

# Quad Cities 1

## 2Q/2009 Plant Inspection Findings

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### Initiating Events

**Significance:**  Dec 31, 2008

Identified By: NRC

Item Type: FIN Finding

#### **EXPLOSION OF THE FDSgT VESTIBULE.**

A self-revealed finding of very low safety significance was identified for inadequate procedures that resulted in an onsite explosion on October 27, 2008. Specifically, operating procedures for the floor drain surge tank did not include appropriate warnings, cautions, or notes to alert operators to potentially hazardous conditions or operating sequences that could result in localized elevated concentrations of methane gas. As a result, waste water transfer activities resulted in an accumulation of methane gas in the floor drain surge tank building vestibule that subsequently ignited, damaging the onsite structure and putting the station in an emergency plan Unusual Event. Corrective actions for the affected tank included purging the tank with nitrogen, repairing the installed tank ventilation, monitoring for methane gas buildup until the tank is cleaned, and processing the waste water stored in the tank. Restrictions on system operation are in place pending final procedure revisions.

The finding is more than minor because if left uncorrected this finding would become a more significant safety concern. In addition, it affected the Reactor Safety: Initiating Events Cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the Reactor Safety: Initiating Events Cornerstone attribute of protection against external factors relating to production and control of hazardous gasses. The finding is of very low safety significance (Green) because the finding does not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions would not be available. Additionally, the finding does not increase the likelihood of a fire affecting mitigating systems or a fire of significant duration. Inspectors determined that the finding had a cross-cutting aspect in the area of Problem Identification and Resolution. Specifically, the inspectors determined that the licensee was aware of industry events involving the anaerobic production of methane gas in radwaste systems and had opportunities to incorporate relevant industry operating experience into recent revisions of radwaste operating procedures, but failed to implement this operating experience into station processes, procedures, and training programs for radwaste operations (P.2 (b)). The failure to establish and implement effective radwaste operating procedures to prevent the production of combustible gasses is not an activity affecting quality subject to 10 CFR Part 50, Appendix B, Criterion V. Therefore, while a performance deficiency was identified, no violation of NRC regulatory requirements occurred.

Inspection Report# : [2008005](#) (*pdf*)

**Significance:**  Sep 30, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

#### **Inadvertent Initiation of the Unit 1 Feedwater Regulating Valve Fire Protection Deluge**

On August 20, a self-revealing finding of very low safety significance and associated Non-Cited Violation (NCV) of Technical Specification (TS) 5.4.1 were identified for an inadequate work instruction for Work Order 00781735-01, "Replace Power Supply for Unit 1 FRV [feedwater regulating valve] Deluge System." The inspectors determined that the work instructions for the activity did not include instructions to prevent deluge system actuation and led to an unplanned initiation of the Unit 1 feedwater regulating valve deluge system. A lockup of the '1B' feedwater regulating valve resulted due to conflicting control signal inputs. The inspectors determined that there were opportunities in the preparation and execution of the work instruction to prevent an unplanned initiation of the deluge system. Questions were asked by the instrument maintenance technicians in the pre-job brief about the function of the batteries in the fire control panel. The supervisor responded that the batteries supplied alarm backup and memory

power only. The work continued on this response rather than obtaining more complete documentation or additional vendor assistance. The inspectors identified that the lack of rigor to validate system function and identify possible unintended consequences was a contributor to the event. The inspectors determined that the event was cross-cutting in the area of Human Performance, Decision Making, Conservative Assumptions (H.1 (b)). Corrective actions were to isolate the deluge to stop the event and identify and wipe down wet equipment in the area. After verification that the feedwater regulating valve control cabinets were dry, the 'B' feedwater regulating valve was returned to automatic operation. The work to replace the alternating current power supply in the fire protection panel was then reevaluated, instructions corrected, and work completed.

The inspectors determined that the failure to implement appropriate work instructions for changing power supplies in fire protection panels without causing an unplanned initiation of the deluge system is a performance deficiency and is more than minor because it impacts the Initiating Events Cornerstone attribute of procedure quality to limit the likelihood of events that upset plant stability. This event could reasonably be viewed as a precursor to a more significant event. The inspectors performed a Phase 1 SDP evaluation and determined that the answer to Initiating Events Cornerstone, Transient Initiators question 1 of Table 4A of Manual Chapter 0609.04 was "No," and determined that the worst case event would not likely result in mitigation equipment functions being unavailable. The issue is therefore screened as Green, and determined to be of very low safety significance.

Inspection Report# : [2008004](#) (*pdf*)

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## Mitigating Systems

**Significance:**  Jun 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

### **INADEQUATE PROCEDURAL GUIDANCE FOR SHUTDOWN AFTER OPERATING BASIS EARTHQUAKE**

A finding of very low safety significance and associated Non-Cited Violation was identified by NRC inspectors for an inadequate procedure, QCOA 0010-09 "Earthquake." This procedure did not direct a shutdown in response to an earthquake event in excess of the operating basis earthquake threshold. 10 CFR 100 Appendix A, Section V(a)(2) states, "If vibratory ground motion exceeding that of the Operating Basis Earthquake occurs, shutdown of the nuclear power plant will be required." Upon discovery, the licensee implemented immediate changes to QCOA 0010-09. This finding was more than minor because this performance deficiency challenged the Reactor Safety - Mitigating Systems Cornerstone attribute of procedure quality. The inspectors performed a Phase 1 SDP screening using inspection manual chapter (IMC) 0609, Attachment 4, Table 4a for the Mitigating Systems Cornerstone. All questions were answered "no" and the issue screened as Green, or very low safety significance. The inspectors determined that this finding did not have a cross-cutting aspect because this procedure has been in place since initial operation and this deficiency was determined to be a latent issue not readily identified through the procedure revision process.

Inspection Report# : [2009003](#) (*pdf*)

**Significance:**  Jun 30, 2009

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **TRIP OF UNIT 2 FUEL POOL COOLING WATER PUMPS DURING SCORPION PLATFORM REMOVAL**

A finding of very low safety significance and Non-Cited Violation of 10 CFR 50.65(a)(4) was self-revealed on May 11, 2009, when the licensee staff failed to manage water level in the spent fuel pool and associated skimmer surge tanks resulting in the Unit 2 fuel pool cooling pumps tripping off while removing the Scorpion platform from the Unit 1 reactor cavity. Immediate corrective actions for this event included refilling the skimmer surge tank and restarting the fuel pool cooling pumps to restore alternate decay heat removal. The inspectors determined that the failure to take adequate action to manage the risk associated with a maintenance activity with a potential to affect a key shutdown safety function was a performance deficiency and a finding. Inspectors determined that the finding was cross-cutting

in the area of Human Performance – Work Control for failure to coordinate work activities by incorporating actions to adequately address the need for work groups to communicate, coordinate and cooperate with each other during activities in which interdepartmental coordination is necessary to assure plant and human performance (H.3(b)). The inspectors determined the finding was more than minor because the failure to implement the management actions resulted in the critical safety function being degraded and is associated with 10 CFR 50.65(a)(4) risk management. The inspectors performed a Phase 1 SDP evaluation and determined that the issue is Green because the Unit 1 pumps remained running with no issues during the event and plant operators were able to recover the Unit 2 cooling pumps before any discernable change in temperature occurred (answer to all questions of Manual Chapter 0609, Attachment 4, Table 4a, Mitigating Systems Cornerstone and Barrier Cornerstone were “no” and the issue screened as Green). Since the finding concerned risk management actions, the inspectors verified the finding was Green using Manual Chapter 0609, Appendix K flowcharts and validated that there was no change in risk thresholds as a result of the event.

Inspection Report# : [2009003](#) (*pdf*)

**Significance:**  Mar 31, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

### **BROKEN LATCH ON FIRE DOOR 145**

Inspectors identified a Non-Cited Violation of License Condition 3.F, having very low safety significance for failure to ensure that Fire Door 145 could be positively latched. Section 2-8.4.4 of the National Fire Protection Association (NFPA) 80-1975, “Fire Doors and Windows,” required that closing mechanisms be adjusted to overcome the resistance of the latch mechanism so that positive latching is achieved on each door operation. As a result of the discovery of the broken latch, that prevented the fire door from positively latching, the licensee initiated an action request report (AR 864090), and established the immediate actions to return Fire Door 145 to service. The licensee declared the fire door inoperable, issued fire impairment No. 1612 and established an hourly watch. Repairs to the door were completed and the fire door was declared operable the same day.

The finding was determined to be more than minor because a lack of positive latching could result in the door opening during a fire, thereby allowing a fire to affect additional equipment important to safety in the exposed fire zone. Based on screening under IMC 0609, Appendix F, “Fire Protection Significance Determination Process,” the inspectors determined that a Phase 2 analysis was required. The inspectors determined that the change in core damage frequency associated with the finding was significantly less than  $1 \times 10^{-6}$  per year. As such, the finding was determined to be of very low safety significance (i.e., Green). This finding has a cross-cutting aspect in the area of Human Performance for the Resources component because the licensee did not provide adequate training to personnel. Specifically, as noted in the licensee’s corrective action document, annual training on fire barriers was inadequate in that equipment operators (EOs) did not consistently challenge fire doors in accordance with training (H.2(b)).

Inspection Report# : [2009002](#) (*pdf*)

**Significance:**  Mar 31, 2009

Identified By: Self-Revealing

Item Type: FIN Finding

### **UNIT 1F DRYWELL COOLER IMPROPER RESTORATION FROM MAINTENANCE**

A self-revealed finding of very low safety significance was identified by the inspectors for incorrect wiring of the circuit breaker for the 1F drywell cooler following system restoration from a breaker cubicle inspection. The wiring discrepancy was not detected in the post-maintenance testing and resulted in the drywell cooler motor rotating in the wrong direction. This equipment malfunction resulted in a high temperature alarm in the upper area of the Unit 1 drywell. The wiring deficiency was corrected and the 1F drywell cooler was restored to service. Temperatures in the Unit 1 drywell returned to normal.

The inspectors determined that the incorrect wiring of the circuit breaker for the 1F drywell cooler was a performance deficiency and was more than minor because, if left uncorrected, the failure to correctly reinstall wiring could lead to unplanned unavailability of safety-related or risk-significant equipment and would become a more significant safety concern. This performance deficiency also challenged the Mitigating Systems Cornerstone attribute of availability for equipment operated per emergency operating procedures. The inspectors concluded that the issue was of very low safety significance (Green) because the issue involved a single drywell cooler and did not impact the function,

reliability or capability of the other six drywell coolers or any other equipment that would be operated per the emergency operating procedures. The inspectors determined that this finding was cross-cutting in the area of Human Performance, Work Practice because inadequate documentation of work activities was a significant contributor to the performance deficiency (H.4(a)).

Inspection Report# : [2009002](#) (pdf)

**Significance:**  Dec 31, 2008

Identified By: NRC

Item Type: FIN Finding

**FAILURE TO REMOVE FME DEVICE.**

A self-revealed finding of very low safety significance (Green) was identified for failure to remove a foreign material exclusion device from the thrust bearing oil supply line of a feed pump during maintenance on November 3, 2008. The pump was returned to service with increased monitoring following the work activity on November 5 and was shutdown for repair on November 7 after the control room received a bearing high temperature alarm. Immediate corrective actions for the equipment condition included lowering power to get flow within the capacity of two feedwater pumps, shutdown of the 1B pump, removal of the plug, correct reassembly of the oil line, and pump restart. Corrective action following the site investigation included retraining provided to Maintenance staff for documentation requirements and expectations for thorough post-maintenance inspections.

The inspectors determined that failure to remove the foreign material exclusion plug was more than minor because if left uncorrected, this behavior could lead to damage of safety-related or risk-significant equipment and thus become a more significant safety concern. The issue impacted the mitigating systems cornerstone objective of ensuring the availability, reliability and capability of systems that responds to initiating event to prevent undesirable consequences. The finding is of very low safety significance (Green) because the problems with a single feedwater pump did not impact the function, reliability or capability of the other two and the issue did not affect other mitigating systems. The inspectors determined that this finding was cross-cutting in the area of Human Performance Work Practices in that error prevention techniques such as self/peer checking and proper documentation of activities were not utilized commensurate with the risk of the assigned task (H.4 (a)). Failure to remove the plug in non-safety related equipment is not an activity affecting quality subject to 10 CFR Part 50, Appendix B, Criterion V. Therefore, while a performance deficiency was identified, no violation of NRC regulatory requirements occurred.

Inspection Report# : [2008005](#) (pdf)

**Significance:**  Oct 24, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

**Use of Non-Conservative Inputs and Methodologies in Calculating Terminal Voltages to Safety-Related MOV Motors During Design Basis Events**

A finding of very low safety significance (Green) involving a NCV of 10 CFR Part 50, Appendix B, Criterion III, Design Control, was identified by the inspectors for the failure to evaluate the effect of lower transient voltages that would exist for safety injection actuated motor-operated valves (MOVs) prior to voltage recovery on the upstream 4Kv buses. Specifically, the licensee used non-conservative inputs and methodologies in calculating terminal voltages to safety-related MOV motors. The licensee entered the issue into their corrective action program and performed an operability review of all safety injection actuated valves to verify they had sufficient margin to operate when considering transient voltage conditions.

The finding was more than minor because it was similar to IMC 0612, Appendix E, Example 3.j, in that there was a reasonable doubt on the operability of several low pressure coolant injection valves that would have to operate at voltages as low as 60 percent of rating. The inspectors determined the finding was of very low safety significance because it was a design deficiency that did not result in actual loss of safety function. This finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Operating Experience because the licensee did not adequately evaluate a similar issue in an NRC Information Notice. (P.2(a)).

Inspection Report# : [2008007](#) (pdf)

**G****Significance:** Oct 24, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

**Inadequate Calculations/Analyses and Testing for Thermal Overload Relays (TOLs) on Safety-Related MOVs**

A finding of very low safety significance (Green) and associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified by the inspectors for the failure to assure that thermal overload relays (TOLs) on safety-related motor-operated valve (MOV) circuits were sized properly and periodically tested. The licensee entered this issue into its corrective action program and was able to demonstrate operability, in that the TOLs would not prevent any MOVs from performing their safety function.

The finding was more than minor because it was similar to IMC 0612, Appendix E, Example 3.j, in that failing to assure that TOLs on safety-related MOV circuits were sized properly and periodically tested led to there being a reasonable doubt as to the operability of the affected safety-related MOVs. The issue was of very low safety significance because the inspectors determined it was a design deficiency that did not result in actual loss of safety function. This finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Self-Assessment because the licensee incorrectly evaluated this issue as not being a concern during a self-assessment. (P.3(a)).

Inspection Report# : [2008007](#) (*pdf*)**G****Significance:** Oct 24, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

**Seismic Qualification of 250 VDC Batteries**

A finding of very low safety significance (Green) and associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified by the inspectors for the failure to assure that 250VDC safety-related batteries were installed in accordance with their seismic qualification. The licensee entered this nonconformance into its corrective action program and initiated work orders to replace the intercell spacers with properly sized material. To establish a reasonable assurance of operability, the licensee reviewed seismic experience database reports from the Seismic Qualification Utility Group.

The finding was determined to be more than minor because the finding was conceptually similar to IMC 0612, Appendix E, Example 3a, in that rework (spacer replacement) was required to restore seismic qualification. The issue was of very low safety significance because the inspectors determined it was a qualification deficiency that did not result in actual loss of safety function. The inspectors determined there was no cross-cutting aspect associated with this finding.

Inspection Report# : [2008007](#) (*pdf*)**G****Significance:** Oct 24, 2008

Identified By: NRC

Item Type: FIN Finding

**Inaccurate RCIC Instrument Setpoints**

A finding of very low safety significance was identified by the inspectors for failure to accurately implement the design setpoint for reactor core isolation cooling turbine exhaust pressure switches 1(2)-1360-26A/B. The licensee entered this issue into its corrective action program and was able to demonstrate operability by determining that the setpoints would not be challenged for scenarios where reactor core isolation cooling was credited.

The finding was determined to be more than minor because the finding was conceptually similar to IMC 0612, Appendix E, Example 3a, in that rework (instrument recalibration) was required to restore conformance with the design. The issue was of very low safety significance because the inspectors determined it was a design deficiency that did not result in actual loss of safety function. This finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program because the licensee did not adequately evaluate the issue in 2004 such that it was properly classified and prioritized. (P.1(c))

Inspection Report# : [2008007](#) (*pdf*)

**G****Significance:** Sep 30, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Adequately Assess and Manage Risk Associated with Work on U1 SBO.**

NRC inspectors identified a finding of very low safety significance and an associated NCV of 10 CFR 50.65(a) (4), "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," when the licensee failed to effectively evaluate the risk associated with work on the Unit 1 station blackout (SBO) diesel generator, which resulted in an unplanned risk condition for Unit 1 and Unit 2 without the appropriate risk management actions. Specifically, the Unit 2 SBO diesel generator was determined to be unavailable after inspectors found the oil level in the governor below the indicating sight glass level due to leakage from a loose connection. Concurrently, the Unit 1 SBO diesel generator was unavailable due to planned maintenance. When unavailability of the Unit 2 SBO diesel generator was factored into the on-line risk model with the Unit 1 SBO diesel generator unavailable, the risk profile changed from Green to Yellow. Since the Unit 2 SBO diesel generator was assumed to be available in the original risk evaluation, the underestimation of risk resulted in the station having no risk management actions in place as would have been required by procedure. Those actions include protecting pathways of safety-related equipment that could have a significant impact on the increase in risk, if unavailable. The inspectors also determined that the finding has a cross-cutting aspect in the area of Human Performance, Resources Component, Documentation Aspect because the licensee failed to provide timely and up-to-date procedures to check the engine governor oil sight glass level following the permanent modification to a different governor model that has an oil level sight glass (H.2(c)). Corrective actions included protecting the appropriate equipment and contacting mechanical maintenance to have the fitting tightened and the governor oil sump refilled to the proper level. The Operations Department initiated a process requiring a walkthrough verification of redundant equipment areas before removing equipment from service. Additionally, procedure revisions to operator rounds were made to include verification of sight glass level.

The finding is determined to be more than minor because the finding is based on incorrect assumptions that changed the outcome of the risk assessment and therefore crossed the risk threshold requiring additional actions to manage the risk. The inspectors evaluated this finding using the Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process," worksheets of IMC 0609 because the finding is a maintenance risk assessment issue. Flowchart 1, "Assessment of Risk Deficit," requires the inspectors to determine the risk deficit associated with this issue. This finding was determined to be of very low safety significance because the incremental core damage probability deficit was less than 1E 6.

Inspection Report# : [2008004](#) (*pdf*)

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## Barrier Integrity

**G****Significance:** Jun 30, 2009

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

**INADEQUATE PROCEDURAL ADHERENCE DURING UNIT 1 TIP PM TESTING**

A finding of very low safety significance and associated Non-Cited Violation of 10 CFR 50, Appendix B, Criterion V was self-revealed during the performance of the Unit 1 traversing incore probe (TIP) modification testing on March 27, 2009. During modification testing, the #2 TIP retracted past the shielded position into the reactor building as a result of failure of test personnel to follow the test procedure. The control room received a, "Rx Bldg Hi Radiation" alarm from the local area radiation monitor. Radiation Protection personnel were on scene to evacuate personnel, track dose rates and to set up boundaries to prevent entry. There were no over exposures and no danger to the health and safety of other radiological workers as a result of this event. The inspectors determined that this finding has a cross-cutting aspect in the area of Human Performance, Work Practice - Expectations. The test coordinator position did not have a qualification program or documented management expectations for procedure adherence (H.4(b)).

The inspectors determined that the failure of the test coordinator and instrument maintenance technicians to follow an approved procedure, TIC-2306, "Automated TIP Control Unit (ATCU) Modification Test," was a performance deficiency and a finding. This finding was more than minor because if left uncorrected, this performance deficiency has the potential to lead to a more significant safety concern. The inspectors performed a Phase 1 SDP screening.

Inspection Manual Chapter 0609, Attachment 4, Table 4a, Mitigating Systems Cornerstone questions were all answered “no.” Therefore the issue screened as Green, or very low safety significance.

Inspection Report# : [2009003](#) (*pdf*)

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## Emergency Preparedness

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## Occupational Radiation Safety

**Significance:**  Mar 31, 2009

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **FAILURE TO COMPLY WITH TECHNICAL SPECIFICATION AND RADIATION WORK PERMIT REQUIREMENTS DURING WORK IN A LOCKED HIGH RADIATION AREA**

A self-revealed finding of very low safety significance and an associated Non Cited Violation (NCV) of Technical Specification 5.7.1 was identified by inspectors for the failure to comply with the requirements of the radiation work permit during work activities in the radwaste basement, an area controlled as a locked high radiation area. Specifically, on January 13, 2009, an equipment operator failed to inform the radiation protection staff prior to access into overhead areas above 7 feet. Consequently, the worker entered areas which had not been surveyed, and, therefore, the radiological conditions were unknown. As a result, the worker encountered radiation levels greater than those anticipated for the work activity. The licensee’s corrective actions included counseling of the involved individual and conducting a standdown with the operations department to reinforce radiological requirements along with communication expectations. The licensee was also in the process of completing an apparent cause evaluation to formulate additional actions to prevent recurrence.

The finding was more than minor because it impacted the program and process attribute of the Occupational Radiation Safety Cornerstone and affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation, in that, access into high radiation areas whose radiological conditions were unknown placed the worker at risk for unnecessary radiation exposure. The finding was determined to be of very low safety significance because it was not an as-low-as-is-reasonably-achievable (ALARA) planning issue, there was no overexposure or substantial potential for an overexposure, and the licensee’s ability to assess worker dose was not compromised. The finding involved a cross-cutting aspect in the area of Human Performance related to Work Practices, in that, radiation work permit (RWP) compliance for access into overhead areas was not effectively communicated to the worker and the worker failed to follow the RWPs (H.4(b)).

Inspection Report# : [2009002](#) (*pdf*)

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## Public Radiation Safety

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## Physical Protection

Although the NRC is actively overseeing the Security cornerstone, the Commission has decided that certain findings pertaining to security cornerstone will not be publicly available to ensure that potentially useful information is not provided to a possible adversary. Therefore, the [cover letters](#) to security inspection reports may be viewed.

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## Miscellaneous

**Significance:** N/A Aug 08, 2008

Identified By: NRC

Item Type: FIN Finding

### **PI&R Assessment**

On the basis of the sample selected for review, the team concluded that implementation of the CAP was generally good. The licensee had a low threshold for identifying problems and entering them in the CAP. Items entered into the CAP were screened and prioritized in a timely manner using established criteria; were properly evaluated commensurate with their safety significance; and corrective actions were generally implemented in a timely manner, commensurate with the safety significance. The team noted that the licensee reviewed operating experience for applicability to station activities. Audits and self assessments were determined to be performed at an appropriate level to identify deficiencies. On the basis of licensee self-assessments and interviews conducted during the inspection, workers at the site expressed freedom to raise safety concerns. The team observed that some significant adverse trends in human performance and equipment clearances and tagging were not initially identified and aggressively addressed for effective results. Subsequent efforts were more effective.

Inspection Report# : [2008008](#) (*pdf*)

Last modified : August 31, 2009