POLICY ISSUE
(Information)

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FOR: The Commissioners

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SUBJECT: RESULTS OF THE PILOT PROGRAM TO IMPROVE THE EFFECTIVENESS OF NUCLEAR REGULATORY COMMISSION INSPECTIONS OF ENGINEERING AND DESIGN ISSUES

PURPOSE:

The purpose of this paper is to provide the Commission the staff's assessment of the results of the pilot program to improve the effectiveness of Nuclear Regulatory Commission (NRC) inspections in the design and engineering area. The paper also contains a summary of the planned changes to NRC programs based on the assessment results.

SUMMARY:

In SECY-04-0071, “Proposed Program to Improve the Effectiveness of the Nuclear Regulatory Commission Inspections of Design Issues,” the staff described its plans to implement a three-part program to improve the NRC’s ability to identify significant design issues at commercial nuclear power facilities. Phase 1 of the program involved data analysis of recent design and engineering issues. The results of Phase 1 were given in SECY-04-0071. Phase 2 of the program involved the development of a new inspection approach and the conduct of four pilot inspections. These four pilot inspections have now been completed. Phase 3 of the program

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involved analysis of the pilot inspection results and the development of program changes. A summary of the Phase 3 analysis and the planned program changes, including enhancement to the baseline engineering inspection and inspection of power uprates, are included in this paper. The recommended program changes will result in additional contractor expenditures which have been reflected in the FY 2006 and FY 2007 budgets.

BACKGROUND:

As previously stated in SECY-04-0071, 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 in part on the assumption that the changes requested do not result in an unacceptable risk to public health and safety despite reductions in margin or redundancy. To support this assumption, the NRC staff and its licensees rely on calculations and analyses that predict the performance of the facility under various accident sequences. Therefore, the accuracy of these design basis calculations and analyses has become increasingly important as the industry and NRC implement new risk-informed regulatory initiatives. It is also important that NRC inspection resources be directed towards aspects of the plant design and operation that represent the most risk and that those resources be implemented as effectively as possible.

DISCUSSION:

Summary of Phase 1 Data Analysis and Phase 2 Pilot Program Development

In the Phase 1 analysis documented in SECY-04-0071, the NRC staff summarized its review of 3 years of data from the Reactor Oversight Process (ROP) to see whether NRC inspections and licensee self-assessment efforts had been effective in identifying latent engineering and design issues. The results of the review highlighted 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. The results also showed that in some instances, the NRC had indications of programmatic design and engineering weaknesses, but did not engage the licensee's further, since the programmatic weaknesses had not yet resulted in issues classified as risk-significant through the ROP's Significance Determination Process (SDP).

Using the insights gained from its Phase 1 review, and based on its review of existing and past NRC inspection practices in the design and engineering area, the staff developed a prototype inspection module to focus on aspects of the facility's design that represented a relatively high degree of risk and for which there appeared to be relatively low margin. This inspection module, "Temporary Instruction 2515/158 Functional Review of Low Margin/Risk Significant Components and Human Actions," was implemented at one site in each of the four NRC regions: Vermont Yankee, V.C. Summer, Kewaunee, and Diablo Canyon.

Phase 3 Assessment of Pilot Program Results

The staff's assessment of the pilot inspection results has been an iterative process, with changes being made to the pilot inspection approach based on lessons learned from each of the pilot inspections. In addition, following the completion of the last of the four inspections, the NRC staff and contractors most directly involved with the pilot inspections conducted a detailed review of the program results and developed recommendations for enhancing the current NRC baseline inspections in the engineering area. The staff's assessment included the inspection approach and content, the inspection frequency, staffing, and training considerations. A separate group conducted an assessment of the Vermont Yankee pilot inspection results and developed preliminary recommendations for enhancing the NRC inspection process for licensee requests for power uprates. A member of the NRC's staff also participated in a panel discussion with pilot inspection recipients at a recent American Nuclear Society conference and received feedback regarding the inspection approach from the industry's perspective. The pilot program was also discussed with external stakeholders at the 2005 Regulatory Information Conference during the regional breakout sessions, and during a monthly public NRC/industry working group meeting to discuss issues associated with the ROP.

CONCLUSIONS:

Effectiveness of Pilot Inspection Approach

The staff concluded that the pilot inspection approach resulted in improvements that should be incorporated into the baseline inspection program. The effectiveness of the pilot inspections was largely attributed to:

- the experience and qualifications of the inspection team leaders and inspectors
- the inclusion of contractors on each inspection with extensive design knowledge
- the selection of components for inspection based on design margin and risk significance
- the inclusion of samples of operating experience
- the inclusion of samples that involve the operations/design interface
- the allowance of additional time on-site to thoroughly assess the inspection samples
- the participation of a senior reactor analyst during the component selection phase of the inspection
- the participation of one of the site resident inspectors (at least during the component selection phase of the inspection)

The staff plans to incorporate these attributes into a revised baseline inspection procedure to be implemented beginning January 1, 2006. The revised inspection procedure will be conducted over a seven week cycle, including three weeks of onsite inspection. This is similar to the approach used during the pilot inspections. The recommended team composition will consist of an NRC team leader, two design contractors (typically one mechanical and one electrical/IC), one regional operations inspector, one regional engineering inspector, and one inspector

trainee. This is a reduction of one contractor and one NRC inspector from the approach used during the pilot inspections. The Office of Nuclear Reactor Regulation (NRR) will conduct a short general training session for team leaders and/or regional inspectors covering the revised inspection approach.

Consistent with the current baseline approach, this inspection will be performed biennially (once in every two-year ROP cycle). Since future inspections will include samples of relatively greater margin and lower risk than those in the first round, consideration will be given to reduced-scope inspections and/or licensee self-assessments, based on performance during the first round and other existing objective criteria. The staff plans to develop specific guidance in this area following the completion of the first year of the program and prior to completion of the first two-year cycle. Included will be specific criteria for determining the appropriate scope and/or staffing of future inspections, including guidance for allowing credit for licensee self assessments.

Assessment of Pilot Inspection Results

The results of the pilot inspections appear to indicate that latent design and engineering issues, mostly of very low safety significance,[1] persist at operating reactors. The pilot inspections resulted in 29 inspection findings. Of interest was the number of inspection findings that involved inadequate operating procedures and the operations-design interfaces. The pilot inspections focused on these areas which had not recently received significant inspection attention. The staff plans to continue this focus during future inspections. Also noteworthy was the large number of findings that involved inadequate corrective actions. This is consistent with other recently performed NRC evaluations in this area. The focus on corrective action programs and their effective implementation remains an important element of the ROP. A more detailed analysis of the inspection findings and a comparison against baseline inspection program data are given in Attachments 1 and 2.

In aggregate, the pilot program results support the need for continued inspection focus in the engineering and design area. However, the results do not indicate the existence of widespread risk-significant issues. As such, the staff plans to enhance, rather than revamp, its approach to inspection and oversight in the design and engineering area. The staff concludes that many aspects of the approach used during the pilot inspections should be incorporated into the current baseline inspection program.

Regional Staffing Considerations

In order to effectively implement future inspections, the staff believes that each region should form a core group of inspectors and team leaders for the inspections. This will help in scheduling both staff and contractors and will allow more consistency from inspection to inspection. Also, a branch chief should be designated in each region as the inspection procedure lead. The regional branch chiefs and the NRR lead will form a focus group that will meet periodically to assess the effectiveness of this part of the inspection program.

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[1]An unresolved issue at Kewaunee involving deficiencies in the auxilliary feedwater system remains to be assessed for risk significance.

Parallel ROP Changes

The staff also looked at what parallel changes might be needed to other aspects of the ROP to address engineering and design inspection issues. The staff identified that enhanced guidance is needed in Inspection Manual Chapter (IMC) 0612 to define what types of engineering and design issues should be considered "minor" or greater than minor. This guidance is important, since issues identified as being minor are typically not documented in NRC inspection reports and are not included in NRC cross cutting issue assessments. The staff is planning to address this concern by revising IMC 0612 prior to the end of calender year (CY) 2005. The staff believes that no other changes to the ROP are necessary at this time. The staff will revisit the question of other parallel ROP changes after revising the IMC 0612 guidance and conducting the revised engineering and design inspections for one year.

Assessment of Power Uprate Inspection Approach

In response to the Commission's Staff Requirements Memorandum M041209, dated December 23, 2004, the staff performed a preliminary assessment of the results of the Vermont Yankee inspection, with the goal of determining whether the NRC needs to enhance the current inspection process for power uprate license amendment requests. Traditionally, the NRR technical staff has reviewed license amendment requests in detail for a power uprate, but the inspection part of that review has been limited. The pilot engineering inspection at Vermont Yankee was an attempt to perform an in-depth inspection of aspects of the facility's design that would be impacted by the requested power uprate.

The staff has reviewed the results of the Vermont Yankee inspection and has concluded that the current power uprate inspection procedure should be enhanced. In addition, a process should be developed to better integrate the inspection and NRR technical review process for power uprates and other important license amendment requests. These conclusions are based primarily on the identification of several issues during the Vermont Yankee inspection. These issues involved the acceptability of the licensee's power uprate submittals with respect to the Station Blackout Rule, motor-operated valve testing, certain operator response times, and certain assumptions in accident analyses. The staff believes it unlikely that these inspection-identified issues would have been identified by subsequent NRR technical reviews, because the NRR technical reviews rely primarily on licensee-submitted documentation. The staff therefore believes a detailed inspection is a good complement to the NRR technical review in this area.

To address the above concerns, the staff plans to perform a more detailed assessment of what specific changes should be made to the inspection part of the power uprate process. The staff will also develop a process for better integrating inspections and NRR technical reviews for important license amendment requests. This assessment, as it relates to power uprates, should be completed before the end of CY 2005.

COMMITMENTS:

Listed below are the significant actions or activities planned by the staff to improve the effectiveness of NRC inspections in the design/engineering area:

- The staff will modify the current baseline inspection program based on the lessons learned from the pilot program and the results of this assessment. This activity will be completed by the end of CY 2005. The revised inspection procedure will be implemented beginning January 1, 2006.

- The staff will revise the guidance in Inspection Manual Chapter 0612 to better define the types of engineering and design issues that should be considered minor or greater than minor and thus documented in the associated inspection reports. This activity will be completed before the end of CY 2005.

- Each region will designate a branch chief as the management lead for the revised procedure and will form a core group of inspectors and team leaders to conduct the inspections. A short general training session for this group will be provided by NRR. These activities will be completed before the end of CY 2005.

- The staff will further assess and define the scope of changes necessary to enhance the inspection part of the power uprate license amendment review process. This assessment will include the scoping of enhanced inspection procedures and a process for integrating the inspection with the concurrent technical staff reviews for the power uprate license amendment. Lessons learned from this activity may also be used to better integrate the inspection and technical reviews for other types of license amendments. This activity will be completed before the end of CY 2005.

RESOURCES:

NRC staff hours to revise the baseline inspection procedures, conduct training, and perform program management are currently budgeted. This work is estimated to be approximately 0.25 FTE.

The planned changes for the first round of inspections should result in a savings of about 1 FTE per year that will be used to help complete other baseline or supplemental inspections. However, there will be an increase in the use of contractor funds for the first round of inspections. It is estimated that contract support needs will total about $70K per inspection. Assuming 33 inspections per year, approximately $2.3 million dollars per year of contract support will be needed. This is in contrast to the approximate $500K allocated to engineering inspections in fiscal year (FY) 2005. Sufficient funds to cover this planned increase in contract support have already been included in the FY 2006 and 2007 budgets.

It is anticipated that after the first round of inspections, the scope of some inspections may be reduced and that consideration may be given to crediting licensee self-assessments in lieu of some NRC inspections in this area. This may result in a reduction in total inspection effort in the subsequent rounds of inspections.

COORDINATION:

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

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

/RA/

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Attachments: 1. Summary of Inspection Findings
2. Assessment of Engineering Pilot Program Data

SUMMARY OF INSPECTION FINDINGS

As part of its assessment of the pilot program results, the staff reviewed each of the inspection findings to determine any common themes among the findings that might warrant additional focus in the inspection program. Each inspection finding was designated as being identified during either the mechanical, electrical, operations-mechanical, or operations-electrical portions of the inspection procedure. Each finding was also coded to indicate whether the finding was associated with the original plant design, a design modification, a lack of an appropriate analysis, inadequate corrective action, design control errors, inadequate operating procedures, or other concerns.

The results of the staff's analysis indicate a fairly balanced number of findings between the electrical and mechanical areas. Of significance is the number of findings that were identified as being associated with the operations-mechanical and operations-electrical interfaces, an area that was focused on during the pilot inspections, but an area that previously had not received significant inspection focus. The staff plans to continue this focus in future inspections. Also noteworthy is the large number of findings associated with inadequate corrective action. This is consistent with other recently performed NRC evaluations of engineering issues.

Vermont Yankee

Green. The team identified a non-cited violation of 10 CFR Part 50.63, "Loss of All Alternating Current Power," because the licensee had not completed a coping analysis for the period of time the alternate alternating current (AC) source (the Vernon Hydro-Electric Station) would be unavailable and had not demonstrated by test the time required to make the alternate source available for a station blackout event involving a grid collapse. (Electrical, b, d)

Green. The team identified a non-cited violation of Technical Specification 6.4.C, "Procedures," because the licensee failed to establish adequate procedures for determining the operability of the 115 kilovolt (kV) Keene line, which is designated as an alternate immediate access power source if the 345/115 kV auto transformer is lost. (Operations-Electrical, f)

Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," because the licensee used incorrect and non-conservative voltage values in calculations performed to assure that electrical equipment would remain operable under degraded voltage conditions. (Electrical, e)

Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," because the licensee did not implement measures to ensure that the design basis for the cooling water supply to the lube oil cooler of the reactor core isolation cooling (RCIC) system was correctly translated into the specifications, drawings, procedures, or instructions. Specifically, the installed pressure control valve in the lube oil cooler water supply line was not independent of air systems, and the installed piping between the pressure control valve and lube oil cooler did not contain a restricting orifice. A contributing cause of this finding is related to the cross cutting area of Problem Identification and Resolution. The licensee had previously reviewed the failure positions of air-operated equipment and issued a report,

"Compressed Air Systems," dated July 16, 1989. During this review, the licensee did not identify that the pressure control valve was not independent of the instrument air system. (Mechanical, a, d)

Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," because the licensee failed to correct a longstanding non-conformance in the operation of pressure control valve PCV-13-23. The team determined through interviews with Vermont Yankee staff that during initial start-up testing, problems were identified with the automatic operation of this valve which affected its ability to properly supply cooling flow to the RCIC lube oil cooler. (Operations-Mechanical, d, f)

Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," because the licensee had neither established the correct condensate storage tank (CST) temperature limit for use in the plant transient analyses nor translated the CST temperature limit into plant procedures. A contributing cause of this finding is also related to the cross-cutting area of Problem Identification and Resolution. The licensee identified this issue in December 2002, but concluded that the non-conservative CST temperature had little to no effect on the transient analyses. (Mechanical, e)

Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," because between June 2001 to September 2004, the licensee did not adequately coordinate between the operations department and the engineering organization regarding procedure revisions that increased the length of time required to place the reactor core isolation cooling system in service from the alternate shutdown panels. (Operations-Mechanical, b, f)

Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," because the licensee had conducted motor-operated valve (MOV) diagnostic tests using procedures that did not include acceptance limits, which were correlated to and based on applicable (stem thrust and torque) design documents. Additionally, MOV diagnostic testing had been conducted solely from the motor control centers using test instrumentation that had not been validated to ensure its adequacy. (Mechanical, electrical, g)

V.C. Summer

Green. The team identified a violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control and 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action. The violation involves a potential design vulnerability for the emergency feedwater (EFW) flow control valves to become plugged by tubercles and other debris from service water, which could result in a common mode failure of the EFW system. Historical licensee corrective actions have not adequately resolved this issue. (Mechanical, a,d)

Green. The team identified a non-cited violation (NCV) of TS 6.8.1.c, Procedures and Programs, for failure to include the proper testing methodology in procedures to meet Technical Specification Surveillance Requirement 4.8.1.1.2.g.6.c, which required testing to demonstrate that all emergency diesel generator trips other than overspeed, generator differential, and low lube oil pressure were automatically bypassed upon loss of voltage on the associated emergency bus concurrent with a safety injection signal. Procedures did not provide for adequate testing of the bypass function. This resulted in the failure to test the bypass function since November 1996, when a similar test deficiency was discovered by the licensee and

addressed by a temporary procedure change. The licensee performed testing, subsequent to the inspection, which demonstrated this feature operated properly and entered it into the corrective action program. (Electrical, g)

Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action. The licensee failed to take timely action to correct the inability of plant operators to terminate safety injection after an inadvertent emergency core cooling system (ECCS) actuation at power within the time assumed in the plant design and licensing basis. This issue was initially identified in 1993 and had not been corrected as of the date of this inspection. (Operations-Mechanical, d, f)

Diablo Canyon

Green. A noncited violation was identified for inadequate corrective action to address an on-going problem with emergency core cooling system gas voiding in the common suction crossover line. The licensee had a sustained history of gas voiding in emergency core cooling system piping, which had the potential to lead to failure of the centrifugal charging pumps or safety injection pumps during the switchover from cold-leg recirculation to hot-leg recirculation during a loss-of-coolant accident. The team concluded that the corrective actions taken by the licensee focused on managing the symptom of the problem rather than finding and eliminating the cause of the voiding. (Mechanical, d)

Green. A finding was identified associated with the minimum flow settings for the auxiliary feedwater pumps. NRC Bulletin 88-04 identified that many pump minimum flow values were too low because they did not account for flow instability concerns. The team identified that when the licensee addressed this operating experience item, they did not properly verify the minimum flow settings with the pump manufacturer in accordance with the bulletin. A new analysis performed during the inspection by the manufacturer concluded that the existing minimum flow settings did not allow continuous operation. The manufacturer recommended an increased monitoring and maintenance schedule for the existing minimum flow values in order to promptly detect degradation. (Mechanical, c)

Green. A noncited violation was identified for inadequately translating design requirements into calculations used to demonstrate the capabilities of the pressurizer power operated relief valve backup accumulators. The calculation was found to contain a number of non-conservative errors and did not contain the most current acceptance criteria from accident analyses. As a result, this calculation failed to demonstrate that the backup nitrogen accumulators could operate the pressurizer power operated relief valves for the required number of cycles. Failure to properly demonstrate that the power operated relief valves could be cycled the number of times calculated to be necessary to respond to an inadvertent safety injection actuation was a violation of 10 CFR Part 50, Appendix B, Criterion III, “Design Control.”
(Mechanical, b)

Green. A finding was identified for modifying the diesel fuel oil transfer system without properly assessing the resulting net affect on reliability from introducing a new failure potential associated with new active components. As a result, the licensee rejected a small design change, which would have eliminated the failure mode when it was recognized that failure of the new pressure control valves could fail the train. Because the failure potential was not fully assessed, the licensee decided not to implement a change that would have eliminated the

impact of the failure, nor were the pressure control valves subject to any preventive maintenance to ensure their reliability. (Mechanical, b)

Green. A noncited violation was identified for failure to demonstrate that load sequencing would satisfy regulatory requirements. The team identified that a single postulated fault occurring during load sequencing with offsite power available could restart load sequencing timers in all three engineered safety features buses and result in a more limiting scenario than previously analyzed by the licensee. This could result in overlaping starting transients for motors that were intended to start separately, which was not evaluated in existing calculations. The combined effects of this could cause later starting times for safety-related loads, potentially affecting system performance assumed in accident analyses. Failure to demonstrate that the system could perform as required considering a single fault was a violation of 10 CFR Part 50, Appendix B, Criterion III, “Design Control.” (Electrical, c)

Green. A noncited violation was identified for not having a procedure to cross-tie fuel oil transfer trains in response to certain failures, contrary to the design and licensing basis of the system. The design and licensing basis of the diesel fuel oil transfer system credited the capability to cross-tie trains in order to meet requirements to maintain the system function and be able to withstand a worst-case single failure. The team identified that the licensee did not have a procedure or training to accomplish this task. Failure to incorporate design and licensing requirements into plant procedures was a violation of 10 CFR Part 50, Appendix B, Criterion III. (Operations-Mechanical, f)

Green. A noncited violation was identified for inadequate design control because the licensee did not properly account for vortex prevention in the calculation used to determine the usable volume in the diesel fuel oil storage tank, which could cause the pump to ingest air. The licensee was unable to locate a technical basis for this part of the calculation. The team independently calculated that 4.1 inches was necessary, compared to the 2.0 inches used in the calculation. The licensee performed a similar calculation and reached the same conclusion, which reduced the tanks' unusable volumes by a little less than 1,000 gallons in this 50,000 gallon tank. Failure to properly account for the unusable fuel oil storage tank volume necessary to prevent vortexing was a violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control." (Mechanical, a)

Green. A noncited violation was identified for inadequate design control, because Calculation STA-135, “Auxiliary Feedwater System,” Revision 2, which was intended to demonstrate that the auxiliary feedwater pumps have adequate capacity to meet their design basis, did not correctly identify the highest pressure under which the pumps needed to function. Specifically, the calculation did not account for the dynamic pressure loss between the feedwater inlet ring and the main steam safety valves. The licensee was able to perform an analysis that concluded the pumps had sufficient flow margin at the new pressure. Failure to properly translate the peak pressure against which the auxiliary feedwater pumps must deliver the required flow rate was a violation of 10 CFR Part 50, Appendix B, Criterion III, “Design Control.” (Mechanical, a)

Kewuanee

Green. The team identified a finding of very low safety significance for a failure to provide adequate relay setpoint calibration tolerances on safety buses 1-5 and 1-6 loss of voltage relays. The existing relay setting calibration tolerances would have allowed the loss of voltage relays to actuate spuriously during certain offsite electrical system disturbances and unnecessarily separate the safety buses from the offsite power system and result in a plant transient. (Electrical, a)

Green. The team identified a Non-Cited Violation of 10 CFR Part 50.63, "Loss of All Alternating Current Power," for a failure to maintain procedural steps that minimized the likelihood and duration of a Station Blackout (SBO) event. The deleted procedural steps allowed for the cross-connection of the plant's two redundant safety buses should both the Reserve Auxiliary Transformer and the 1B Emergency Diesel Generator fail. These procedural steps, as originally employed, served to lessen the likelihood of the SBO occurring, and/or reduce the time of the SBO. (Operations-Electrical, b)

Green. The team identified a finding of very low safety significance for a failure to provide adequate electrical coordination of protective devices thereby ensuring that postulated electrical faults would be isolated upon detection. Specifically, the team identified that the lack of adequate electrical systems coordination between the undervoltage and overcurrent protection on 4160 Vac safety bus 1-5 would result in the loss of voltage relays actuating before the bus over-current relays. This design deficiency results in the failure to lock out safety bus 1-5 upon postulated electrical faults and subjects the postulated faulted safety bus 1-5 to be re-energized via an alternate offsite source. This design introduced a challenge to the safety equipment availability and reliability. (Electrical, a)

Green. The team identified a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion II, "Quality Assurance Program," for a failure to identify potentially adverse conditions to the plant's fire protection safe shutdown analysis caused by known overduty conditions on non-safety related buses 1-1, 1-2, 1-3, and 1-4. While the overduty condition was known to have existed at least since 1992, the licensee never entered the issue into the plant's corrective action program, where a proper evaluation should have addressed 10 CFR Part 50, Appendix R, safe shutdown related effects. (Electrical, d)

Green. The team identified a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for failure to implement adequate design controls of documents, inputs, and assumptions in the design of the two safety-related batteries. Specifically, the licensee did not perform and control battery sizing calculations, including consideration of temperature effects, to ensure that the batteries maintained sufficient capacity to perform the intended design function. The team determined that the failure to appropriately evaluate effects of battery room and cell temperatures also affected the cross-cutting area of Problem Identification and Resolution because the subject of battery capacity versus battery temperature had been previously identified in a 1992 NRC inspection. (Electrical, d, e)

Severity Level IV. The team identified a finding involving a Non-Cited Violation of 10 CFR 50.59, "Changes, Tests, and Experiments." The finding involved a failure to perform an adequate review of operations procedure changes in accordance with 10 CFR Part 50.59 associated with the operation of motor-operated valves for the auxiliary feedwater suction source from the service water system. The team determined that the licensee's approval of

changes to Procedure E-0-05, with the introduction of adverse effects, and a determination that 10 CFR Part 50.59 was not applicable was a violation of 10 CFR Part 50.59. (Operations-Mechanical, g)

Green. The team identified a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for failure to establish the condensate storage tank (CST) level setpoint to transfer the auxiliary feedwater (AFW) pump suction supply from the CST to service water. The team determined that the calculation setpoint did not include an allowance for the manual operator actions required by emergency operations procedures. (Operations-Mechanical, f)

Green. The team identified a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control." The finding involved the condensate storage tank (CST) level setpoint to transfer the auxiliary feedwater (AFW) pump suction from the CSTs to service water. A calculation assumption stated that a flow would drain from the CSTs to the condenser for 10 minutes until the operators isolated the flow by closing manual valve MU-2A. The team determined that the actions could not be completed in the time assumed by the calculation. (Operations-Mechanical, f)

Green. The team identified a Non-Cited Violation of 10 CFR Part 50.63, "Loss of All Alternating Current Power." The finding involved the failure to establish a target reliability for the plant's alternate power source consistent with the reliability approved by the NRC staff in the licensee's Station Blackout submittal for 10 CFR Part 50.63. The non-conservative target reliability employed by the licensee resulted in the failure of the licensee to increase efforts to restore the Technical Support Center (TSC) Diesel Generator (DG) to its approved target reliability at an earlier date. (Electrical, g)

Unresolved. Auxiliary feedwater system vulnerabilities due to loss of suction. (Mechanical, a)

Inspection Finding Data By Program Area

Category	Code	Total Findings
Original Design	a	7
Caused by Modification	b	5
Lack of Analysis	c	2
Inadequate Corrective Action	d	8
Design Control Concern	e	3
Inadequate Operating Procedure	f	7
Other	g	4

Inspection Finding Data By Review Area

Finding Type	Total Findings
Electrical	10
Mechanical	12
Operations - Electrical	2
Operations - Mechanical	6

ASSESSMENT OF ENGINEERING PILOT PROGRAM DATA

Inspection Findings

	Green Findings	White or Greater Findings	Unresolved Items	Total Findings	Direct Inspection Hours (incl. contractors)
VY	8	0	1	8	910
VC Summer	3	0	1	3	830
Diablo Canyon	8	0	1	8	864
Kewaunee	9	0	1[2]	10	728
Total	28	0	4	29	3332

Total Findings Per 1000 hours = 29/3332 x 1000 = 8.7

Comparison With Baseline Program Data

	Total Findings Per 1000 hours
Engineering Pilot Program	8.7
Current Engineering Team Inspection - IP 71111.21 - combined 2002- 2004 data[3]	3.1
Baseline Program - Reactor Safety - 2004 data[4]	5.9
Baseline Program - Team Inspections Only - 2004 data[5]	6.9

[2]The unresolved item at Kewaunee is being counted as an inspection finding since it has been determined to be a performance deficiency and remains to be assessed for risk significance

[3]Assumes 100 hours for contractors on half of inspections

[4]Excludes findings from special inspections and event response

[5]Includes Fire Protection, SSDPC, and PI&R only