December 6, 2000

Mr. Harold W. Keiser
President and Chief Nuclear Officer
PSEG Nuclear Limited Liability Company
Post Office Box 236
Hancocks Bridge, NJ 08038

SUBJECT: HOPE CREEK NUCLEAR GENERATING STATION - NRC INSPECTION REPORT 05000354/2000-010

Dear Mr. Keiser:

On November 11, 2000, the NRC completed an inspection of your Hope Creek facility. The enclosed report presents the results of that inspection. The preliminary findings were presented to PSEG Nuclear management led by Mr. Larry Wagner in an exit meeting on November 15.

NRC inspectors examined numerous activities as they related to reactor safety and compliance with the Commission's rules and regulations, and with the conditions of your license. The inspection consisted of selective review of procedures and representative records, observations of activities, and interviews with personnel. Specifically, this inspection involved six weeks of resident inspection.

The inspectors identified one finding that was evaluated under the risk significance determination process and was determined to be of very low safety significance (Green). This finding has been entered into your corrective action program and is discussed in the summary of findings and in the body of the attached inspection report. Furthermore, the finding was determined to involve a violation of NRC requirements, but because of its very low safety significance, the violation is non-cited. If you deny this non-cited violation, a response should be provided within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at the Hope Creek facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Glenn W. Meyer, Chief,
Projects Branch 3
Division of Reactor Projects

Enclosure: Inspection Report 05000354/2000-010

cc w/encl:
E. Simpson, Senior Vice President and Chief Administrative Officer
M. Bezilla, Vice President - Technical Support Operations
D. Garchow, Vice President - Operations
G. Salamon, Manager - Licensing
C. Kresge, External Operations - Nuclear, Conectiv Energy
R. Kankus, Joint Owner Affairs
J. J. Keenan, Esquire
Consumer Advocate, Office of Consumer Advocate
F. Pompper, Chief of Police and Emergency Management Coordinator
M. Wetterhahn, Esquire
State of New Jersey
State of Delaware

Distribution w/encl:
Region I Docket Room (with concurrences)
J. Schoppy - NRC Resident Inspector
H. Miller, RA
J. Wiggins, DRA
G. Meyer, DRP
R. Barkley, DRP
C. O'Daniell, DRP
L. Prividy, DRS
J. Shea, OEDO
E. Adensam, NRR
R. Ennis, NRR

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No: License No:	50-354 NPF-57
Report No:	05000354/2000-010
Licensee:	PSEG Nuclear LLC
Facility:	Hope Creek Nuclear Generating Station
Location:	P.O. Box 236 Hancocks Bridge, NJ 08038
Dates:	October 1 - November 11, 2000
Inspectors:	J. G. Schoppy, Jr., Senior Resident Inspector J. D. Orr, Resident Inspector
Approved By:	Glenn W. Meyer, Chief, Projects Branch 3 Division of Reactor Projects

Summary of Findings

IR 05000354-00-10, on 10/01-11/11/2000, Public Service Electric Gas Nuclear LLC, Hope Creek Generating Station. Permanent Plant Modifications.

The inspection was conducted by resident inspectors. This inspection identified one green issue, which was a non-cited violation. The significance of this finding is indicated by its color (Green, White, Yellow, or Red) and was determined by the Significance Determination Process (SDP) in Inspection Manual Chapter 0609 (see Attachment 1).

A. Inspector Identified Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a non-cited violation for failure to properly implement fire protection program requirements for inoperable fire doors, in that the fire doors for three adjacent emergency diesel generator (EDG) rooms were allowed to be left open simultaneously for modifications without increasing the fire protection compensatory measures to the procedurally specified continuous fire watch.

  The safety significance of this finding was very low because of the availability of detection, the low combustible loading in the area, and the relative short duration of the condition (ten hours over five days). (Section 1RO17)

B. Licensed Identified Violations

The inspectors did not review any licensee identified violations.

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Report Details

SUMMARY OF PLANT STATUS

The Hope Creek plant operated continuously at or near full power for the duration of the inspection period except for planned power reductions on October 6 for A feedwater heater train corrective maintenance, on October 8 for turbine valve testing, and on October 29 for scram time testing.

1. REACTOR SAFETY
(Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity)

R01 Adverse Weather Protection

a. Inspection Scope

The inspectors reviewed PSEG Nuclear's implementation of HC.OP-GP.ZZ-0003, *Station Preparations for Winter Conditions*. The inspection focused on protection of the design features of the service water and fire protection systems. The inspectors performed walkdowns of portions of these risk significant systems to independently verify alignment of freeze protection power distribution, thermostat setpoints, fire water tank heater controls, ventilation louvers, and access doors. In addition, the inspectors reviewed notifications involving adverse weather preparations (20041886, 20041895, and 20046242).

The inspectors reviewed the following additional documents:

Updated Final Safety Analysis Report (UFSAR) Sections 7.4.1.1.2, 9.4.7.1, & 9.4.8
HC.OP-SO.KC-0001, *Fire Water System Operation*
HC.OP-SO.GQ-0001, *Service Water Intake Structure Ventilation System Operation*
OP-SO.GD-001, *Fire Pump House Ventilation System Operation*

b. Issues and Findings

No findings of significance were identified.

R04 Equipment Alignment

a. Inspection Scope

The inspectors verified by plant walkdowns and main control room tours that a planned equipment outage on the D station service water pump (SSW) did not adversely affect the redundant SSW pumps. The inspectors also verified that the D SSW pump was restored to an operable condition after the planned maintenance was complete. Additionally, the inspectors reviewed various corrective action notifications associated with equipment alignment deficiencies (20041440, 20041494, 20041701, 20043398, 20043442, 20043930, AND 20044190).

b. Issues and Findings

No findings of significance were identified.

R05 Fire Protection

a. Inspection Scope

The inspectors reviewed Hope Creek's Individual Plant Examination for External Events for risk insights and noted that a loss of heating, ventilation, and air conditioning (HVAC) is narrowly defined in the Hope Creek Generating Station (HCGS) probabilistic safety assessment. This initiating event is appropriate only for the situations in which either all Class 1E Panel Room HVAC is lost or all switchgear room cooling (all four channels) is lost. Only three compartments (5604, 5620 and 5703/5704) are capable of causing this initiating event.

The inspectors performed walkdowns of these areas and reviewed fire protection impairment reports. Additionally, the inspectors reviewed several notifications associated with fire protection deficiencies (20041267, 20041346, 20041601, 20041775, 20041922, 20041963, 20043385, and 20044169).

b. Issues and Findings

No findings of significance were identified.

R06 Flood Protection Measures

a. Inspection Scope

The inspectors reviewed notification 20041512 associated with a flood protection deficiency.

b. Issues and Findings

No findings of significance were identified.

R07 Heat Sink Performance

a. Inspection Scope

The inspectors reviewed notification 20044378 associated with emergency diesel generator (EDG) heat exchanger preventive maintenance.

b. Issues and Findings

No findings of significance were identified.

R11 Licensed Operator Requalification

a. The inspectors observed two simulator training scenarios, involving two different operating crews, to assess operator performance and training effectiveness. The scenarios involved the risk significant operator actions of reactor pressure vessel manual depressurization for low pressure injection and restoration of off-site power following a station blackout. The inspectors assessed simulator fidelity and observed the simulator instructor's critique of operator performance. The inspectors also reviewed the operator actions most important in preventing core damage as listed in SH.OP-AP.ZZ-0027, *On-Line Risk Assessment*, to evaluate the degree to which operator training is risk-informed.

b. Issues and Findings

No findings of significance were identified.

R12 Maintenance Rule Implementation

a. Inspection Scope

The inspectors reviewed all Hope Creek corrective action notifications initiated from June 16 to July 31, 2000, for maintenance rule screening. The inspectors further reviewed several notifications that included system functional failures or should have included system functional failure determinations (20033148, 20034847, 20035642, 20032919, 20028808, 20032170, 20036363, 20036095, 20033880, 20036154, 20033262, 20034075, and 20036147). The inspectors also reviewed Hope Creek Expert Panel Meeting Minutes (HCEP 00-09 and HCEP 00-10).

To assess implementation of 10CFR 50.65 *Maintenance Rule* requirements, the inspectors reviewed the following documents:

SE.MR.HC.02, *System Function Level Maintenance Rule VS Risk Reference*

NRC Regulatory Guide 1.160, *Monitoring the Effectiveness of Maintenance at Nuclear Power Plants*, Revision 2

NUMARC 93-01, *Industry Guideline For Monitoring the Effectiveness of Maintenance at Nuclear Power Plants*, Revision 2

b. Issues and Findings

No findings of significance were identified.

R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors reviewed the risk management for a planned D SSW pump outage and emergent work concerning excessive electrohydraulic control (EHC) system filter loading. The inspectors reviewed maintenance risk evaluations, work schedules, recent corrective action notifications, and control room logs to verify that other concurrent planned and emergent maintenance or surveillance activities did not adversely affect the plant risk already incurred with the SSW pump outage and EHC degraded condition. For the EHC condition, the inspectors performed a walkdown of the EHC system and reviewed the system operating procedure, the Technical Issues Fact Sheet (CR 70012186), and the corrective action plan. In addition, the inspectors reviewed other notifications involving risk assessment and emergent work (20041435, 20042091, 20043357, 20043712, 20044233, 20044403, 20045265, 20045776, 20046051, 20046164, AND 20046224).

b. Issues and Findings

No findings of significance were identified.

R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed an operability determination involving failure of containment isolation valve KL-HV-5152A to stroke fully closed during a quarterly in-service test. The inspectors also reviewed all other PSEG Nuclear identified safety-related equipment deficiencies during this report period and assessed the adequacy of the operability screenings.

b. Issues and Findings

No findings of significance were identified.

R16 Operator Workarounds

a. Inspection Scope

The inspectors reviewed the operator work-around list, corrective action notifications, operator logs, and instrument panel status to evaluate potential impacts on the operators' ability to implement abnormal or emergency operating procedures.

b. Issues and Findings

No findings of significance were identified.

R17 Permanent Plant Modifications

a. Inspection Scope

During a 1997 carbon dioxide system discharge test in EDG room 5307, the 3 hour rated fire door opened under pressure from the expanding carbon dioxide. As a compensatory measure for the degraded condition, fire protection isolated the automatic suppression system from the EDG rooms and maintained an hourly fire watch since 1997. Engineering developed a design change (ECA No. 80009844) to upgrade the EDG area fire doors to improve the enclosure structural integrity and prevent a recurrence of the 1997 failure. The inspectors performed frequent walkdowns of the EDG rooms during maintenance's implementation of this upgrade project to verify that the interim fire protection system configurations did not place the plant in an unsafe condition.

b. Issues and Findings

The inspectors identified a non-cited violation for failure to properly implement fire protection program requirements for inoperable fire doors. The safety significance of this finding was very low because of the availability of detection, low combustible loading in the area, and the relative short duration of the condition.

On October 17 the inspectors noted that the 3 hour rated fire doors for B, C, and D EDG rooms (FD5305A, FD5306A, and FD5304A) were simultaneously blocked open with the automatic suppression system disabled and fire protection personnel did not take additional compensatory measures beyond their previously established hourly fire watch. The inspectors noted that detection was available, combustible loading in the area was low, and that an hourly fire watch was maintained. Maintenance supervision stated that the doors were open for painting following the door modifications and that the duration was limited to two hours per day over a five day period. The inspectors reviewed the associated fire protection impairment permit and noted that fire protection had granted permission to concurrently open all eight fire doors to the four EDG rooms from October 16 through October 27. Fire protection engineers subsequently documented the adverse condition in notification 20047777 on November 20. As the inspectors brought the condition to the attention of fire protection personnel on October 17, the delay in initiating corrective actions appeared to indicate that fire protection personnel lacked a full awareness of the Appendix R design basis.

The inspectors discussed the significance of this issue with NRC regional fire protection experts and a senior reactor analyst. The issue involved a degradation in automatic suppression capability and fire barriers without appropriate compensatory measures. A 3 hour fire barrier separating redundant safe shutdown functions was affected, which necessitated a Phase 2 SDP. The risk screening included an assumption that adequate intervening combustibles existed to allow a fire to propagate throughout the three affected EDG rooms. This was conservative as the EDG rooms are separated by more than 20 feet and combustible loading is very low in the area. A quantification of degradation ratings (DR) of the individual defense-in-depth (DID) elements resulted in a DR of -1 (3 hour fire doors open: DR = 0, automatic suppression unavailable: DR = 0, no known degradation in manual fire fighting capability: DR = -1). There was no adjustments made for dependencies between DID elements or common cause contributions (between sprinkler systems and manual hose stations). Based on the HCGS IPEEE, a fire ignition frequency of 8.2E-03 was used. These factors resulted in a fire mitigation frequency of -3 and a delta core damage frequency (CDF) of 1 per 10^3 to 10^4. In the aggregate, the condition existed for less than 3 days which decreased the approximate frequency by a factor of 100. Based on the resultant estimated likelihood rating (F) and the needed safety functions for a loss of offsite power, the finding is characterized as Green by the SDP. The safety function analysis assumed only one of four EDGs available, no credit for degraded EDG restoration, high pressure coolant injection and reactor core isolation cooling system availability, and credit for operator action to recover offsite power in time to prevent core damage.

Hope Creek Generating Station Facility Operating License Condition 2.C.7 requires PSEG Nuclear to implement and maintain all provisions of the approved fire protection program as described in the final safety analysis report. Appendix 9A of the HCGS UFSAR, *Appendix R Comparison*, states that HCGS maintains Appendix R separation between two shutdown trains. Appendix R Section III.G.2 requires that separation of redundant trains shall be provided by (1) a fire barrier having a 3 hour rating, or (2) separation by not less than 20 feet horizontal distance plus automatic suppression and detection, or (3) a fire barrier having a 1 hour rating plus automatic suppression and detection. Fire protection procedure HC.FP-AP.ZZ-0004, *Actions For Inoperable Fire Protection*, specifies a continuous fire watch for an inoperable suppression system for areas in which redundant systems or components could be damaged. With inoperable automatic suppression and no 3 hour fire barrier between redundant EDG rooms, fire protection personnel failed to establish a continuous fire watch. This is a violation of License Condition 2.C.7. However, because the violation is of very low significance and the deficiency was entered into the corrective action system (notification 20047777), this finding is being treated as a non-cited violation, consistent with Section VI.A of the Enforcement Policy, issued on May 1, 2000 (65FR25368). **(NCV 05000354/2000-010-01)**

R19 <u>Post Maintenance Testing</u>

a. <u>Inspection Scope</u>

The inspectors witnessed post maintenance testing (PMT) on the B safety auxiliaries cooling loop heat exchanger bypass high temperature isolation valve, the F FRVS (filtration, recirculation ventilation system) recirculation fan, and the C SSW pump. The inspectors reviewed NC.NA-TS.ZZ-0050, *Maintenance Testing Program Matrix,* and verified that the PMTs were adequate for the scope of maintenance performed. The inspectors also reviewed notifications concerning problems associated with PMTs (20041669, 20041818, 20042182, 20044754, 20045922, and 20046143).

b. <u>Issues and Findings</u>

No findings of significance were identified.

R22 Surveillance Testing

a. Inspection Scope

The inspectors observed portions of and reviewed the results of the A residual heat removal pump in-service test and the B EDG 24 hour operability run and hot restart test. The inspectors reviewed the test procedures to verify that applicable system requirements for operability were incorporated correctly into the test procedures, test acceptance criteria were consistent with the TS and updated final safety analysis requirements, and the systems were capable of performing their intended safety functions. The inspectors observed a chemistry technician sample and analyze the reactor coolant system (RCS) to demonstrate that the specific activity was within TS 3.4.5 limits. The inspectors also reviewed notifications concerning problems encountered during surveillance testing (20041774, 20041804, 20042160, 20042663, 20042787, 20043535, 20043669, 20044831, 20045257, and 20045878).

The inspectors reviewed the following documents during this inspection:

A Residual Heat Removal Pump In-service Test (HC.OP-IS.BC-0001)
RHR Hydraulic Analysis Design Calculation (BC-0056) pages 10-12
EDG 1BG 400-24 Hour Operability and Hot Restart Test (HC.OP-ST.KJ-0015)

b. Issues and Findings

No findings of significance were identified.

R23 Temporary Plant Modifications

a. Inspection Scope

The inspectors reviewed notification 20044846 associated with a temporary plant modification deficiency.

b. Issues and Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness [EP]

EP1 Drill, Exercise, and Actual Events

a. The inspectors observed two PSEG Nuclear-evaluated training evolutions on the simulator, which contributed data to the performance indicator for drill/exercise performance. The inspectors observed the evaluation team’s critique to evaluate the adequacy of PSEG Nuclear’s assessment of operator performance to identify weaknesses and deficiencies. The inspectors reviewed the simulator scenarios and operator performance with primary focus on proper event classification.

The inspectors reviewed the following documents during this inspection:

HCGS Event Classification Guide
NEI 99-02, Revision 0, *Regulatory Assessment Performance Indicator Guideline*

b. Issues and Findings

No findings of significance were identified.

4. OTHER ACTIVITIES [OA]

OA1 Performance Indicator Verification

.1 Reactor Coolant System Specific Activity

a. Inspection Scope

The inspectors verified the methods used to calculate the performance indicator (PI) on *Reactor Coolant System (RCS) Specific Activity* and reviewed the accuracy of PI data submitted for the months of July, August, and September 2000. The inspectors observed a chemistry technician sample and analyze the RCS (see also Section 1R22). In addition, the inspectors verified that PSEG Nuclear took adequate corrective actions to address the minor deficiencies identified during a similar review in October 1999 (see NRC Integrated Inspection Report 05000354/99007 Section 4OA2.1).

b. Observations and Findings

No findings of significance were identified.

.2 Reactor Coolant System Leakage

a. Inspection Scope

The inspector verified the methods used to calculate the PI on *Reactor Coolant System Leakage.* The inspectors verified the accuracy of PI data submitted through review of the applicable page in the daily TS surveillance data sheet (HC.OP-DL.ZZ-0026, *Surveillance Log - Control Room*) for the period November 1999 through September 2000.

b. Observations and Findings

No findings of significance were identified.

OA2 Identification and Resolution of Problems

Inspection findings in previous sections of this report also had implications regarding PSEG Nuclear's identification, evaluation, and resolution of problems, as follows:

> Section 1RO17 - Failure to properly implement fire protection program requirements for inoperable fire doors. This demonstrated weak identification of a design basis configuration control problem.

Additional items associated with the corrective action program were reviewed without findings and are listed in Sections 1R01, 1R04, 1RO5, 1R06, 1R07, 1R12, 1R13, 1R15, 1R16, 1R19, 1R22, and 1R23 of this report.

OA5 Other

INPO Evaluation Report Review

The inspectors reviewed the Institute for Nuclear Power Operations (INPO) Interim Report for the INPO evaluation of Salem and Hope Creek Generating Stations conducted September 11-22, 2000.

OA6 Management Meetings

a. Exit Meeting Summary

On November 15, the inspectors presented their overall findings to members of PSEG Nuclear management led by Mr. Larry Wagner. PSEG Nuclear management stated that none of the information reviewed by the inspectors was considered proprietary.

b. PSEG Nuclear/NRC Management Meeting

On October 27 Dr. Richard Meserve, NRC Chairman, and Mr. Hub Miller, Region I Administrator, met with members of PSEG Nuclear management; discussed regulatory issues during a working lunch; toured the Salem and Hope Creek plants; and answered questions from the media.

SUPPLEMENTAL INFORMATION

a. Key Points of Contact

Nick Conicella, Nuclear Training Supervisor - Licensed Training
Sam Jones, Maintenance Team #3 Department Lead
Kurt Krueger, Operations Manager
Mike Mohney, System Engineering Manager
Devon Price, Assistant Operations Manager
Gabor Salamon, Licensing Manager
Larry Wagner, Work Management Department Lead

b. List of Items Opened, Closed, and Discussed

Opened/Closed

05000354/2000-010-01	NCV	Failure to properly implement fire protection program requirements for inoperable fire doors. (Section 1R17)

c. List of Documents Reviewed

In addition to the documents identified in the body of this report, the inspectors reviewed the following documents and records:

HCGS UFSAR
Technical Specification Action Statement Log (SH.OP-AP.ZZ-108)
HCGS NCO Narrative
HCGS Plant Status Report
HCGS PSA Risk Evaluation Forms for Work Week Nos. 143 - 148
Main Turbine Control Oil (EHC) System Operation, (HC.OP-SO.CH-0001)
HCGS Probabilistic Safety Assessment, Revision 1.1, dated March 10, 2000
NEI 99-02, Revision 0, *Regulatory Assessment Performance Indicator Guideline*
ECA No. 80009844, *Hope Creek Emergency Diesel Generator CO2 Related Room Upgrades*

d. List of Acronyms

CDF	Core Damage Frequency
DID	Defense-In-Depth
DR	Degradation Ratings
EDG	Emergency Diesel Generator
EHC	Electrohydraulic Control
FRVS	Filtration, Recirculation Ventilation System
HCGS	Hope Creek Generating Station
HVAC	Heating, Ventilation, and Air Conditioning
INPO	Institute for Nuclear Power Operations

NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
PI	Performance Indicator
PMT	Post Maintenance Testing
PSEG	Public Service Electric Gas
RCS	Reactor Coolant System
SDP	Significance Determination Process
SSW	Station Service Water
UFSAR	Updated Final Safety Analysis Report

ATTACHMENT 1

NRC's REVISED REACTOR OVERSIGHT PROCESS

The federal Nuclear Regulatory Commission (NRC) recently revamped its inspection, assessment, and enforcement programs for commercial nuclear power plants. The new process takes into account improvements in the performance of the nuclear industry over the past 25 years and improved approaches of inspecting and assessing safety performance at NRC licensed plants.

The new process monitors licensee performance in three broad areas (called strategic performance areas): reactor safety (avoiding accidents and reducing the consequences of accidents if they occur), radiation safety (protecting plant employees and the public during routine operations), and safeguards (protecting the plant against sabotage or other security threats). The process focuses on licensee performance within each of seven cornerstones of safety in the three areas:

Reactor Safety

- Initiating Events
- Mitigating Systems
- Barrier Integrity
- Emergency Preparedness

Radiation Safety

- Occupational
- Public

Safeguards

- Physical Protection

To monitor these seven cornerstones of safety, the NRC uses two processes that generate information about the safety significance of plant operations: inspections and performance indicators. Inspection findings will be evaluated according to their potential significance for safety, using the Significance Determination Process, and assigned colors of GREEN, WHITE, YELLOW or RED. GREEN findings are indicative of issues that, while they may not be desirable, represent very low safety significance. WHITE findings indicate issues that are of low to moderate safety significance. YELLOW findings are issues that are of substantial safety significance. RED findings represent issues that are of high safety significance with a significant reduction in safety margin.

Performance indicator data will be compared to established criteria for measuring licensee performance in terms of potential safety. Based on prescribed thresholds, the indicators will be classified by color representing varying levels of performance and incremental degradation in safety: GREEN, WHITE, YELLOW, and RED. GREEN indicators represent performance at a level requiring no additional NRC oversight beyond the baseline inspections. WHITE corresponds to performance that may result in increased NRC oversight. YELLOW represents performance that minimally reduces safety margin and requires even more NRC oversight. And RED indicates performance that represents a significant reduction in safety margin but still provides adequate protection to public health and safety.

The assessment process integrates performance indicators and inspection so the agency can reach objective conclusions regarding overall plant performance. The agency will use an Action Matrix to determine in a systematic, predictable manner which regulatory actions should be taken based on a licensee's performance. The NRC's actions in response to the significance (as represented by the color) of issues will be the same for performance indicators as for inspection findings. As a licensee's safety performance degrades, the NRC will take more and increasingly significant action, which can include shutting down a plant, as described in the Action Matrix.

More information can be found at: http://www.nrc.gov/NRR/OVERSIGHT/index.html.