POLICY ISSUE
NOTATION VOTE

April 29, 2004 SECY-04-0071

FOR: The Commissioners

FROM: William D. Travers
Executive Director for Operations

SUBJECT: PROPOSED PROGRAM TO IMPROVE THE EFFECTIVENESS OF THE NUCLEAR REGULATORY COMMISSION INSPECTIONS OF DESIGN ISSUES

PURPOSE:

The purpose of this paper is to obtain Commission approval of the staff's methodology for conducting a pilot program to assist in determining whether changes should be made to the Reactor Oversight Process (ROP) to improve the effectiveness of Nuclear Regulatory Commission (NRC) inspections in the design/engineering area.

SUMMARY:

This paper describes a program to improve the ability to identify significant design issues at commercial nuclear power facilities. This new inspection module responds to lessons learned from past inspections and events, and is intended to provide a more indepth inspection of engineering activities, thereby improving the effectiveness of the current engineering inspection. The program has three phases: (1) data analysis of recent design/engineering issues, (2) development and implementation of a pilot inspection program, and (3) analysis of pilot program results and development of recommendations for future changes.

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During Phase 1, the staff reviewed the results of recent NRC design inspections, and evaluated the contributing factors to design inspection findings that were NRC-identified, licensee-identified, or self-revealing. The staff also performed a review of recent NRC design inspection results, including the inspection history at two facilities where the licensee had identified significant design issues that had not been previously identified, namely Point Beach and Davis-Besse.

In conjunction with the data analysis, the staff conducted a review of its existing and previous inspection guidance in the design area. Based on this review, the staff developed a draft prototype inspection procedure which incorporates the best practices of the existing and past programs, and which provides enhanced guidance that should improve the effectiveness of the overall inspection effort. The draft prototype inspection procedure focuses on risk-significant components with a low safety margin (performance characteristics with relatively small margin to design requirements), while making extensive use of industry operating experience.

During Phase 2, the prototype inspection module would be conducted at four sites. During Phase 3, which is planned to commence following the completion of the pilot inspections, the staff will perform an assessment of the pilot results to determine the need for any overall program changes. The staff's goal is to provide a status of the assessment to the Commission as part of the 2004 annual ROP self-assessment Commission Paper in April 2005.

BACKGROUND:

As part of the licensing process for commercial nuclear power facilities, licensees must demonstrate to the NRC that plant systems and components are designed with sufficient margins and redundancy to ensure they can perform their intended safety-related functions. After granting an operating license, the NRC relies on the licensee to maintain the facility's design in accordance with its licensing requirements. In addition, recent risk-informed initiatives intended to reduce unnecessary regulatory burden are based on the assumption that the changes being requested do not result in an unacceptable risk to public health and safety, despite reductions in available margin or redundancy. To support this assumption, the NRC staff and its licensees place significant emphasis on the results of probabilistic risk assessments (PRAs) that model safety systems and components, and predict the likelihood of various accident sequences.

A fundamental and necessary aspect of such reliance on PRAs is that the design of the modeled safety systems and components is correct, i.e., the PRA must accurately reflect the current plant status. Any errors in the design, in the implementation of the design, or in the modeling of plant changes could potentially invalidate the conclusions derived from the PRA. Therefore, verification that safety systems and components are correctly designed and can perform their intended safety functions has become increasingly important as the industry and NRC place increased reliance on and implement new risk-informed regulatory initiatives.

DISCUSSION:

Phase 1- Data Analysis of Recent Design/Engineering Issues

In order to better understand the degree to which NRC inspections and licensee self assessment efforts have been effective in identifying design issues, the staff reviewed the last 3 years of data from the ROP. The details of this review are contained in the attachment. The review covered greater-than-green issues in the initiating events, mitigating systems, or barrier integrity cornerstones that involved safety systems or components that were nonfunctional due to weaknesses in design or engineering.

Of the 17 greater than green design/engineering issues that fell within the scope of this review, 11 were NRC-identified, 2 were licensee-identified, and 4 were self-revealing. Of the 11 NRC-identified issues, 7 involved issues that had been previously recognized by the licensee, but whose significance the licensee had not recognized. Therefore, the licensees had not taken adequate corrective actions. Three of the NRC-identified issues were associated with fire protection, an area not typically covered in NRC design inspections.[1] Only one of the NRC-identified issues was identified as a result of an NRC design inspection. Of the two licensee-identified issues, one was identified as a result of extensive system reviews conducted by the licensee during an extended shutdown, and one was identified as a result of a pro-active self-assessment.

The staff also performed a review of the results of recent NRC design inspections conducted in accordance with Inspection Procedure 71111.21, “Safety System Design and Performance Capability,” including the inspection history at Point Beach and Davis-Besse, facilities where the licensee had identified significant design issues that had not been previously identified by the NRC. The staff noted that the design inspections at Point Beach and Davis-Besse, conducted prior to the licensees’ identification of significant design issues, had identified a greater number of lower level (green) design issues than were identified at other facilities during the same period. Specifically, during the year 2000 design inspections at Point Beach and Davis-Besse, there were five design related findings at each site, which was approximately twice the average number of design inspection findings for all sites inspected during the same year. Furthermore, the findings at Point Beach and Davis-Besse covered a wide range of design activities and included multiple examples of calculational errors, errors in the translation of design specifications, and test control weaknesses. Because these issues were not identified as being risk-significant, the NRC did not perform detailed extent-of-condition reviews of the identified issues, consistent with the ROP.

The results highlight the need for aggressive licensee self-assessments in the design area and effective corrective action programs that can evaluate and resolve the identified issues in a timely manner. Lastly, the results show that in some instances, the NRC had indications of programmatic design/engineering weaknesses, but did not engage further, as the

[1]Fire protection is not typically reviewed as part of NRC design inspections since the NRC has a specific fire protection inspection.

programmatic weaknesses had not yet resulted in issues that could be classified as risk-significant. In such instances, the issues were entered into the licensee's corrective action program.

Phase 2 - Development of Prototype Inspection Module and Pilot Inspection Program

Using the insights gained from its review of the above inspection data, and based on its review of existing and past NRC inspection modules in the design area, the staff has developed a prototype inspection module to more keenly focus inspection resources on areas of risk significance. This new inspection module responds to lessons learned from past inspections and events, and is intended to provide a more indepth inspection of engineering activities, thereby improving the effectiveness of the current engineering inspection. A significant aspect of the new inspection module is that it will focus on risk-significant/low margin components, including components where margins have been reduced as a result of modifications to the plant's design or licensing bases. The newly developed prototype inspection module incorporates the best features of the current and past NRC design/engineering inspections, while differing from the current safety system design and performance capability inspection module primarily in the following areas:

- Inspection samples will not be limited to one or two systems, but instead, will be focused on risk-significant, low-margin components and operator actions.

- Significant effort will be spent assessing relevant industry operating experience associated with the samples selected for inspection.

- The inspection sample will not be limited to mitigating system components and may include components that could be contributors to initiating events.

- If performance deficiencies are identified, extent-of-condition reviews will be performed, as required.

- A more detailed inspection report will be written that will include an integrated assessment of design/engineering weaknesses.

- Overall, the prototype inspection module is more resource intensive and will require about 700 hours of direct inspection versus the current allocation of approximately 500 hours[2] for the safety system design inspection.

These changes are intended to focus inspection efforts on design and engineering areas which have proven to be most susceptible and that have a high degree of safety significance.

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[2] This increase in resources is partially attributed to the fact that the prototype inspection combines the inspection requirements from several baseline inspection modules into one team inspection. To normalize the inspection resources, credit could be given to completing applicable portions of those baseline inspections.

As part of Phase 2, the staff intends to conduct a pilot program that would consist of four inspections using the prototype inspection module. The pilot inspections will take the place of the next regularly scheduled baseline safety system design inspection. The inspections will be performed with a dedicated inspection team, and include three onsite inspection weeks and one week of in-office preparation/inspection. The inspection team will consist of a team leader, two or three contractor participants with expertise in power plant design, and a combination of two or three regional and NRR inspectors. The design review portion of the inspection will be performed by contractors/inspectors with extensive nuclear plant design experience, preferably comparable to the experience gained through previous employment with an architect engineering firm.[3] The field portion of the inspection will be performed by either resident inspectors, regional inspectors, or NRR staff with past inspection experience.

A key variable in the success of the proposed pilot inspections will be the qualifications and experience of the inspection team members, particularly the inspection team leaders. The staff is proposing the creation of four temporary inspection team leader positions to lead the pilot inspections. The team leader positions will be for 3 months to allow sufficient time to prepare for, conduct, and document the inspection. The need for specifically designated design/engineering inspection team leaders on a ongoing basis will be assessed during Phase 3 of the overall program. The staff may also consider the use of additional regional inspectors during the pilots in order to enhance the inspection knowledge base.

The sites for the pilot inspections will be selected based on consideration of the following factors:

- Recent adverse performance as indicated by inspection findings, cross-cutting issues, or performance indicators. The site should not have had significant engineering/design inspection activity within the last year, such as IP 71111.21 SSDPC inspections, IP 95003 Supplemental inspections, and oversight under IMC 0350, “Oversight of Operating Reactor Facilities in a Shutdown Condition with Performance Problems."

- Site attributes such as design and licensing basis consistency with established NRC regulatory positions, quality and scope of design basis information, unique plant safety features, and recent licensing basis changes that could reduce safety analysis margins (e.g., power uprates) should also be considered when selecting a site for this TI.

The plants selected may change based upon various scheduler considerations. Candidates currently under consideration include Arkansas Nuclear One (ANO), Diablo Canyon, Kewaunee, Monticello, Nine Mile Point Units 1 or 2, Summer, and Vermont Yankee.

The pilot program could be completed in approximately 6 to 9 months from the date of Commission approval of the approach.

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[3] This may cause some potential organizational conflict of interest (OCOI) concerns because of the limited availability of skilled contractors with this expertise. The staff may seek a waiver from the Commission’s policy on avoidance of contractor OCOI.

Phase 3 - Follow-on Assessment

As part of Phase 3, the staff plans to evaluate the results of the four pilot inspections. Included within the scope of this evaluation will be the effectiveness of the pilot inspection procedure, potential changes to ROP design/engineering-related procedures, the appropriateness of the ROP guidance that governs NRC engagement on programmatic/cross-cutting issues, and the adequacy of NRC staffing/training in the design/engineering area. In addition, prior to initiating this review of the NRC's design/engineering inspections, the staff had been working with the industry on a proposal to allow NRC inspection credit for licensee self-assessments in the design area. A brief synopsis of the staff's work in this area was included in the 2002 and 2003 ROP self-assessments provided to the Commission. These efforts culminated last year with the industry's submittal of a draft self-assessment guidance document, NEI 04-03, "Safety System Function Assessment (SSFA) Generic Assessment Plan Guideline." This document contains industry guidance for conducting self-assessments in the design area, including guidance regarding staffing, self-assessment content, issue follow-up, baseline inspection credit, and report documentation. The staff will consider additional interactions with the industry, such as industry participation in a subsequent effort which would allow facilities to conduct, and receive inspection credit for, design/engineering self-assessments.

In addition to periodic status updates, the results of the staff's evaluation and any recommendations for continuing program changes will be included in the next ROP self-assessment. The staff estimates Phase 3 could be completed in 2 to 3 months after completion of the last pilot inspection.

RESOURCES:

To implement the pilot program, the staff estimates it would take about 1 FTE of NRR staff, 1 FTE of regional staff, and $350,000 of contract support ($210K in FY 2004 and $140K in FY 2005), beyond the resources which would have been spent performing the regularly scheduled baseline design inspections. These resource estimates include both management of the program and the actual pilot inspections. The staff estimates it would take about 1 NRR FTE to complete the program evaluation specified in Phase 3. The FTE resources to conduct the pilot inspections and subsequent program review would be accommodated with the resources already budgeted in FY04 and FY05 for inspection program development, management, and oversight. The additional $210K in FY 2004 would be reprogrammed from existing NRR resources.

The Phase 1 work completed in FY 2004 was performed as an integral part of existing design inspection resources. Pending Commission decision on the proposed program described in this paper, any additional resources needed in the out years would be addressed as part of the FY 2006 Budget Process through FY 2005 reprogramming and a FY 2006 budget request.

The additional inspection hours required to conduct the four pilot inspections would not be billed to the individual licensees as Part 170 fees, but would be charged to all reactor licensees under Part 171 annual fees since this work is program development.

COORDINATION:

The Office of the General Counsel has reviewed this Commission paper and has no legal objections to its contents.

The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications.

RECOMMENDATION:

The NRC staff recommends the Commission approve the methodology for conducting a pilot program in the design/engineering area. The staff plans to discuss this effort with external stakeholders following Commission approval.

/RA/

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Attachment: Data Analysis of Recent Design/Engineering Issues

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Attachment: Data Analysis of Recent Design/Engineering Issues

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*see previous concurrence

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DATA ANALYSIS OF RECENT DESIGN/ENGINEERING ISSUES

In an effort to improve the ability to identify significant design issues at commercial nuclear power facilities, a data analysis of recent design/engineering issues was performed. As part of this analysis, NRC staff reviewed the results of NRC inspections from the past 3 years and evaluated the contributing factors to greater-than-green design inspection findings that were NRC-identified, licensee-identified, or self-revealing. This appendix describes the 17 design/engineering issues that were identified during the review. The findings affected the initiating events, mitigating systems, or the barrier integrity cornerstones and involved systems or components that had been rendered inoperable due to weaknesses in design or engineering.

For the purposes of this paper, licensee-identified findings are those findings identified through a licensee program or process that was specifically intended to identify the problem and for which the licensee made effective evaluations and took appropriate corrective actions. NRC-identified findings are those findings that were solely identified by NRC inspectors or those findings which the licensee had identified but had not effectively evaluated or had not taken appropriate actions to correct. Self-revealing findings are those findings that reveal themselves to either the NRC or the licensee through a change in process, capability or functionality of equipment, operations, or programs during routine operation. Of the 17 greater-than-green design/engineering issues that fell within the scope of the review, 11 were NRC-identified, 2 were licensee-identified, and 4 were self-revealing.

NRC-IDENTIFIED FINDINGS

Of the 11 NRC-identified issues, 7 involved issues that had been previously recognized by the licensee but whose significance the licensee had failed to understand. As a result, the licensee had not taken adequate corrective actions. Three of the NRC-identified issues were associated with fire protection, and one of the NRC-identified findings was a new issue identified as a result of an NRC design inspection. These findings are described below.

HARRIS 1 - FIRE PROTECTION - WHITE

During a review of technical issues related to the fire-resistive performance of Thermo-Lag fire area enclosures, NRC inspectors identified that the Thermo-Lag fire barrier material did not perform to the manufacturer's specifications. Fire endurance testing demonstrated that the Thermo-Lag walls which served as part of the fire area separation barriers between cable spreading rooms A and B and switchgear room B would have provided a 1 hour and 48 minutes barrier for a 3-hour fire loading area with no automatic suppression and a fire brigade that had not practiced in the area for over 7 years. This degraded condition increased plant risk because if a severe fire occurred in the B train switchgear room and breached the Thermo-Lag fire barrier, both trains of post-fire safe shutdown capability could have been damaged or lost due to the same fire. (IR 2002010, 1999013, 2000009)

KEWAUNEE - FIRE PROTECTION - WHITE

As a follow-up to issues raised by the NRC during a triennial fire protection inspection (FPI), the licensee determined that a fire area TU-95B (Safeguards Alley) was misclassified as having to meet requirements of Section III.G.2 of 10 CFR Part 50, Appendix R. The fire area

should have been classified as having to meet requirements of Section III.G.3 and thus should have had a fixed suppression system. As a result of failing to have a fixed fire suppression system, there was a greater likelihood that a fire in fire area TU-95B would not be suppressed, and redundant trains of cables and equipment required for safe shutdown could be damaged. The corresponding damage could require a shutdown of the plant from outside the control room, significantly increasing the complexity of manual actions required to achieve safe shutdown. (IR 2002006, 2003003, 2001002)

PALISADES - FIRE PROTECTION - WHITE

NRC inspectors identified that smoke detectors in the northwest portion of the cable spreading room were not located and installed in accordance with the applicable National Fire Protection Association (NFPA) code. The smoke detector located in that area was not adequately evaluated to consider the effects of installed ventilation on the detector's performance and would not be able to quickly detect a fire. As a result of the inadequate detector placement, detection of a fire in the northwest portion of the cable spreading room could be delayed and sufficient cable damage could occur which would require a shutdown of the plant from outside the control room, significantly increasing the complexity of manual actions required to achieve safe shutdown. (IR 2002008, 2001008)

OCONEE - CORRECTIVE ACTIONS - WHITE

The NRC performed an in-office follow-up inspection on June 4, 2000, of Unresolved Item 50-269,270,287/00-04-01, Lack of Reasonable Assurance That a High Pressure Injection (HPI) Pump Could Operate for the Necessary Time Frame Using the Spent Fuel Pool (SFP) as the Suction Source Following a Tornado. This follow-up inspection (documented in IR 50-269,270,287/00-11) resulted in the identification of a potential white finding. A violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control" (50-269,270,287/00-07-04), was cited for Oconee's failure to adequately consider design inputs to assure that the design bases were translated into specifications, drawings, procedures, and instructions for the HPI system using the SFP as a suction source following certain tornadoes. (IR 2001006)

TMI - CORRECTIVE ACTIONS - WHITE

The NRC inspectors identified that AmerGen had failed to consider all operability aspects of a significant oil leak on the A EFW pump (EF-P-2A) outboard pump bearing. Auxiliary operators and control room operators had noticed the increased oil condition and had made a nonconservative operability determination that only considered standby pump conditions. The NRC inspectors also identified an empty oil reservoir condition. (IR 2001014)

NINE MILE POINT - CORRECTIVE ACTIONS - WHITE

NRC inspectors identified a failure to evaluate significant conditions adverse to quality involving degraded piping in the reactor building closed loop cooling (RBCLC) system. This failure resulted in repetitive and continued degraded piping conditions in the RBCLC system. An RBCLC system piping leak occurred due to significant pipe corrosion, primarily as a result of inadequate piping design, application, and operation. Although numerous RBCLC system leaks occurred during several preceding years, the cause for these leaks was not determined and appropriate corrective actions were not implemented. This led to further degradation of the RBCLC system piping such that additional significant leaks occurred. These leaks were accompanied by a significant reduction in the pipe wall which degraded the structural integrity of the affected piping sections. The degraded RBCLC piping increased the likelihood of the loss of the RBCLC system which would result in the loss of cooling to several other risk-significant systems following a loss-of-coolant accident or a loss-of-all-AC-power event. (IR 2003003, 2003010)

OCONEE 1 - CORRECTIVE ACTIONS - WHITE

NRC inspectors identified that the licensee failed to promptly correct a condition adverse to quality. The condition concerns an inability to align the station auxiliary service water (ASW) pump to supply lake water to the steam generators within the 40 minutes required for mitigation of a design basis tornado. During a simulator exercise, operators took over 60 minutes to align the pump. The licensee then determined that procedures for aligning the station ASW pump to mitigate a tornado were not adequate to ensure that the pump could be started and aligned within sufficient time (40 minutes) to mitigate a design basis tornado event. NRC inspectors identified that more than a year later, the licensee had not implemented corrective actions to assure that operators could align the station ASW pump within 40 minutes. (IR 2001008, 2002007)

OCONEE 1 - CORRECTIVE ACTIONS - WHITE

NRC inspectors identified a potential flooding problem from non-safety-related fire protection/HPSW lines in the auxiliary building (one system serves both high-pressure service water and fire protection functions). The inspectors noted that the non-seismic 16-inch fire system header that passed through the auxiliary building posed a potential problem to the auxiliary building if the piping ruptured during a seismic event. Due to the design of the HPI rooms, water from any flood in the auxiliary building would find its way into the HPI rooms via the drain system. Penetrations between the HPI rooms and the LPI/RBS pump rooms increased the likelihood that a flood in one room would affect more than one train of emergency core cooling system pumps and thus reduce the total amount of flooding necessary to affect the HPI and LPI/RBS pump rooms. (IR 2002013, 2000008)

OCONEE 3 - CORRECTIVE ACTIONS - WHITE

NRC inspectors identified a failure of the licensee to properly implement the vendor's written instructions for attaching electrical connectors on a pre-staged 4160 VAC emergency power supply cable from the auxiliary service water switchgear to a high-pressure injection (HPI) motor. The power supply cable would have been used to power the HPI pump motor following the loss of the essential buses (normal AC electrical power supply) and the loss of the standby shutdown facility function. Damaged electrical connectors were found while performing maintenance activities. Had it been necessary to operate the pump during a high energy line break or tornado event recovery, the cable connectors would have overheated and likely failed, causing a loss in HPI pump function. Overheating would have been caused by the lack of mating surfaces between the male and female ends of the connectors and the resulting higher resistance for electrical current flow. Loose connectors would potentially impact the ability to use the HPI pump during high energy line break and/or tornado event recovery. (IR 2003008, 2002015)

THREE MILE ISLAND - CORRECTIVE ACTIONS - WHITE

After noticing an empty oil reservoir condition, NRC inspectors identified that the licensee failed to consider all operability aspects of a significant oil leak on a motor-driven emergency feedwater pump outboard bearing. The oil leak was known by auxiliary operators to have existed for more than 10 days before they initiated corrective actions to identify the cause. System engineers failed to investigate an unexplained step change in pump vibrations during the most recent pump in-service test. The increased vibrations were later determined to be directly related to the condition causing the oil loss. The oil loss and increased pump vibrations resulted from loose cover bolts on the pump bearing housing. The bearing housing cover bolts would have loosened sufficiently to cause increased pump vibrations and an oil leak of sufficient magnitude to render the pump inoperable. This finding resulted in a single train of emergency feedwater being inoperable for longer than the Technical Specification allowed outage time. (IR 2001014, 2001002)

PRAIRIE ISLAND - NRC DESIGN INSPECTION - WHITE

During a Safety System Design and Performance Capability Inspection (SSDI), NRC inspectors discovered that the original design and installation of the three safety-related deep draft cooling water (service water) pumps failed to require safety-related electrical power for the filter backwash system for the water source for bearing lubrication and cooling of the pump drive shaft bearings. During a loss of offsite electrical power (LOOP), this could have resulted in the clogging of the filters after a short time and inoperable cooling water pumps due to the loss of shaft bearing lubrication water. In addition, a design change in 1977 inappropriately reclassified the safety-related bearing lubricating water source for the pumps from safety-related to non-safety-related. This resulted in the installation of non-safety related bearing lubrication water sources for the safety-related drive shaft bearings. The licensee declared all three safety-related pumps inoperable since non-safety-related lubricating water systems might not be available after a seismic event, a LOOP, and possibly other failures. (IR 2000013, 2001014, 2002003)

LICENSEE-IDENTIFIED FINDINGS

Of the two licensee-identified issues, one was identified as a result of extensive system reviews conducted by the licensee during an extended shutdown, and one was identified as a result of a proactive self-assessment. These findings are described below.

DAVIS-BESSE - YELLOW

During a 2002 refueling outage, the licensee determined that the existing amount of unqualified containment coatings, uncontrolled fibrous material, and other debris inside containment could have potentially blocked the emergency sump intake screen, rendering the sump inoperable following a loss-of-coolant accident. With the emergency sump inoperable, both independent emergency core cooling systems (ECCSs) and both containment spray (CS) systems are inoperable, because both require suction from the emergency sump during the recirculation phase of operation. This could prevent both trains of ECCS from removing residual heat from the reactor and could prevent CS from removing heat and fission product iodine from the containment atmosphere. Despite previous opportunities to identify and correct this design control issue, the licensee failed to implement appropriate corrective actions. This resulted in an actual loss of safety function of the ECCS system.

POINT BEACH - RED

The licensee probabilistic risk analysis (PRA) staff identified a vulnerability associated with the auxiliary feedwater (AFW) recirculation valves. The recirculation valves were air-operated valves which failed closed upon a loss of instrument air. Consequently, in certain transients, such as a loss of instrument air, a loss of offsite power, a loss of service water, or a seismic event, the flow path via the recirculation lines would be lost due to the recirculation valves failing closed upon a loss of instrument air. Closure of the recirculation valves could result in pump failure under low-flow conditions such as when AFW flow was throttled back to control steam generator level or mitigate RCS overcooling. A common-mode failure of the AFW pumps would result in substantially reduced mitigation capability for safely shutting down the plant in response to certain transients; therefore, the issue was determined to have high safety significance (red). (IR 2001017, 2003007)

SELF-REVEALING FINDINGS

Of the four self-revealing findings, three involved weaknesses in the licensee's corrective action program and one was a fire protection issue revealed during repair work. These findings are described below.

D.C. COOK - CORRECTIVE ACTIONS - WHITE

The licensee failed to take prompt corrective actions to prevent a repetitive failure of a turbine driven auxiliary feedwater pump (TDAFWP). On two occasions (about 5 months apart), the pump failed due to the failure of the trip throttle valve latch mechanism to remain engaged during pump start. The licensee concluded that the root cause of the repetitive failure was incorrect machining of the trip throttle valve trip hook which resulted in inadequate alignment of the trip hook and latching up lever faces. The pump failure resulted in the unavailability of a train of auxiliary feedwater. (IR 2003004, 2002002, 2002005)

FERMI 2 - CORRECTIVE ACTIONS - WHITE

Approximately 12 hours into a routine 24-hour emergency diesel generator (EDG) surveillance run, the EDG outboard bearing housing metal exhibited a high and rising temperature which was sufficient to ignite the paint that covered the housing. An investigation into the EDG outboard bearing failure revealed that the oil level in the bearing housing was below the manufacturer-recommended minimum level. A previous modification (adding a stiffener plate to the endbell of the generator housing of the EDG to reduce axial vibration) resulted in the oil sight glass piping reference (tick) mark being lowered by 7/8 inch. As part of its root cause analysis of this issue, the licensee identified several prior opportunities where this problem could have been identified and corrected. (IR # 2001010)

POINT BEACH - CORRECTIVE ACTION - WHITE

A safety injection (SI) pump failed during monthly preventative maintenance bearing lubrication activities. The failure was caused by gas binding from back-leakage of nitrogen-saturated water from a reactor coolant system safety injection accumulator through two check valves. An auxiliary operator stationed locally in the vicinity of the SI pump noted a loud noise near the end of the pump coastdown, observed excessive seal leakage, and perceived an acrid smell. Inspection of the pump revealed damage to the rotating element, the coupling and shaft keys between the pump and the motor, the pump internal wearing rings, and other components. Despite multiple opportunities to have identified the effects of the leaking accumulator, the licensee's organization did not properly respond to adverse accumulator leakage trends or effectively use industry operating experience to prevent failure of the safety injection pump. The pump failure resulted in the inoperability of one train of the safety injection system. (IR 2002005, 2002012)

INDIAN POINT 2 - WHITE

Deficiencies were found in a concrete block wall located in the central control room (CCR) as part of an initiative to reduce air in-leakage to the CCR and to improve HVAC system performance. The wall was supposed to be constructed as a 3 hour rated fire barrier to separate the control building from the turbine building. Passages through both the outer brick and inner portions of the wall were identified when the licensee removed decorative interior wall panels. If a significant amount of smoke and gas had penetrated the wall, the CCR could have become inhabitable, causing the operators to resort to using the alternate safe shutdown System. (IR # 2003010, 2002010)