

Summer 3Q/2013 Plant Inspection Findings

Initiating Events

Mitigating Systems

Significance: G Sep 30, 2013

Identified By: NRC

Item Type: FIN Finding

Failure to develop adequate corrective action for a condition adverse to quality involving the loss of the alternate AC transformer

The inspectors identified a Green finding of licensee procedure, SAP-999, "Corrective Action," Revision 11 for the failure to develop corrective actions for a Level 3 condition report (CR) which described a condition adverse to quality (CAQ) associated with the loss of transformer, XTF-5052, alternate AC source.

The inspectors determined that the failure to develop corrective actions for a Level 3 CR as required by their corrective action program (CAP) procedure was a performance deficiency (PD). The inspectors reviewed inspector manual chapter (IMC) 0612 and determined the PD is more than minor and therefore a finding because it adversely impacted the Mitigating Systems cornerstone objective to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences and the respective attribute of equipment performance. Specifically, a system component, XTF-5052, associated with recovery of an offsite power circuit and installed to reduce core damage frequency, was rendered unavailable. The inspectors reviewed IMC 0609, Attachment 4, and Appendix A – Exhibit 2, and determined the finding was of very low safety significance or Green because the finding was not a design deficiency or a loss of function during a required alignment per Technical Specifications. The inspectors reviewed IMC 0310 and determined the cause of the finding involved the cross-cutting area of problem identification and resolution, the component of corrective action program, and the aspect of appropriate corrective actions, P.1(d), because the licensee failed to develop corrective actions for the Level 3 CR associated with the loss of XTF5052. (Section 40A2.3)

Inspection Report# : [2013004](#) (*pdf*)

Significance: G Sep 30, 2013

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to adequately evaluate new fire hoses for post-loss coolant accident conditions.

The NRC inspectors identified a NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the failure to adequately accomplish engineering services procedure, ES-0419, "Equal To/Better Than (ETBT) Evaluation Process," Revision 9, for new fire hoses located in the reactor building. The issue was entered into the licensee's CAP as condition report CR-12-05730.

The inspectors determined that the failure to adequately accomplish ES-0419 for new fire hoses in the reactor building was a PD. The inspectors reviewed IMC 0612 and determined that the PD is more than minor and therefore a finding

because if left uncorrected it would have the potential to lead to a more significant safety concern in that degradation of the fire hoses in post loss of coolant accident (LOCA) conditions would adversely impact the emergency core cooling system (ECCS) containment sump screens. The inspectors reviewed IMC 0609, Attachment 4, and Appendix A – Exhibit 2, and determined the finding was of very low safety significance or Green because the finding was not a design deficiency or represented a loss of function. Specifically, the inspectors identified the problem prior to the licensee incurring actual risk exposure time. The inspectors reviewed IMC 0310 and determined the cause of the finding involved the cross-cutting area of human performance, the component of resources, and the aspect of adequate emergency equipment, H.2(d), because the licensee failed to ensure the new fire hoses would not impact safety-related components such as ECCS sump screens during post-LOCA conditions. (Section 40A5.2)

Inspection Report# : [2013004](#) (*pdf*)

Significance: G Jun 30, 2013

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Perform a Past Operability Evaluation of the Service Water Outlet Header to ‘B’ Component Cooling Water Cross-Connect Valve

The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” for the failure to accomplish a past operability evaluation for the 'B' component cooling water (CCW) train as required by corrective action program (CAP) procedures; consequently, the licensee did not recognize that the Technical Specification 3.7.3 allowed outage time was exceeded. The issue was entered into the licensee’s CAP as condition report CR-13-00930.

The inspectors determined that the failure to evaluate past operability as required by the licensee’s CAP procedures was a performance deficiency (PD). The inspectors reviewed inspector manual chapter (IMC) 0612 and determined the PD is more than minor and therefore a finding because if left uncorrected it would have the potential to lead to a more significant safety concern in that the licensee would not have performed a past operability evaluation. Consequently, the licensee would not have realized technical specifications were exceeded, would not have performed as thorough of an extent of condition review and would not have submitted a LER. Additionally, the inspectors also considered IMC 0612, Appendix E, Example 4.a in which the PD is more than minor if the later evaluation determined that safety related equipment was adversely affected. The inspectors reviewed IMC 0609, Attachment 4, and Appendix A – Exhibit 2, and determined the finding was of very low safety significance or Green because the finding did not contribute to the likelihood of both a reactor trip and the unavailability of mitigation equipment and associated functions. The cause of the finding involved the cross-cutting area of problem identification and resolution, the component of corrective action program, and the aspect of complete and thorough evaluation, P.1(c), because the licensee failed to evaluate past operability for the ‘B’ CCW train. (Section 1R15)

Inspection Report# : [2013003](#) (*pdf*)

Significance: G Jun 30, 2013

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Adequately Design, Install and Maintain Oil Collection Devices for Reactor Coolant Pump Motors

The inspectors identified three examples of a non-cited violation of the Virgil C. Summer Nuclear Station, Unit No. 1, Renewed Facility Operating Licensee No. NPF-12, Condition 2.C(18), Fire Protection System, associated with 10 CFR 50, Appendix R, Section III.O, for problems associated with reactor coolant pump (RCP) motor oil collection system. Specifically, the inspectors identified (1) a split in the sealing boot for the ‘B’ reactor coolant pump (RCP) motor oil cooler enclosure, (2) a failure to ensure an adequate design for the oil lift pump enclosure, and (3) a failure to have oil collection components for internally leaked oil escaping the RCP motor discharge air ductwork flange area.

The licensee entered the problem into their corrective action program as condition reports 12-05736 and 12-05756.

The inspectors determined that the aforementioned problems with RCP motor oil enclosures and ductwork were performance deficiencies (PD). The inspectors reviewed inspector manual chapter (IMC) 0612 and determined that the PDs were more than minor and therefore a finding because they impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and the related attribute of protection against external factors such as fire. This finding has a credible impact on safety because the failure to adequately install, maintain and design the oil collection system presented a degradation of a fire confinement component which has a fire prevention function of not allowing an oil leak to reach hot surfaces. The inspectors reviewed IMC0609, Attachment 4, and Appendix F and determined that the following for each example.

Example 1 was assigned a high degradation rating because the split in the boot on the bottom of the oil enclosure would allow significant leakage to occur. The duration was greater than thirty days because the condition had existed for the previous operating cycle and this yields a duration factor of 1.0. Combining this with a generic fire frequency for a pressurized water reactor (PWR) containment or $1E-2$ results in a fire frequency of $1E-2$ which requires a phase 2 evaluation.

Example 2 was assigned a moderate degradation rating due to openings which would allow the escape of high pressure oil based on the location and orientation of the leak within the enclosure on each of the three RCPs. However, since the oil lift pumps are only operated for approximately five minutes before the start of a RCP, the duration is less than three days yielding a duration factor of .02. Combining this with a generic fire frequency for a PWR containment or $1E-2$ results in a fire frequency of $2E-4$ which requires a phase 2 evaluation.

Example 3 was assigned a low degradation rating due to minimal leakage potential which screens to a Green or very low safety significance.

A phase 2 Significance Determination Process (SDP) risk evaluation was performed by a regional SRA for PD examples 1 and 2 using NRC IMC 0609 Appendix F, with data from NUREG/CR 6850, the licensee's fire protection engineering report and the latest NRC VC Summer SPAR PRA risk model. The major assumptions for example 1 included: a one year exposure period, the ignition frequency from NUREG /CR 6850 for reactor coolant pump oil fires increased by one order of magnitude to account for the PD, the probability of non-suppression (PNS) from NUREG/CR 6850 for containment with detection at 5 minutes and damage at 10 minutes, and a base reactor trip transient conditional core damage probability (CCDP). The Example 2 assumptions included: a one hour exposure period to account for oil lift system operation for all three RCPs, the ignition frequency from NUREG/CR 6850 for reactor coolant pump oil fires increased by an order of magnitude to account for the PD, the PNS from NUREG/CR 6850 for containment with detection at 5 minutes and damage at 10 minutes, and a CCDP assumed for a small loss of coolant accident (LOCA) given the potential target cables in the RCP enclosures. The dominant sequence for example 1 was an oil leak in the B RCP oil cooler enclosure which leaked onto hot surfaces causing an oil fire on B RCP which was assumed to lead to a reactor trip if not rapidly suppressed. The dominant sequence for example 2 was an oil fire in any of the 3 RCPs upon startup due to spray from the oil lift system enclosure causing a fire on contact with hot surfaces. The fire is assumed to damage cables associated with reactor coolant system boundary valves if not rapidly suppressed leading to a small LOCA. For PD example 1 the risk was mitigated by the absence of safe shutdown equipment in the vicinity of the B RCP and PD example 2 risk was mitigated by the short exposure period. The risk of the three examples together represented an increase in core damage frequency of $<1E-6$ /year a GREEN finding of very low safety significance.

The cause example 1 relating to ensuring collection devices are leak-free involved the cross-cutting area of human performance, the component of resources, and the aspect of complete and accurate procedures, H.2(c), because the procedure for inspection of the oil collection enclosures was inadequate to detect the degraded condition. The other examples were not indicative of current licensee performance. (Section 40A.5.2)

Inspection Report# : [2013003](#) (pdf)

Significance:  Jun 30, 2013

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Assess and Manage the Risk Impact of Time to Core Boil With Reactor Vessel Upper Internals Installed and Cavity Level is Greater Than Reactor Vessel Flange

The inspectors identified a non-cited violation of 10 CFR 50.65 (a)(4) which requires in part that the licensee assess and manage the increase in risk that may result from proposed maintenance activities. Specifically, the licensee failed to assess and manage the increase in risk for shutdown operations and corresponding maintenance activities during Refueling Outage 20 because the qualitative risk evaluation failed to correctly update the time to core boil (TTCB), as determined by a computer program, for a plant operating state (POS) consisting of upper reactor vessel (RV) internals installed, RV head removed, and reactor cavity level greater than RV flange. The licensee entered this problem in their corrective action program as condition report 12-04757.

The inspectors determined that the failure to assess and manage the increase in risk for shutdown operations and corresponding maintenance activities because the qualitative risk evaluation failed to correctly update the TTCB, as determined by a computer program, for the above POS was a performance deficiency (PD). The inspectors reviewed inspector manual chapter (IMC) 0612, Appendix B and determined the PD is more than minor and therefore a finding because if left uncorrected it would have to the potential to lead to a more significant safety concern. Specifically, the above POS results in a TTCB measured in minutes as opposed to hours, and the failure to accurately calculate and track for increase in risk and procedure applications would impact operator response to loss of the residual heat removal system.

The finding was screened using IMC 0609 Attachment 4 which routed the significance determination to IMC 0609 Appendix K. Since the licensee used a qualitative risk assessment process during shutdown conditions, a bounding risk assessment was done in accordance with IMC 0609 Appendix M requirements. A risk assessment was performed by a regional senior risk analyst using the shutdown risk methodology of IMC 0609 Appendix G. The major assumptions included: a 39 hour exposure period within Plant Operating State 2 (POS-2 early time window), Loss of Inventory, Loss of Offsite Power and Loss of residual heat removal (RHR) initiators were evaluated, both trains of RHR and emergency core cooling system including both emergency diesel generators were available, base case results were increased by a factor of 5 to account for the procedure SSP-004 not providing guidance that TTCB should be adjusted while the upper internals were installed (this was determined using the NRC standardized plant risk analysis – human (SPAR-H) error methodology for “Available but poor” procedure within the Diagnosis HEP performance shaping factors). The dominant sequence was Loss of RHR with failure to recover RHR and failure to initiate injection. The risk was mitigated by the short exposure period and the availability of both trains of RHR. The result of the risk evaluation was an increase in core damage frequency of <math><1E-6</math>/year a GREEN finding of very low safety significance.

This finding impacts the cross-cutting area of human performance, the component of work control, and the aspect of planning work activities by incorporating risk insights, H.3(a), because the licensee failed to recognize the TTCB for the identified POS caused a high risk evolution or a Yellow risk condition. (Section 40A5.3)

Inspection Report# : [2013003](#) (pdf)

Significance:  Dec 31, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Promptly Identify and Correct a Condition Adverse to Quality for Alignment of the Safety-Related

Refueling Water Storage Tank to a Non-Seismic Spent Fuel Purification system

A non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," was identified by the inspectors for the failure to promptly identify and correct a condition adverse to quality (CAQ) involving alignment of the safety-related refueling water storage tank (RWST) to a non-seismic spent fuel purification (SF) system. The licensee entered the problem into their corrective action program as condition report 12-06193.

The inspectors determined that the failure to promptly identify and correct the CAQ for the alignment of the RWST to the SF system was a performance deficiency (PD). The inspectors reviewed Inspector Manual Chapter (IMC) 0612, Appendix B and determined the PD was more than minor and therefore a finding, because it affected the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences and the respective attribute of configuration control because the alignment of the safety-related RWST to the non-seismic SF system created a CAQ and rendered the RWST inoperable. The inspectors evaluated the finding in accordance with NRC IMC 0609, "Significant Determination Process," Attachment 4 and Appendix A and determined that the finding required a phase 3 evaluation by a senior reactor analyst using the NRC SPAR model. A one year exposure period was used and no recovery credit was assumed in the analysis. The non-seismic RWST purification piping was assumed to fail at the same seismic input as that assumed for a loss of offsite power. The dominant sequence was a seismically induced loss of offsite power leading to a station blackout with failure of the emergency power system and failure to recover offsite power or the EDGs. Subsequent battery depletion and operator failure to control the TDEFW pump would lead to core damage. The risk was mitigated by the low probability of a seismic event. The analysis determined that the risk increase of the performance deficiency was an increase in core damage frequency less than 1E-6/year a GREEN finding of very low safety significance. The cause of the finding involved the cross-cutting area of problem identification and resolution, the component of corrective action program, and the aspect of complete and thorough evaluation, P.1(c), because the licensee failed to determine that the alignment of the safety-related RWST to the non-seismic SF system was a CAQ. (Section 40A2.3)

Inspection Report# : [2012005](#) (*pdf*)

Significance:  Oct 31, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate Procedures and Procedure Compliance For Preventative Maintenance Deferrals

The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings." The licensee failed to ensure that the procedure for performing Preventative Maintenance (PM) deferrals included provisions to ensure that when a Work Order (WO) high value Preventative Maintenance Task Sheet (PMTS) is deferred past its end date that the new end date for the PMTS is updated in the Computerized Maintenance Management System (CMMS). Additionally, the licensee failed to ensure personnel performed PM deferrals when a WO high value PMTS could not be performed by its required end date as directed by the PM program procedure. The licensee entered the issue into the corrective action program as CRs 12-03940, 12-3930, 12-03931, 12-04122, and 12-04152.

The licensee's failure to have an adequate procedure for PM deferrals and failure to perform PM deferrals as required by procedure SAP 143 was a performance deficiency. The performance deficiency was determined to be more than minor because if left uncorrected, the performance deficiency had the potential to lead to a more significant safety concern. Specifically, the failure to perform PMs at the required intervals could result in degradation or failure of safety significant equipment. The inspectors used IMC 0609, Att. 4, "Initial Characterization of Findings," issued 6/19/12, and IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," issued 6/19/12, and determined the finding to be of very low safety significance (Green) because the finding was not a design or qualification deficiency, did not represent a loss of system and/or function, did not result in exceeding a TS allowed outage time and did not represent an actual loss of function of one or more non-Tech Spec Trains. The team identified a cross-cutting aspect in the resources component of the human performance area because the licensee failed to ensure

that the procedure was complete accurate and up to date. [H.2(c)] (Section 40A2 a.3)
Inspection Report# : [2012008](#) (*pdf*)

Barrier Integrity

Significance: G Mar 31, 2013

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Perform Examinations of Reactor Pressure Vessel Supports

The inspectors identified a non-cited violation (NCV) of Code of Federal Regulation (CFR) 10 CFR Part 50.55a, “Codes and Standards,” involving the licensee’s failure to include the reactor pressure vessel supports in the scope of the V. C. Summer Inservice Inspection Program (ISI) program. 10 CFR 50.55a requires that licensees develop an Inservice Inspection (ISI) program and update that program every 10 years in accordance with the approved edition of American Society of Mechanical Engineers (ASME) Section XI in effect 12 months prior to the beginning of the 10 year interval. The inspectors identified that the nuclear Class 1 reactor pressure vessel supports were not included in the scope of the V. C. Summer Unit 1 ISI Program for the third interval. The licensee’s ISI program was prepared in accordance with the 1998 Edition of the ASME Section XI Code, with addenda through 2000, as modified by 10 CFR 50.55a. As required by Article IWF 1000, Table 2500-1, Examination Category Item Number F1.40, the Reactor Pressure Vessel (RPV) supports are required to be periodically VT-3 visually examined. Also as required by Subsection IWB of Section XI, Table IWB-2500-1, Examination Category B-K, Item No. B10.10, the support integral attachment weld is to be periodically subjected to a surface examination. This issue was entered into the licensee’s corrective action program as Condition Report (CR) 13-00138 and CR-13-00737. The licensee took action and performed an operability determination and conducted remote visual examinations to assess the condition of the reactor vessel supports.

The failure to include the RPV supports in the scope of the ISI program and the failure to conduct the required examinations was a performance deficiency that was within the ability of the licensee to foresee and correct. This finding was of more than minor significance because it was associated with the Design Control attribute of the Barrier Integrity Cornerstone and affected the cornerstone objective of providing reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, examinations of the RPV supports provide assurance that the structural boundary of the reactor coolant system remains capable of performing its intended safety function. The inspectors used IMC 0609, “Significance Determination Process,” Attachment 0609.04, “Phase 1 – Initial Screening and Characterization of Findings,” and determined that the finding was of low safety significance (Green) because it did not represent an actual failure of the RPV supports.

The cause of the finding involved the cross-cutting area of problem identification and resolution, the component of operating experience (OE), and the aspect of implements and institutionalizes OE through changes to station process, procedures and programs, P.2(b). Specifically, the licensee failed to implement and institutionalize OE for RPV supports into station processes and procedures. (Section 40A5.4)

Inspection Report# : [2013002](#) (*pdf*)

Emergency Preparedness

Occupational Radiation Safety

Significance:  Sep 30, 2013

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to evaluate radiological conditions

A Green, self-revealing, NCV was identified for the failure to perform radiological surveys required by 10 CFR 20.1501(a) to ensure the potential radiological hazards and extent of radiation levels were understood and controlled before disassembling pressurizer spray valve PCV-444C. The issue was entered in the licensee's CAP as CR-12-05132.

The inspectors determined that the failure to perform radiological surveys required by 10 CFR 20.1501(a) was a PD. The inspectors determined that the PD was more than minor because it impacted the program and process attribute of the Occupational Radiation Safety Cornerstone and adversely affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation in that the licensee failed to adequately evaluate potential radiological hazards that could be present in a work area. The finding was assessed using the Occupational Radiation Safety significance determination process and was determined to be of very low safety significance (Green) because it was not an ALARA planning issue, there was no overexposure nor substantial potential for an overexposure, and the licensee's ability to assess dose was not compromised because the workers were wearing electronic dosimetry that was remotely monitored and intermittent on-site HP coverage was provided. This finding had a crosscutting aspect associated with human performance, work control, H.3(a). When licensee personnel failed to identify potential changes in expected radiological conditions and incorporate those changes into the RWP requirements prior to beginning work on valve PCV-444C, appropriate radiological work controls were not established. (Section 2RS1)

Inspection Report# : [2013004](#) (*pdf*)

Public Radiation Safety

Significance:  Dec 31, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

Resin Shipment in Steel High Integrity Container Noncompliance with 10 CFR 61.56(b)(2)

A self-revealing NCV of 10 CFR 61.56(b)(2) was identified because the licensee transported a cask shipment for disposal at the Energy Solutions Disposal Facility, Barnwell, South Carolina, which contained liquid above regulatory limits for final form for burial. The licensee entered the problem into their corrective action program as CR-12-04279.

This finding is greater than minor because it was associated with the low level burial attribute of the Public Radiation Safety Cornerstone and adversely affected the cornerstone objective to ensure adequate protection of the public health and safety from exposure to radioactive materials released into the public domain. The finding is of very low safety significance because the shipping cask was discovered to have minimal liquid exceeding the regulatory limit of one half percent of the waste shipment total volume transported to the burial site for disposal and the liquid was discovered prior to waste disposal. The cause of the finding involved the cross-cutting area of human performance, the

component of resources, and the aspect of complete and accurate procedures, H.2(c), because the procedures did not address the permutation of having wet resin added on top of already dewatered resin, nor did it lead the user to the more restrictive dewatering regimen based on internals as a first choice. (Section 2RS8)

Inspection Report# : [2012005](#) (*pdf*)

Security

Although the Security Cornerstone is included in the Reactor Oversight Process assessment program, the Commission has decided that specific information related to findings and performance indicators pertaining to the Security Cornerstone will not be publicly available to ensure that security information is not provided to a possible adversary. Other than the fact that a finding or performance indicator is Green or Greater-Than-Green, security related information will not be displayed on the public web page. Therefore, the [cover letters](#) to security inspection reports may be viewed.

Miscellaneous

Significance: N/A Oct 31, 2012

Identified By: NRC

Item Type: FIN Finding

PI&R Assessment Results

The inspectors concluded that, in general, problems were properly identified, evaluated, prioritized, and corrected. The licensee was generally effective at identifying problems and entering them into the corrective action program (CAP) for resolution. Generally, prioritization and evaluation of issues, formal root cause evaluations for significant problems, and corrective actions specified for problems were consistent with licensee CAP procedures. Overall, corrective actions developed and implemented for issues were generally effective and implemented in a timely manner.

The inspectors determined that audits and self-assessments were adequate in identifying deficiencies and areas for improvement in the CAP, and appropriate corrective actions were developed to address the issues identified. Operating experience usage was found to be generally acceptable and integrated into the licensee's processes for performing and managing work, plant operations, and cause evaluations.

Based on discussions and interviews conducted with plant employees from various departments, the inspectors determined that personnel at the site felt free to raise safety concerns to management and use the CAP to resolve those concerns.

Inspection Report# : [2012008](#) (*pdf*)

Last modified : December 03, 2013