

IMC 0612 Appendix F – Examples of Cross-Cutting Aspects

This exhibit provides guidance and examples on how to document cross-cutting aspects (CCAs) in inspection reports. The following examples, except for the traditional enforcement example, are based on findings that have been established in accordance with IMC 0612 Appendix B screening.

H.1(a) Example
Control Room Supervisor (CRS) directed an Instrumentation and Controls (I&C) supervisor to reset a sealed-in relay on the condensate polisher system. The CRS and the I&C supervisor reviewed circuit schematics and decided to momentarily lift the power supply lead to the relay without discussing their planned actions with the engineering department. As a result of lifting this lead, the condensate polisher post-filter bypass valve closed, resulting in all condensate flow to be sent to the condensate polisher. Since the polisher did not have sufficient capacity to handle the full condensate flow, this caused a reduction in main feed pump suction pressure, and subsequent reduction in feed pump speed and flow. The resultant steam and feedwater flow mismatch caused a lowering of steam generator water levels. An automatic reactor trip signal was generated based on the steam flow/feed flow mismatch signal coincident with the low steam generator water level.
CCA Documentation for Third Part of Analysis Section
The NRC determined the finding had a cross cutting aspect in the human performance area associated with decision-making - systematic processes because the licensee did not make safety-significant or risk-significant decisions using a systematic process when they decided to momentarily lift the power supply lead to the relay without discussing planned actions with the engineering department. [H.1(a)]
CCA Documentation for Summary
The NRC determined the finding had a cross cutting aspect in the human performance area associated with decision-making - systematic processes. [H.1(a)]

H.2(c) Example

On February 4, 2006, an equipment operator (EO) identified steam leaking from the High Pressure Containment Isolation (HPCI) steam admission valve. The licensee issued a condition report and a maintenance work request to inspect and repair the suspected packing leak. The following day on February 5, 2006, a system engineer inspected the steam admission valve and determined that the leak was not from the valve packing but was from the leak-off plug. The steam leak from the leak-off plug was discussed with the operations shift personnel and engineering management and operability determinations were performed using, in part, design dwg. XX-XXXXXX, revision 6, which showed that the leak-off plug was outside the ASME Class 2 code boundary. The condition report was also changed to reflect that the leak was from the leak-off plug.

On February 8, 2006, the ASME Code program manager at the corporate office reviewed the condition report written for the HPCI leak and determined that the leakage was through a component within the ASME Code Class 2 pressure boundary. Although the proposed revision 7 to design dwg. XX-XXXXXX correctly showed that the leak-off plug was within the ASME Class 2 code boundary, it had not been approved for use by plant personnel. Revision 7 to the design dwg. XX-XXXXXX was completed in August of 2002, and was in the backlog of engineering drawings for review and approval by corporate engineering department. Inspectors noted that there were many other open engineering evaluation requests or recommended changes to various engineering documents in the engineering backlog that were more than two years old. Work order (RXXXXXXX) was used to install and seal weld the threaded plug in the 2-MO-14 leakoff port and the licensee entered a 72 hour Limiting Condition for Operation (LCO) based on the inoperable train of the HPCI system.

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The NRC determined the finding had a cross cutting aspect in the human performance area associated with resources – documentation and procedures because the licensee did not ensure that resources were available to maintain up-to-date design documentation in order to assure nuclear safety when they allowed an excessive backlog of engineering drawings for review and approval to occur. [H.2(c)]

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The NRC determined the finding had a cross cutting aspect in the human performance area associated with resources – documentation and procedures. [H.2(c)]

H.3(b) Example
<p>On February 8, 2006, station personnel completed their biennial preventive maintenance (PM) to clean and inspect the station 125 volt DC battery charger #1. The technicians completed their PM on the battery charger with the exception of checking the cables and connections for degradation, cracks or other signs of damage. The work order did not require inspection of the cables and connections because the licensee had deferred these inspections and planned to complete inspection of these components during the next biennial inspection of the battery charger. The PM was completed with no identified deficiencies.</p> <p>On March 15, 2006, the operators received DC battery alarms and determined that the station battery charger #1 had failed. The unit was shutdown when the maintenance technicians were not able to repair and restore the battery charger to service in two hours. The licensee's inspection of the charger identified that all three battery charger output fuses were blown and two leads and a jumper in the inductive-resistive-capacitive filter circuit had degraded insulation with some exposed wire. The licensee's root cause analysis concluded that the condition of the wires was the most likely cause of the charger failure. Similar, but less severe, wire insulation degradation was found on two of the other three battery chargers.</p>
CCA Documentation for Third Part of Analysis Section
<p>The NRC determined the finding had a cross cutting aspect in the human performance area associated with work control – coordination because the licensee did not coordinate preventative maintenance activities to support the long-term equipment reliability when they deferred battery charger cable and connection inspections. [H.3(b)]</p>
CCA Documentation for Summary
<p>The NRC determined the finding had a cross cutting aspect in the human performance area associated with work control – coordination. [H.3(b)]</p>

H.4(b) Example (finding reflects present performance with a > 3 year old finding)
<p>On January 10, 2010, the inservice drop test of atmospheric dump valve ADV-## failed due to leakage past check valve SGEV-###. Troubleshooting identified that foreign material was the cause for the leakage past check valve SGEV-###. Inspectors determined the maintenance completed in March 2000 was the most probable cause of foreign material introduction to the atmospheric dump valve nitrogen system. Inspectors reviewed the licensee's cleanliness and foreign material controls program contained in procedure ###-###. Inspectors reviewed the March 2000 and three other similar quality assurance records generated last year and determined that maintenance personnel omitted the quality assurance inspection and certification step required by procedure ###-### each time. This inspection and certification step is used to verify system cleanliness standards prior to system closeout.</p>
CCA Documentation for Third Part of Analysis Section
<p>The NRC determined the finding had a cross cutting aspect in the human performance area associated with work practices – procedural compliance because the licensee did not define and effectively communicate expectations regarding procedural compliance when they allowed maintenance personnel to routinely omit the documentation of quality assurance cleanliness inspections. The NRC concluded that the finding reflected present licensee performance because the failure of maintenance personnel to comply with procedures continues to be evident. Specifically, the NRC concluded that licensee's present performance would not provide a reasonable assurance of system cleanliness during an identical maintenance evolution if performed today. [H.4(b)]</p>
CCA Documentation for Summary
<p>The NRC determined the finding had a cross cutting aspect in the human performance area associated with work practices – procedural compliance. [H.4(b)]</p>

H.4(c) Example
<p>A Green finding was identified involving poor maintenance work practices (failure to follow vendor manual instructions) and insufficient contractor oversight (monitoring, quality verification, and knowledge of work activity) which contributed to the failure of the 345 kV output breaker on January 9 and on March 8, 2006. The unit tripped as a result of the failure of 345 kV generator output breaker. In both instances, the licensee's root cause investigations concluded that the breaker failures were directly attributed to inadequately performed maintenance and ineffective oversight to ensure quality.</p> <p>Contributing to these failures was the lack of appropriate contractor oversight of the preventive and corrective maintenance activities performed on breaker No. 3. The January 9 failure was traced to a breaker overhaul performed during the Spring 2005 refueling outage. The misalignment of the breaker contacts did not have an immediate impact, but rather caused a degradation of the contact surfaces over time, due to high resistance overheating. The March 2006 failure was the result of improperly conducted corrective maintenance following the January failure. The B phase dielectric was compromised due to moisture in the SF⁶ gas and contamination of a pull rod assembly caused by the vendor not adhering to the established repair guidance and ineffective oversight to ensure quality.</p>
CCA Documentation for Third Part of Analysis Section
<p>The NRC determined the finding had a cross cutting aspect in the human performance area associated with work practices – oversight because the licensee did not ensure supervisory and management oversight of work activities, including contractors, such that nuclear safety was supported when they allowed a contracted vendor deviate from established maintenance instructions. [H.4(c)]</p>
CCA Documentation for Summary
<p>The NRC determined the finding had a cross cutting aspect in the human performance area associated with work practices – oversight. [H.4(c)]</p>

P.1(c) Example
<p>The licensee encountered various compatibility and design problems associated with the installation of modified breakers in their 6.9-kV breaker cabinets leading to the failures of a residual heat removal (RHR) pump to start when required. Several of these issues required modifications to the mechanism-operated cell (MOC) linkage to address operational problems. A similar binding problem on a different breaker had been discovered one year ago, when maintenance technicians discovered a tight shoulder bolt during a receipt inspection. Following a series of failures during post maintenance testing, the vendor found a binding problem (due to bradding in the MOC slide assembly) on one of four breakers the licensee had sent to the vendor for a root-cause analysis.</p> <p>The vendor suggested either a visual or functional inspection should be conducted on installed breakers with the modification. The vendor stated that a visual inspection was somewhat subjective and therefore, a functional test, which included disconnecting the MOC actuator at its gear drive and exercising it to prove that no binding occurs, was a more accurate method of inspection. The licensee elected to do visual inspections, not the functional tests. Consequently, the binding/bradding problem that led to the failure of RHR pump was not detected when the licensee personnel performed the visual inspection on the RHR breaker.</p>
CCA Documentation for Third Part of Analysis Section
<p>The NRC determined the finding had a cross cutting aspect in the problem identification and resolution area associated with corrective action program – problem evaluation because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions, as necessary when they elected to do visual inspections instead of performing the more accurate functional tests to detect binding/bradding problems with RHR breakers. [P.1(c)]</p>
CCA Documentation for Summary
<p>The NRC determined the finding had a cross cutting aspect in the problem identification and resolution area associated with corrective action program – problem evaluation. [P.1(c)]</p>

P.2(b) Example

The licensee's preventive maintenance (PM) strategy for the 22 KV electrical system did not effectively include pertinent information from industry operating experience related to inspections of isophase bus bars and flexible connections or the periodic testing of surge arresters or capacitors located in the generator potential transformer cabinets. As a result, degraded conditions on the "B" phase bus bar flexible connection and within the "A" phase surge arrester went undetected resulting in a two-phase electrical fault-to-ground that ignited a fire on top of the main transformer resulting in an automatic reactor scram.

The licensee determined that there were two root causes of this event. The first was that the PM performed on the 22KV isophase bus bars and flexible connections were not adequate because the scope of the PM did not include evaluation of the condition of the bus bars or the condition of the flexible connections. Industry operating experience (OE) indicated the need for inspections of the flexible connectors due to previous failures similar to that experienced at the site. Additional inspections to evaluate the condition of the bus bars and flexible connectors at the site would have allowed for the detection of the degraded flexible connector. The second root cause identified by the licensee was that no testing was performed on the surge arresters or capacitors located in the generator cabinets. Industry OE had revealed that surge arresters degrade over time due to a combination of age, service environment, and service conditions. Periodic testing would have detected degradation and allowed for replacement prior to failure.

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The NRC determined the finding had a cross cutting aspect in the problem identification and resolution area associated with operating experience – implementation because the licensee did not implement and institutionalize operating experience through changes to station processes, procedures, equipment, and training programs when they did not incorporate operating experience into the preventive maintenance program for the 22 KV electrical components. [P.2(b)]

CCA Documentation for Summary

The NRC determined the finding had a cross cutting aspect in the problem identification and resolution area associated with operating experience – implementation. [P.2(b)]

P.3(a) Example

Criteria were not established for the acceptability of the diesel generator oil sample collected in the licensee surveillance procedure. Consequently, the licensee failed to promptly investigate the cause of an increasing trend in the No. 3 emergency diesel generator (EDG) lubricating oil silver concentration. On April of 2005, the EDG No. 3 was shutdown during its monthly surveillance due to high bearing temperatures. Licensee's investigation into the cause for the failed EDG No. 3 surveillance test found that there was severe damage on seven of the piston wrist pin and piston carrier bearing surfaces. The damage included displacement of the silver surface on the bearing surfaces such that all or some of the lubricating oil channels were blocked. The licensee concluded that prolonged operation would most likely have resulted in catastrophic failure of the engine.

The evaluation also revealed that the lubricating oil silver concentration had been steadily increasing since June of 2004. In August of 2004, the lubricating oil concentration reached the vendor recommended range for increased oil sampling. In January of 2005, the lubricating oil concentration reached the vendor recommended range for inspection of the EDG for abnormal wear.

Licensee's review of past surveillances for EDGs found that lubricating oil samples were not always taken or if taken, not analyzed and some oil analyses results were not documented in the surveillances. Additionally, licensee determined that past reviews and self-assessments of the station's oil analyses program lacked sufficient depth, and were not sufficiently comprehensive in that these reviews did not identify that some of the required EDG oil samples had not been performed, no acceptance criteria were established for what constituted acceptable oil samples and EDG oil sample results were not always documented.

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The NRC determined the finding had a cross cutting aspect in the problem identification and resolution area associated with self- and independent assessments – self-assessments because the licensee did not conduct self-assessments at an appropriate frequency; such assessments are of sufficient depth, are comprehensive, are appropriately objective, and are self-critical when they failed to identify that required EDG oil samples were not taken, documented, or analyzed and that there was no identified acceptance criteria for silver concentration during past self assessments of the oil analysis program. [P.3(a)]

CCA Documentation for Summary

The NRC determined the finding had a cross cutting aspect in the problem identification and resolution area associated with self- and independent assessments – self-assessments. [P.3(a)]

S.1(a) Example

On November 15, 2005, pipe fitters were instructed to cut out and sand a section of the reactor water clean-up (RWCU) system piping. Although the piping was known to be internally contaminated, the job was conducted "clean" (non-contaminated), and therefore the RWP did not require that workers wear personnel contamination clothing. After cutting through several sections of piping to remove it, the workers left the radiologically protected area. When exiting the area, the workers alarmed the personal contamination monitors at the radiologically protected area (RPA) egress. The licensee found significant skin contamination on one of the workers, and another worker received an intake radioactive material above the licensee's administrative limits.

Licensee follow up confirmed that the radiological work procedure (RWP) for the job did not require personal protective clothing. Discussions with the health physicist who developed the RWP indicated that he determined that no protective clothing was necessary based on previous RWPs written for removal of the piping that did not require personal protective clothing and the fact that the contamination on the piping was internal. He also indicated that conflicting information existed regarding whether the workers would need to cut the piping to remove it or whether it could simply be unbolted. While he questioned whether protective clothing was needed based on the potential difference in the scope of the work, he did not raise the issue to radiation protection management because the radiation protection supervisor had indicated in the shift turnover meeting that the piping must be replaced on that shift, that the number of questions raised regarding the job had delayed the work, and that further delays would be reflected in job performance reviews.

A finding of very low safety significance was identified for the licensee's failure to understand and plan the scope of radiological work to be performed. This is a performance deficiency associated with implementation of Technical Specification required procedures for planning and conduct of radiological work. These specifications are to be implemented via the RWP program. The program must provide measures to limit internal and external radiation exposures including protective clothing, respiratory protection, etc., as applicable based on evaluated radiological conditions.

Note: For this example, the inspector had to determine:

- ▶ Whether the referenced discussion at the turnover meeting occurred as suggested.
- ▶ If others also interpreted the discussion to have an impact on SCWE (e.g., suppressing concerns which would slow job completion)

It is important to note that this constitutes inspection activity, and is not an allegation follow up activity. In this instance, the activity directly relates to an event and inspection follow up of that event. The focus of the inspection follow up is on the outcome of the supervisor's words (i.e., altered work environment, actions or changed paths) rather than supervisor's intent. Concerns regarding intent of the supervisor (e.g., willfulness) would be appropriate for follow up under the allegations program.

CCA Documentation for Third Part of Analysis Section
The NRC determined the finding had a cross cutting aspect in the safety conscious working environment area associated with environment for raising concerns – free flow of information because the supervisor’s behavior and interaction with the workers adversely impacted the free flow of information related to nuclear safety which significantly contributed to the inadequate planning for the radiological work on the reactor water cleanup system. [S.1(a)]
CCA Documentation for Summary
The NRC determined the finding had a cross cutting aspect in the safety conscious working environment area associated with environment for raising concerns – free flow of information. [S.1(a)]

S.2(c) Example

On October 1, 2005, the licensee identifies a leak in the feedwater system near the “A” flow control valve. Licensee evaluation of the root cause of the leak determined that stresses on the piping likely contributed to the failure. Inspector review of the design documentation for the system indicates that the value used in the design documentation for the assumed stresses on the piping did not consider all of the actual stresses on the piping. During discussions with a design engineer, the inspector determines that the engineer was concerned about potential additional stresses on the piping beyond those considered in the design documents, but did not raise the issue because another engineer was recently disciplined for raising a safety issue. The inspector also finds that the licensee had in fact disciplined an individual after he raised a safety issue, but for tardiness. However, the licensee had not reiterated the tardiness policy or its support for raising safety issues to mitigate this perception.

CCA Documentation for Third Part of Analysis Section

The NRC determined the finding had a cross cutting aspect in the safety conscious working environment area associated with preventing, detecting, and mitigating perceptions of retaliation – chilling effects because the licensee’s failure to mitigate potential chilling effects of disciplinary actions on individuals’ willingness to raise safety concerns substantially contributed to improper consideration of stresses on a system during development of design documentation. The information gathered indicated that the adverse action against the other individual actually occurred and could have reasonably affected individuals’ willingness to raise issues based on an ineffective communication to mitigate the perception. [S.2(c)]

CCA Documentation for Summary

The NRC determined the finding had a cross cutting aspect in the safety conscious working environment area associated with preventing, detecting, and mitigating perceptions of retaliation – chilling effects. [S.2(c)]

Finding Does Not Reflect Present Performance
The licensee did not design and implement a simulator model that accurately demonstrated the reference plant response to a loss of safety-related 480 volt bus E-2. Following an actual event on the reference plant in 2010, it was determined that when power to bus E-2 was transferred to the emergency diesel generator, FCV-626, thermal barrier heat exchanger outlet isolation flow control valve, closed. The simulator modeled FCV-626 to respond to Component Cooling Water flow through the valve and did not model the effect of a loss of power to the valve operator and associated control circuit. Consequently, with a loss of power to bus E-2, the simulator model caused this valve to remain open. The simulator model with this inaccurate simulated plant response was implemented sometime in 1991. The NRC reviewed the licensee configuration and control process and reviewed three simulator model changes and their acceptance tests completed within the last two years and found no problems.
CCA Documentation for Third Part of Analysis Section
No cross cutting aspect was assigned to this finding because the NRC concluded the finding did not reflect present licensee performance. The inaccurate simulator modeling occurred over three years ago and the present configuration control and change processes for controlling model fidelity would have likely prevented this inaccurate modeling from occurring today.
CCA Documentation for Summary
No cross cutting aspect was assigned to this finding because the NRC concluded the finding did not reflect present licensee performance.

None of The Cross Cutting Aspects Defined in IMC 0310 Correspond Well with the Cause of the Finding

On September 4, 2008, the licensee began an investigation into potentially inappropriate conduct involving two security officers on September 1, 2008. During the investigation, the licensee determined that an additional security officer was present in the secondary alarm station for a prolonged period of time between 11 a.m. and 12 p.m., although his roving patrol assignments required fire watch tours in the control and auxiliary buildings during this time. During the licensee's investigation, the officer initially denied missing any fire watches, but ultimately admitted, when confronted with the evidence, that he missed one fire watch tour between 11 a.m. and 12 p.m., and failed to adequately perform a separate fire watch tour between 2 p.m. and 3 p.m., on September 1, 2008. The officer also admitted signing the fire watch logs indicating the tours were completed as required. The licensee promptly notified the NRC Senior Resident Inspector on September 4, 2008. The officer was placed on administrative leave and ultimately resigned. The licensee took the following actions in response to this issue:

- The licensee interviewed the security officer, removed his plant access, and placed the security officer on administrative leave.
- The licensee conducted an extent of condition review by conducting an audit of fire watch tours by the individual, but identified no other discrepancies.

The licensee had previously completed an audit of fire watch tours in May 2008. The audit reviewed 103 fire watch tours between November 1, 2007 and March 9, 2008. The results of the audit indicate that all of the sampled fire watch tours were properly completed. During an interview with the NRC, the officer admitted being aware that failure to perform a fire watch was a violation of requirements. The officer testified that he had routinely performed fire watch tours and his training was not an issue. The officer's training records indicated satisfactory completion of the required fire watch training. Based on Office of Investigations Report 4-2008-### and inspection activities, the NRC concluded that the individual failed to complete the required fire watch tours due to a careless disregard for the regulations on the part of the individual and then deliberately falsified the fire watch logs.

CCA Documentation for Third Part of Analysis Section

No cross cutting aspect was assigned to this finding because the NRC concluded that none of the cross cutting aspects defined in IMC 0310 correlate to the finding's most significant contributor.

CCA Documentation for Summary

No cross cutting aspect was assigned to this finding because the NRC concluded that none of the cross cutting aspects defined in IMC 0310 correlate to the finding's most significant contributor.

Traditional Enforcement Violation Without Finding
<p>On September 29, 2009, the upper shaft coupling for the C service water pump, P-7C, failed. In order to complete repairs, the licensee requested a Notice of Enforcement Discretion (NOED). The licensee had evaluated the failed coupling and determined that the coupling failed due to improper heat treatment of the coupling. In order to ensure that the replacement couplings met hardness criteria, the licensee indicated that each replacement coupling would receive a hardness test by an independent test organization. The licensee provided this information verbally during the October 1 call, and in writing in the October 5 letter. The NRC acknowledged the licensee's actions. However, each coupling did not receive an independent hardness test. Instead, the vendor sent a sample for independent testing. This sampling strategy selected a coupling from each batch of couplings receiving heat treatment and performed hardness testing on the sample. This strategy is a common industry practice and is adequate in many cases to validate the heat treatment. However, the cause of the improper heat treatment was not known at the time of the NOED and hardness testing of the failed coupling as part of manufacture had been ineffective at identifying the improper heat treatment. Therefore, the method of hardness testing was germane to the acceptability of the NOED. In addition, no independent hardness nor batch sample testing occurred on two of the couplings.</p> <p>After the licensee submitted the written request for a NOED, the inspectors learned that no independent hardness testing occurred on two of the couplings and the rest of the couplings had been tested using a sampling methodology. The inspectors discussed this condition with licensee. The licensee informed the inspectors that the vendor desired to use a sampling methodology and that the licensee agreed to this method since it was a common practice and generally equivalent to testing each coupling. After the NOED had been granted and the letter sent, the licensee informed the inspectors that that no testing had occurred on two of the couplings.</p> <p>Due to potential willful aspects associated with the NOED, the inspectors provided information to the Office of Investigations (OI) for review. OI reviewed the issue to determine if licensee personnel willfully failed to provide complete and accurate information to the NRC in the NOED. OI completed the investigation, and the NRC did not substantiate, based upon the evidence, that personnel willfully failed to provide complete and accurate information to the NRC. However, information included in the Request for Enforcement Discretion dated October 5, 2009, was not complete and accurate in all material respects.</p>
CCA Documentation for Third Part of Analysis Section
No cross cutting aspect was assigned because this violation was not associated with a finding.
CCA Documentation for Summary
No cross cutting aspect was assigned because this violation was not associated with a finding.

Attachment 1 – Revision History for IMC 0612 Appendix F

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Training Required and Completion Date	Comment and Feedback Resolution Accession Number
N/A	ML060730204 06/22/06 CN 06-015	Initial issuance of Appendix F to IMC 0612 which provides how to document cross-cutting aspects of inspection findings based on changes made to IMC 0305 by the safety culture working group.	Yes 07/01/06	ML061510121
N/A	ML11357A115 03/13/13 CN-13-009	Aligned examples to conform to IMC 0612 documentation requirements. Complete re-issue.	No N/A	ML12137A333