, the manual action to restore cooling water within the alternative shutdown procedure was not appropriately prioritized. Entergy considered one hour to restore cooling water as adequate, which was incorrect. Only 4 minutes are actually available if the charging pump is operating at minimum speed.

Analysis. Entergy's failure to ensure the 23 charging pump was not made unavailable due to a spurious trip of a CCW pump is a performance deficiency. This finding is more than minor because it is associated with the External Factors attribute (fire) of the Mitigating Systems Cornerstone and adversely affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the availability of the Appendix R protected charging system train was not ensured for all postulated alternative shutdown area fires.

The team used IMC 0609, Appendix F, "Fire Protection Significance Determination Process (SDP)," Phase 1, 2, and 3 risk assessment tools to determine that this finding was of very low safety significance (Green), with a cumulative estimated CDF in the low to mid E-7/year range. Following the Phase 1 screening criteria, a Phase 2 review was necessary because the issue involved post-fire shutdown and was assigned a high degradation rating. The high degradation rating was assigned because Entergy did not ensure that the Appendix R protected train of high pressure injection (23 charging pump) would remain available to makeup to the RCS given a potential fire in an alternate shutdown fire area.

The Phase 2 analysis was sufficient for all affected areas except for the control room. A Phase 3 analysis was needed for postulated control room fires to address the potential for control board fires and spurious valve operations as the operators transfer control to alternate safe shutdown systems. Control room evacuation conditions include habitability concerns due to smoke, heat, or a loss-of-control scenarios due to fire damage.

The team made the following assumptions to support the Phase 2 and 3 risk evaluations:

- The operating CCW pump spuriously trips due to the fire following control room evacuation and prior to operators manning the alternate shutdown stations. This timing maximizes the vulnerability of the operating charging pump to loss of CCW cooling.
- Redundant CCW pumps fail to start on a low CCW flow signal, consistent with the SSAR assumption that automatic actuation logic is not credited for alternate shutdown actions.
- The worst case control room evacuation scenario is for the 23 charging pump to be in operation as the control room operators transition to alternate shutdown control stations. Based upon charging pump run time equalization, the probability of the 23 charging pump being in-service is 1-in-3.
- By procedure, operators secure RCS letdown prior to the control room evacuation. This action results in the operating charging pump automatically running back to minimum speed in response to rising pressurizer level. Charging pumps running on minimum speed are more susceptible to pump damage upon loss of cooling flow (~4 minutes). For the postulated worst case scenario, the operating charging pump is assumed to be at minimum speed.
- All control circuits and power cables of concern are treated as thermoplastic cables. This is a conservative assumption because a large percentage of Unit 2 thermoplastic cables are covered with a glass asbestos braid that affords some additional protection from fire and related heat damage.

To gather the information necessary to complete the Phase 2 analysis, the team walked down the affected areas with the assistance of the licensee's fire protection engineering staff. The team noted the placement of fire detection and suppression system equipment. The team also recorded distances from ignition sources to target combustibles, cable routes for circuits of concern, and smoke detectors. The circuits of

concern included the power and control cables for all trains of CCW pumps and the CCW low flow automatic start signal. Based on the walkdowns, the team determined that for areas outside the control room, only the cable spread room, cable tunnel, and switchgear room were fire areas of concern.

After collecting field data, the team considered only fire damage state 1 (FDS1) scenarios (i.e., fire damage occurs to unprotected components or cables located near the fire ignition source). FDS1 damage occurs from the fire plume and direct radiant heating. FDS1 scenarios were evaluated in accordance with the Phase 2 SDP fire modeling tools. FDS2 scenarios (i.e., widespread fire damage) were judged not applicable to the scenario of concern (loss of component cooling water at the onset of the fire due to immediate cable damage to the operating CCW pump control or power circuits and the auto start circuit on low CCW flow) because combustible loading in the affected fire areas is low, minimizing the probability of any rapidly spreading fires. 2-AOP-SSD-1, Rev. 15, includes an operator action at step 4.34 to restore cooling water to any operating charging pump from the city water supply or to start the 23 CCW pump powered by the alternate safe shutdown substation 12FD3. Accordingly, the team judged that restoring CCW during a FDS2 scenario would likely be successful and occur prior to widespread fire damage that would affect all CCW cables.

Cable Spread and Electrical Switchgear Rooms – Phase 2

The team noted that all ignition sources of concern would, at most, produce a 200kW heat release rate (HRR) in accordance with the Phase 2 fire modeling tools. Using Table 2.3.2 of IMC 0609, Appendix F, "Fire Protection Significance Determination Process (SDP)," thermoplastic cables within a 7.3 foot vertical height above and 3.0 foot radial distance to an ignition source are assumed damaged from plume or radiant heating respectively. The ignition sources of concern only included electrical switchgear cabinets. Consistent with the SDP guidelines, the fire origin is assumed 1 foot below the top of electrical cabinets. The team noted that at each ignition source, at least one train of CCW circuits and the CCW low flow automatic start signal cable was outside the zone of influence for plume heating. Accordingly, the team concluded that there were no credible FDS1 scenarios within the cable spread and electrical switchgear rooms that would result in a loss of all CCW cooling.

Cable Tunnel – Phase 2

Because the cable tunnel included self-ignited cables as the only ignition source, the cable tunnel was analyzed with different assumptions, consistent with IMC 0609, Appendix F, Fire Protection SDP. The team referenced Attachments 3 and 5 to IMC 0609, Appendix F and determined that the only credible FDS1 scenario would require at least one train of CCW power cables to be in a common cable tray with the CCW low flow signal circuit. Otherwise only a FDS2 scenario would result in losing all trains of CCW cooling. The 21 CCW, 22 CCW, 23 CCW and the CCW low flow automatic start signal cables were determined to be routed in separate cable trays within the cable tunnel. Accordingly, the team concluded that there were no credible FDS1 scenarios that would result in a loss of all CCW cooling.

Control Room – Phase 3

Using generic control room fire frequency and non-suppression probability values from NUREG 6850, "Fire Probabilistic Risk Assessment (PRA) Methodology for Nuclear Power Facilities," and IMC 0609, Appendix F, the SRA estimated the control room evacuation frequency for a small fire (compromising only the affected CCW pump control circuits that are all within 6 inches of each other on a single main control cabinet) to be in the low E-7/year range. However, a small control room fire would likely be promptly detected. The control room is continuously manned and protected by an automatic detection system (based upon the team's control room walkdown, a smoke detector was noted in the affected main control cabinet and in close proximity to the CCW pump control circuits of concern). Based upon continuous manning and early detection of a fire, it is reasonable to conclude that a small fire would be manually suppressed prior to fire propagation to adjacent control cabinets and the need for a control room evacuation. Accordingly, a small control room fire leading to an evacuation was not considered plausible.

For a large control room fire (impacted the affected control circuits and with an ignition source sufficient to involve multiple adjacent control room cabinets and associated circuits) leading to a control room evacuation, the SRA estimated the evacuation frequency to be conservatively an order of magnitude greater than a small fire (low E-6/year range, and involving an equivalent of 4-5 adjacent control cabinets). For the worst case fire scenario, the 23 charging pump is assumed to be in service and the running component cooling pump trips or becomes disabled by fire before the operators can reasonably take action to restore cooling to the 23 charging pump. The loss of cooling to the 23 charging pump is assumed to disable the pump, with no chance for recovery. This worst case fire scenario compromises the only protected alternate safe shutdown high head injection source. The team identified that the operations staff balances charging pump run times, accordingly, there is a 1-in-3 probability that the 23 charging pump is operating at the time of the postulated fire event. In addition, a control room fire may or may not result in the loss of the operating CCW pump following control room evacuation. Therefore, the SRA assumed a conservative 0.50 failure probability for loss of the operating CCW pump. Based upon these assumptions, the SRA estimated the likelihood of a large control room fire necessitating evacuation and contributing to the loss of the alternate safe shutdown charging system (with resultant reactor coolant pump seal LOCA) to be in the low E-7/year range. The SRA concluded that although the postulated worst case fire scenario is plausible, the likelihood of this postulated event is sufficiently small to not pose a significant challenge to reactor safety.

The finding was also evaluated for large early release frequency in accordance with IMC 0609 Appendix H. Since Indian Point Unit 2 has a large dry containment and the event did issue did not include a steam generator tube rupture, large early release frequency was not a significant contributor.

Cross-Cutting Aspects

The team determined that no cross-cutting aspects were associated with this finding. Entergy had a legacy interpretation that nominally one hour existed to restore cooling

water to a charging pump. The manual action to restore cooling water within the alternative shutdown procedure was inappropriately prioritized. Entergy considered one hour to restore cooling water as adequate compared to 4 minutes if the charging pump were at minimum speed. Because the error occurred more than three years ago, the cross-cutting aspect is not indicative of current licensee performance.

Enforcement. Appendix R to 10 CFR 50, Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979, Section III.G.3 requires in part that alternative shutdown capability and its associated circuits, independent of cables, systems or components in the area, room, (or) zone under consideration should be provided where the protection of systems whose function is required for hot shutdown does not satisfy the requirement of paragraph III.G.2. Contrary to the above, on January 29, 2010, the NRC identified that Entergy did not meet this requirement for several alternative shutdown fire zones and failed to protect the 23 charging pump from a postulated fire-induced circuit failure resulting in the spurious trip of a component cooling water pump. Because this finding was of very low safety significance (Green) and has been entered into Entergy's corrective action program (CR-IP2-2010-00751), this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy). **(NCV 05000247/2010006-002, Fire Scenario Resulting in Loss of Cooling Water to Charging Pumps)**

.02 Protection of Safe Shutdown Capabilities

a. Inspection Scope

The team reviewed the FHA, safe shutdown analyses, and supporting drawings and documentation to verify that safe shutdown capabilities were properly protected. The team ensured that separation requirements of Section III.G of 10 CFR 50, Appendix R, were maintained for the credited safe shutdown equipment and their supporting power, control, and instrumentation cables. This review included an assessment of the adequacy of the selected systems for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring, and associated support system functions.

The inspectors reviewed Entergy's procedures and programs for the control of ignition sources and transient combustibles to assess their effectiveness in preventing fires and in controlling combustible loading less than the analyzed limits established in the FHA. The inspectors reviewed selected hot work permits, transient combustible control, and fire protection program evaluations to assess the adequacy of Entergy's fire protection program administrative controls. During plant walkdowns, the inspectors observed permanent and transient combustible loading and potential ignition sources to independently verify whether the installed protective features were being properly maintained and administrative controls were being adequately implemented.

b. Findings

No findings of significance were identified.

.03 Passive Fire Protection

a. Inspection Scope

The inspectors walked down accessible portions of the selected fire areas to evaluate whether the observed material conditions of the fire area boundaries were adequate for the fire hazards in the area. The inspectors compared the fire area boundaries, including walls, fire doors, fire dampers, penetration seals, electrical raceway fire barriers, and redundant equipment fire barriers to design basis requirements, industry standards, and Entergy's fire protection program, as approved by the NRC, to identify any potential degradation or non-conformances.

The inspectors reviewed selected engineering evaluations, installation work orders, and qualification records for a sample of penetration seals to determine whether the fill material was properly installed and whether the as-left configuration satisfied design requirements for the intended fire rating. The inspectors also reviewed similar records for selected fire protection wraps to verify whether the material and configuration was appropriate for the required fire rating and conformed to the engineering design.

In addition, the inspectors reviewed the most recent test results for the switchgear room fire damper functionality test, and inspection records of penetration fire barrier seals and fire separation barriers for the selected fire areas, to verify whether the inspection and testing was adequately conducted, the acceptance criteria were met, and any potential performance degradation was identified.

b. Findings

No findings of significance were identified.

.04 Active Fire Protection

a. Inspection Scope

The inspectors evaluated the fire detection and suppression systems in the selected fire areas to determine whether they were installed, tested, maintained, and operated in accordance with NRC requirements and approved exemptions, National Fire Protection Association (NFPA) codes of record, and Entergy's fire protection program, as approved by the NRC. The inspectors also assessed whether the suppression systems capabilities were adequate to control and/or extinguish fires associated with the hazards in the selected areas.

The inspectors reviewed the design capability of the fire water supply system to verify whether the design basis and NFPA code requirements for the hazards involved were adequately satisfied. The inspectors reviewed the fire water system hydraulic analyses to assess the adequacy of either the motor-driven pumps or the diesel-driven pump to supply the largest single hydraulic load on the fire water system plus concurrent fire hose usage. The inspectors evaluated the motor-driven and diesel-driven fire pump capacity tests to assess the adequacy of the test acceptance criteria, for pump minimum

discharge pressure at the required flow rate, to satisfy design basis and hydraulic analysis requirements. The inspectors also evaluated the underground fire loop and turbine building fire loop flow tests to verify whether the tests adequately demonstrated that the flow distribution circuits were able to meet design basis requirements. In addition, the inspectors reviewed the most recent pump and loop flow test results to verify whether the testing was adequately conducted, the acceptance criteria were met, and any potential performance degradation was identified.

The inspectors walked down accessible portions of the detection and suppression systems in the selected areas and major portions of the fire water supply system, including motor and diesel driven fire pumps, fire water storage tank, city water supply in the utility tunnel, interviewed system and design engineers, and reviewed selected open condition reports to assess the material condition of the systems and components. In addition, the inspectors reviewed the most recent test results for the electrical cable tunnel deluge system and for the smoke and heat detectors for the selected fire areas to verify whether the testing was adequately conducted, the acceptance criteria were met, and any potential performance degradation was identified.

The inspectors assessed the fire brigade capabilities by reviewing training, qualification, and drill critique records. The inspectors also reviewed pre-fire plans and smoke removal plans for the selected fire areas to determine if appropriate information was provided to fire brigade members and plant operators to identify safe shutdown equipment and instrumentation, and to facilitate suppression of a fire that could impact post-fire safe shutdown capability. The inspectors independently inspected the fire brigade equipment, including personnel protective gear (e.g., turnout or bunker gear) and smoke removal equipment, to determine operational readiness for fire fighting. In addition, the inspectors reviewed Entergy's fire brigade equipment inventory and inspection procedure and the most recent inspection and inventory results to verify whether adequate equipment was available, and whether any potential material deficiencies were identified.

b. Findings

No findings of significance were identified.

.05 Protection from Damage from Fire Suppression Activities

a. Inspection Scope

The inspectors walked down the selected fire areas and adjacent areas, and reviewed selected documents to determine whether redundant safe shutdown trains could be potentially damaged from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems. Specifically, to determine whether a potential existed to damage redundant safe shutdown trains, the inspectors evaluated whether:

- A fire in one of the selected fire areas would not release smoke, heat, or hot gases that could cause unintended activation of suppression systems in adjacent fire areas which could potentially damage all redundant safe shutdown trains;

- A fire suppression system rupture, inadvertent actuation, or actuation due to a fire, in one of the selected fire areas, could not directly damage all redundant trains (e.g. sprinkler caused flooding of other than the locally affected train); and
- Adequate drainage was provided in areas protected by water suppression systems.

b. Findings

No findings of significance were identified.

.06 Alternative Shutdown Capability

a. Inspection Scope

Alternative shutdown capability is discussed in section 1R05.01 of this report.

.07 Circuit Analysis

a. Inspection Scope

The team verified that Entergy performed a post-fire safe shutdown analysis for the selected fire areas and the analysis appropriately identified the structures, systems, and components important to achieving and maintaining safe shutdown. Additionally, the team verified that Entergy's analysis ensured that necessary electrical circuits were properly protected and that circuits that could adversely impact safe shutdown due to hot shorts, shorts to ground, or other failures were identified, evaluated, and dispositioned to ensure spurious actuations would not prevent safe shutdown.

The review considered fire and cable attributes, potential undesirable consequences and common power supply/bus concerns. Specific items included the credibility of the fire threat, cable insulation attributes, cable failure modes, and actuations resulting in flow diversion or loss of coolant events.

The team also reviewed cable raceway drawings for a sample of components required for post-fire safe shutdown to verify that cables were routed as described in the cable routing matrices.

Cable failure modes were reviewed for the following components:

- Unit 2 Station Blackout and Appendix R Diesel Generator and Auxiliaries;
- 23 Service Water Pump;
- 21 Steam Generator Level Instrument LI-5001-1;
- Pressurizer Level Instrument LI-3101-1; and
- Alternate Safe Shutdown System Unit Substation 12FD3.

The team reviewed circuit breaker coordination studies to ensure equipment needed to conduct post-fire safe shutdown activities would not be impacted due to a lack of

coordination. The team confirmed that coordination studies had addressed multiple faults due to fire. Additionally, the team reviewed a sample of circuit breaker maintenance records to verify that circuit breakers for components required for post-fire safe shutdown were properly maintained in accordance with procedural requirements.

b. Findings

No findings of significance were identified.

.08 Communications

a. Inspection Scope

The team reviewed safe shutdown procedures, the safe shutdown analysis, and associated documents to verify an adequate method of communications would be available to plant operators following a fire. During this review the team considered the effects of ambient noise levels, clarity of reception, reliability, and coverage patterns. The team also inspected the designated emergency storage lockers to verify the availability of portable radios for the fire brigade and for plant operators. The team also verified that communications equipment such as repeaters and transmitters would not be affected by a fire.

b. Findings

No findings of significance were identified.

.09 Emergency Lighting

a. Inspection Scope

The inspectors walked down the emergency lights in the selected fire areas to independently evaluate the placement and coverage areas of the lights. The inspectors assessed whether the lights provided adequate illumination on local equipment and instrumentation, required for post-fire safe shutdown, to ensure local operations could be reliably performed under expected post-fire conditions. Emergency light placement was also evaluated to determine adequate illumination of local area access and egress pathways.

The inspectors verified whether the emergency light batteries were rated for at least an eight-hour capacity. Preventive maintenance procedures, the vendor manual, completed surveillance tests, and battery replacement practices were also reviewed to evaluate whether the emergency lighting was being maintained in a manner that would ensure reliable operation.

b. Findings

No findings of significance were identified.

.10 Cold Shutdown Repairs

a. Inspection Scope

The team verified that Entergy had dedicated repair procedures, equipment, and materials to accomplish repairs of components required for cold shutdown which might be damaged by the fire to ensure cold shutdown could be achieved within the time frames specified in their design and licensing bases. The team verified that the repair equipment, components, tools, and materials (e.g. pre-cut cables with prepared attachment lugs) were available and accessible on site.

b. Findings

No findings of significance were identified.

.11 Compensatory Measures

a. Inspection Scope

The team verified that compensatory measures were in place for out-of-service, degraded or inoperable fire protection and post-fire safe shutdown equipment, systems, or features (e.g. detection and suppression systems and equipment, passive fire barriers, or pumps, valves or electrical devices providing safe shutdown functions or capabilities). The team also verified that the short term compensatory measures compensated for the degraded function or feature until appropriate corrective action could be taken and that Entergy was effective in returning the equipment to service in a reasonable period of time.

b. Findings

No findings of significance were identified.

.12 Large Fires and Explosions Mitigation Strategies

a. Inspection Scope

The team conducted a review of selected mitigation strategies intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with loss of large areas of the plant due to explosions or fire. The team verified that Entergy continued to meet the requirements of the Unit 2 and 3 license conditions, 2.N. and 2.AC respectively. The team reviewed several mitigation strategies at both units and completed one inspection sample for Unit 2 and Unit 3.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES [OA]

4OA2 Identification and Resolution of Problems

.01 Corrective Actions for Fire Protection Deficiencies

a. Inspection Scope

The inspectors reviewed a sample of condition reports associated with the fire protection program and post-fire safe shutdown issues to verify Entergy was appropriately identifying, characterizing, and correcting problems in these areas, and to assess whether the planned or completed corrective actions were appropriate. The condition reports reviewed are listed in the attachment.

b. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

The team presented the inspection results to Mr. Joseph Pollock, Site Vice President, and other members of the site staff at an exit meeting on February 23, 2010. On April 7, 2010, the team leader updated the inspection results to Mr. T. Orlando and other members of the site staff. No proprietary information was included in this inspection report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

ATTACHMENT

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

J. Balletta	Senior Reactor Operator
S. Bianco	Fire Brigade Training
T. Chan	Design Engineer
J. Cottam	Fire Protection Engineer
G. Dahl	Licensing Engineer
K. Elliot	Appendix R Engineer
T. Gander	Program Manager
D. Halama	System Engineer
J. Hill	Design Engineer
T. Orlando	Director of Engineering
J. Pollock	Site Vice President
C. Smyers	Assistant Operations Manager

NRC

A. Ayegbusi	Resident Inspector, Indian Point Unit 2
C. Cahill	Senior Reactor Analyst
R. Fuhrmeister	Senior Reactor Inspector
B. Haagensen	Acting Senior Resident Inspector, Indian Point Unit 2
J. Rogge	Chief, Engineering Branch 3, Division of Reactor Safety

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000247/2009-006-01	NCV	Fire Scenario Resulting in Loss of Charging Pump Suction
05000247/2009-006-02	NCV	Fire Scenario Resulting in Loss of Cooling Water to Charging Pumps

LIST OF DOCUMENTS REVIEWED

Fire Protection Licensing Documents

EN-DC-330, Fire Protection Program, Rev. 0
IP2-DBD-221, Fire Protection System Design Basis Document, Rev. 1
IP2-RPT-03-00015, Fire Hazards Analysis, Rev. 3
IP-RPT-04-00224, NFPA Code of Record Determination, Rev. 0
IP-RPT-05-00071, Appendix-R Safe Shutdown Separation Analysis, Rev. 1
SAO-703, Fire Protection Impairment Criteria and Surveillance, Rev. 26
SMM-DC-901, Fire Protection Program Plan, Rev. 6

Calculations/Engineering Evaluation Reports

Evaluation of Penetration Seal at Location 15/11-199, 12/08/09
FEX-00160-03, IP2 Evaluation of Alternate Safe Shutdown System (ASSS) Power Supplies, Rev. 3
IP3-CALC-CVCS-393, Calculation of Allowable Time for Operating Charging Pumps without Cooling Water, including Minor Calculation Change DRN-04-02260, Rev. 0
IP-CALC-04-01047, Charging Pump Heatup Analysis, Rev. 0
IP-CALC-04-01171, Hydraulic Analysis of Fire Water System, Rev. 0
IP-CALC-05-01034, Appendix R Cooldown Benchmark and Sensitivity Analysis using RETRAN-3D, Rev. 1
IP-CALC-07-00201, PRA for Explosions Hazards, Rev. 0
IP-CALC-09-00244, Backup Cooling From City Water to SI/RHR/CHG Pumps, Rev. 0
IP-RPT-04-00188, Evaluation of Hemyc Wrap Fire Protection Systems, Rev. 1
IP-RPT-05-00084, IP2 Appendix R Safe-Shutdown Manual Action Feasibility Report, Rev. 0
IP-RPT-07-00109, Independent Spent Fuel Storage Installation Fire Hazards Analysis, Rev. 0
IP-RPT-08-00008, Evaluation of Fire Barrier Penetration Seal at Location 60A/23-022, 4/30/09
IP-RPT-09-00012, Validation of Operator Manual Actions Credited for Appendix R, Section III.G Fire Areas: IP2 and IP3, Rev. 0
NEA-00031, IP2 SG Boil Dry Analysis with RETRAN-3D, Rev. 1
P1551-020, Exclusionary Analysis for IP2 Aux. Boiler Feedpump Room in Support of FR-H.1, Rev. 2
PGI-00355, NRC IN 92-18 MOV Control Circuit Hot Short Issue, Rev. 2
PGI-00460-00, Evaluation of High Pressure Fire Water System to Meet Design Demand, Rev. 0
SEE-03-5, Indian Point Unit 2 RHR Cooldown Analysis for the 5% Power Uprate, Rev. 1

Procedures

0-PT-M-002, Alternate Safe Shutdown Equipment Inventory and Inspection, Rev. 5
2-ELC-004-FIR, IP2 Repairs for Safe Shutdown in the Event of an Appendix R Fire, Rev. 2
2-PC-R37, Alternate Safe Shutdown and Remote Shutdown Instruments, Rev. 12
EN-DC-128, Fire Protection Impact Reviews, Rev. 3
EN-DC-161, Control of Combustibles, Rev. 3
EN-IS-109, Compressed Gas Cylinder Handling and Storage, Rev. 6
O-PT-M001, Fire Brigade Equipment Inventory & Inspection, Rev. 5

Operations Procedures
2-AOP-SSD-1, Control Room Inaccessibility Safe Shutdown Control, Rev. 15
2-COL-1.1, Reactor Coolant System, Rev. 28
2-COL-3.1, Chemical and Volume Control System, Rev. 39
2-ONOP-FP-001, Plant Fires, Rev. 6
2-SOP-20.3, Hotwell Dump and Condensate Transfer Operations, Rev. 20
2-SOP-27.6, Unit 2 Appendix R Diesel Generator Operation, Rev. 6
2-SOP-29.2, Fire Protection System Operation, Rev. 22
OAP-048, Seasonal Weather Preparation, Rev. 6

Large Fires and Explosions Mitigation Strategies Documents
0-AOP-SEC-1, Rev. 6
0-AOP-SEC-2, Rev. 5
0-AOP-SEC-3, Rev. 3
0-AOP-SEC-4, Rev. 4
0-PT-Q003, Rev. 2
0-SOP-ESP-2, Rev. 5
2-SOP-ESP-001, Rev. 4
3-SOP-ESP-001, Rev. 19
IP-CALC-08-00097

Completed Tests/Surveillances
0-ELC-420-FIR, EL-17 App-R Light Insp., Battery Replacement, & Test, performed 9/15/09
0-ELC-420-FIR, EL-17A App-R Light Insp., Battery Replacement, & Test, performed 2/02/09
0-ELC-420-FIR, EL-17B App-R Light Insp., Battery Replacement, & Test, performed 11/18/08
0-ELC-420-FIR, EL-18 App-R Light Insp., Battery Replacement, & Test, performed 11/05/09
0-PT-Q001, Alternate Safe Shutdown Equipment Inventory and Inspection, performed 1/10/10
2-PT-2Y017, Penetration Fire Barrier Seal Inspections, performed 12/20/05
2-PT-2Y041, Fire Damper Functionality, performed 1/25/10
2-PT-3Y015A, Underground Fire Loop Flow Test, performed 8/22/08
2-PT-3Y015B, Turbine Building Fire Loop Flow Test, performed 6/27/08
2-PT-A023, Fire Main Booster Pump Capacity Test, performed 5/09/09
2-PT-A040, Diesel Fire Pump Capacity Test, performed 5/03/09
2-PT-M034A, 11 Fire Main Booster Monthly Pump Test, performed 10/28/09
2-PT-M034B, 12 Fire Main Booster Monthly Pump Test, performed 10/29/09
2-PT-M040, Diesel Fire Pump Monthly Test, performed 10/18/09
2-PT-M040, Diesel Fire Pump Monthly Test, performed 11/15/09
2-PT-M040, Diesel Fire Pump Monthly Test, performed 12/12/09
2-PT-M040, Diesel Fire Pump Monthly Test, performed 9/19/09
2-PT-M49A, Appendix-R Emergency Lights Test, Conventional Area, performed 10/27/09
2-PT-M49B, Appendix-R Emergency Lights Test, Nuclear Area, performed 11/02/09
2-PT-SA012C, Ionization Smoke Detector Test, Electrical Penetration Area, performed 10/15/09

2-PT-SA12A, Ionization Smoke Detector Test, Conventional Area, performed 9/01/09
2-PT-W005, Weekly Diesel Fire Pump Verification, performed 12/25/09
IP2-UT-09-034, Fire Water Storage Tank NDE Examination, performed 8/04/09
TST-2-PI-Q001, Separation Fire barriers, performed 10/22/09
TST-2-PT-A16, Electric Cable Tunnel Pre-Action Water Spray System Test, performed 3/06/09

Drawings and Wiring Diagrams
138893, Indian Point No. 1 Ext. Diagram of Connections Substation 12RW3, Rev. 11
1981M161, Diesel Fire Engine Controller Wiring Diagram, Rev. 2A
244016, One-line 440VAC Swgr. Unit – Substs. 11RW1, 12RW3, 12FD3, MCCs 10M, 10N, 10Z & 10X, Rev. 20
308762-5, IA/N2 Supply to Pressurizer & Stm. Gen. Instr. Flow Diagram, Rev. 5
400400, Fire Area/Zone Arrangement, Site Plan, Rev. 2
400401, Fire Area/Zone Arrangement, Elev. 15 Ft., Rev. 4
400402, Fire Area/Zone Arrangement, Elev. 36 Ft., Rev. 2
400403, Fire Area/Zone Arrangement, Elev. 53 Ft., Rev. 4
400404, Fire Area/Zone Arrangement, Elev. 80 Ft., Rev. 2
400405, Fire Area/Zone Arrangement, Elev. 98 Ft., Rev. 2
400420, App-R Emergency Lighting Safe Shutdown Paths, Site Plan, Rev. 1
400421, App-R Emergency Lighting Safe Shutdown Paths, Elev. 15 Ft., Rev. 2
400422, App-R Emergency Lighting Safe Shutdown Paths, Elev. 36 Ft., Rev. 3
400423, App-R Emergency Lighting Safe Shutdown Paths, Elev. 53 Ft., Rev. 3
400424, App-R Emergency Lighting Safe Shutdown Paths, Elev. 80 Ft., Rev. 2
400425, App-R Emergency Lighting Safe Shutdown Paths, Elev. 98 Ft., Rev. 2
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400872, Station Blackout and Appendix R Diesel Generator Set Connection Diagram SBO/App. R 6.9kV Switchgear Electrical, Rev. 0
400874, Station Blackout and Appendix R Diesel Generator Set Schematic Diagram Fuel Fwd Pump #1 Electrical, Rev. 0
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NFPA 20-2010, Stationary Pumps for Fire Protection
NFPA 27-1975, Private Fire Brigades

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EN-TQ-125, Fire Brigade Drills, Rev. 0
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All 2009 Unannounced Fire Brigade Drills

LIST OF ACRONYMS

ADAMS	Agencywide Documents Access and Management System
ASSS	Alternate Safe Shutdown System
CCW	Component Cooling Water
CDF	Core Damage Frequency
CFR	Code of Federal Regulations
CR	Condition Report
DRS	Division of Reactor Safety
DRP	Division of Reactor Projects
Entergy	Entergy Nuclear Operations, Inc.
FDS1	Fire Damage State 1
FDS2	Fire Damage State 2
FHA	Fire Hazards Analysis
FPP	Fire Protection Program
FZ	Fire Zone
HRR	Heat Release Rate
IP	Inspection Procedure
IP2	Indian Point Nuclear Generating Unit 2
IR	Inspection Report
LOCA	Loss of Coolant Accident
NFPA	National Fire Protection Association
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
PAR	Publicly Available Records
P&ID	Piping and Instrumentation Drawing
PRA	Probabilistic Risk Assessment
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RWST	Refuel Water Storage Tank
SDP	Significance Determination Process
SRA	Senior Reactor Analyst
SER	Safety Evaluation Report
SSAR	Safe Shutdown Analysis Report
UFSAR	Updated Final Safety Analysis Report
VCT	Volume Control Tank