

Problem Statement:

The current process for determining whether a regulatory finding or violation is more than minor in significance is overly subjective. As a result, the documentation of the basis for characterizing a finding or violation as more than minor in significance can make the justification for this characterization unclear to the licensee and to external stakeholders.

Discussion:

NRC Inspection Manual Chapter 0612, *“Power Reactor Inspection Reports,”* provides the guidance for making the determination if a finding/violation is of greater than minor safety significance. Briefly, the process follows these steps:

1. Identification of a potential issue
2. Determination of whether the issue represents a performance deficiency (PD)
3. Comparison of the performance deficiency to the examples in MC0612, Appendix E.
4. If the PD is determined to not be similar enough to the examples in Appendix E, answer the 5 questions in Appendix B, Section 3.

The questions in Appendix B, Section 3 are:

- (1) Could the finding be reasonably viewed as a precursor to a significant event?*
- (2) If left uncorrected would the finding become a more significant safety concern?*
- (3) Does the finding relate to a performance indicator (PI) that would have caused the PI to exceed a threshold?*
- (4) Is the finding associated with one of the cornerstone attributes listed at the end of this attachment and does the finding affect the associated cornerstone objective?*
- (5) Does the finding relate to any of the following maintenance risk assessment and risk management issues?*
 - (a) Licensee risk assessment failed to consider risk significant SSCs and support systems (included in Table 2 of the plant specific Phase 2 SDP risk informed inspection notebook) that were unavailable during the maintenance.*
 - (b) Licensee risk assessment failed to consider unavailable SSCs such as Residual Heat Removal Systems (PWR and BWR) that prevent or mitigate Interfacing System LOCAs.*
 - (c) Licensee risk assessment failed to consider SSCs that prevent containment failure such as containment isolation valves (BWR & PWR), BWR drywell/containment spray/containment flooding systems, and PWR containment sprays and fan coolers.*

(d) Licensee risk assessment failed to consider unusual external conditions that are present or imminent (e.g, severe weather, offsite power instability).

(e) Licensee risk assessment failed to consider maintenance activities that could increase the likelihood of initiating events such as work in the electrical switchyard (increasing the likelihood of a loss of offsite power) and RPS testing (increasing the likelihood of a reactor trip).

(f) Licensee risk assessment failed to consider the uncompensated removal or impairment of / plant internal and/or external flood barriers.

(g) Licensee risk assessment failed to account for any unavailability of a single train of a system (primary or back-up) that provides a shutdown key safety function.

(h) Licensee's risk assessment has known errors or incorrect assumptions that has [sic] the potential to change the outcome of the assessment.

(i) Licensee failed to implement any prescribed significant compensatory measures or failed to effectively manage those measures.

Although the guidance in MC0612 instructs the inspectors to compare the finding to the examples in Attachment E “to determine if it *is similar to a minor example*,” experience has shown that inspectors apply a high standard to what is considered similar. In other words, it is exceptional when a finding is determined to be minor due to its similarity with a minor example. This means that the use of Attachment E is often an ineffective screen and the inspector defaults to answering the questions in Section 3 of MC0612 Attachment B, “Issue Screening.”

Of the questions in MC0612, Attachment B, Question 4, is used liberally by inspectors writing inspection reports as the justification for characterizing a finding/violation as greater-than-minor. The question uses the terms “associated with” and “affect” as the key decision points. This makes the question very subjective by its very wording.

Often, the only documentation contained in an inspection report of the justification of a particular finding/violation being characterized as being greater than minor is a simple affirmation of the applicability of Question 4 to the finding. This provides no meaningful insight to the reader of the inspection report (the licensee or other external stakeholder).

To illustrate the subjectivity of question 4, attached is an example. The example takes a violation that is currently listed in MC0612, Attachment E as a minor violation and shows how a liberal interpretation of Question 4 of Section 3 of

MC0612, Attachment B can be used to characterize a minor violation as having greater-than-minor significance.

Recommendation:

Revise Manual Chapter 0612 to remove the excess subjectivity from the process of determining whether a finding is of greater-than-minor significance or not.

A suggested revision to Section 3, MC 0612, Attachment B has been provided as a significant first step. This is not the only change that could or should be made to solve this problem. Additional examples can be added to Attachment E. Several new examples have been proposed for potential inclusion in Attachment E. MC0612 should also be strengthened to emphasize the use of the minor examples in Attachment E as a screening tool for minor violations/findings.

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Examples of Minor Issues

1. Record Keeping Issues

Example a. Post-maintenance testing was performed on ten glycol air handling units during an outage of a Westinghouse ice condenser facility. All the required tests were performed, based on statements from licensee workers, but there was no record that an actual air flow test was conducted on two of the units. Based on indication in the control room, both air handling units had comparable air flow to those that had documented test results, and the ice condenser technical specification required air temperatures were all well-within specification.

The violation: 10 CFR 50, Appendix B, Criterion XI or the licensee's procedures require test results to be documented and evaluated to assure that test requirements are satisfied.

Minor because: This was a record keeping issue of low significance. There was reasonable assurance that test requirements were met as evidenced by actual air flow being satisfactory and technical specification temperatures being within limits.

Not minor if: The air flow was determined to be degraded during subsequent testing.

Review Conclusion: The "Not minor if" description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example b. In a records storage vault, the licensee observes a ceiling leak. Temporary containers were used to collect water during rainstorms. This "work around" was entered for resolution in the licensee's corrective action program. The condition continued for a year. The containers overflowed during a heavy weekend rainstorm when no one was available to monitor the containers and some safety-related records were damaged, but were still readable.

The violation: The licensee failure to correct the water intrusion problem in a prompt manner which resulted in damage to records violated the 10 CFR 50.71 requirement to maintain certain records.

Minor because: This was a failure to implement a corrective action that had no safety impact because no records were lost.

Not minor if: Required records were irretrievably lost.

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Example c. The licensee's surveillance test records were not complete for a safety-related pump because the operators skipped a page of the surveillance procedure and failed to record one section of the test.

The violation: The surveillance test is required by Technical Specifications.

Minor because: The surveillance test was performed, but not completely documented. The portion of the test documented and the last completed surveillance test revealed that the equipment performed its' safety function.

Not minor if: The subsequent surveillance test showed that the equipment would not perform some safety-related function.

Review Conclusion: The "Not minor if" description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example d. An inspector found that a licensee was missing area radiation survey records or weekly area contamination (smear) records.

The violation: Area radiation surveys and contamination surveys are required by license conditions or 10 CFR 20.2103.

Minor because: The record of the survey is missing, but the survey was actually performed. No unexpected contamination or exposure resulted from the violation.

Not minor if: An unexpected contamination or exposure resulted from the violation.

Review Conclusion: The "Not minor if" description involves an actual event of consequence (i.e., an unexpected contamination or exposure) due to the performance deficiency.

2. Licensee Administrative Requirement/Limit Issues

Example a. While performing a review of a completed surveillance test, the system engineer determines that operators performing the test had made a calculation error when determining the leak rate of a power-operated relief valve's nitrogen accumulators. When calculated correctly, the actual check valve leakage exceeded the surveillance leakage rate's acceptance criterion in the surveillance procedures (but not the Technical Specifications surveillance requirement). The surveillance had been completed a week earlier and the system had been returned to service. The allowable leakage rate was below that used in the design assumptions for sizing of the accumulators and it was

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determined that with the identified leakage, the valves would be able to perform the required number of strokes assumed in the accident analysis.

The violation: The Technical Specification surveillance test's allowable check valve leakage rates were exceeded and the system was returned to service.

Minor because: The limit exceeded was an administrative limit. Actual check valve leakage rates, based on testing history, have always been significantly low enough to meet the required number of valve strokes.

Not minor if: Maintenance records indicated that historical check valve leakage rates were too high bringing the ability of the valves to meet the required number of valve strokes into question or Technical Specification limits were exceeded.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example b. NRC inspectors identified that a high radiation door was not locked as required by plant procedures. While the licensee's procedurally controlled administrative limit for area postings was exceeded, the door to the area was conservatively classified and did not exceed regulatory radiation levels to warrant posting as a locked high radiation area.

The violation: Site procedures require activities to be accomplished in accordance with procedures.

Minor because: The requirement was a licensee administrative limit. The area was conservatively posted and no regulatory limits requiring posting were exceeded.

Not minor if: The area radiation levels exceeded the limits such that the area should have been a locked high radiation area or the radiation levels in the area were changing rapidly due to power changes or system operation such [that the] radiation levels at which the door would be required to be locked could be reached.

Review Conclusion: The “Not minor if” description is not clear. No actual impact or consequence resulted from failure to post or lock the door.

Example c. During a refueling outage, the licensee tested a charging pump at full flow conditions as required every 18 months. Vibration data taken during this test indicated vibration of 0.324 inches per second (ips), which exceeded the test procedure Alert range of 0.320 ips. The procedure required the surveillance frequency to be increased to every nine months after exceeding the Alert range. The licensee failed to identify that the test result exceeded the Alert range, so the

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test frequency was not increased. Subsequent vibration testing revealed no further vibration degradation. The ASME Code acceptance criterion for vibration measurements was 0.325 ips.

The violation: Criterion XI or the licensee's procedures require that test procedures shall incorporate acceptance limits established by design documents. Measured vibration data exceeded the test procedure alert levels and the additional testing was not performed.

Minor because: This limit was a licensee administrative limit. The ASME Code limit was not exceeded and there was no subsequent degradation of vibration of the pump.

Not minor if: Subsequent vibration tests revealed degradation into the action range, the same issue affected a number of pumps tested, or the issue was repetitive.

Review Conclusion: The "Not minor if" description involves an actual Degraded Condition with impact on safety-related plant equipment or a breakdown of a safety related program.

Example d. The licensee missed an hourly update of a state agency during a declared Unusual Event because of an oversight by the Shift Manager.

The violation: 10 CFR 50.54(q) requires that licensees follow their emergency plan and the plan committed the licensee to hourly updates of state agencies during declared emergencies.

Minor because: There is no regulatory requirement to make this update, there was no impact on public health and safety, and it did not detract significantly from the state agency's ability to function during the emergency.

Not minor if: There was a failure to make required initial notifications, a significant breakdown in communication functions committed to in the emergency plan, or a failure that affected the agency's ability to respond to the emergency.

Review Conclusion: The "Not minor if" description involves a condition that resulted in actual adverse impact on emergency response.

Example e. During an inspection of silicon foam penetration seals, an inspector noted that foam extrusion (3/8 inch) from repaired seals was less than the amount specified in the seal repair procedure (1/2 inch). However, the silicon foam vendor's instructions permit extrusions as little as 1/4 inch.

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The violation: The seal repair was not performed in accordance with the licensee's procedure.

Minor because: This is a violation of a licensee administrative requirement. Because the extrusions met the vendor's instruction's limits, no regulatory limit was violated.

Not minor if: Both the licensee and vendor procedures were violated such that the condition would have impacted the ability of the seal to perform its function.

Review Conclusion: The "Not minor if" description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example f. The licensee's procedure required that heat tracing be energized in the diesel fire pump room from September 30 to April 30. In December, an inspector observed that the heat tracing was de-energized. The room temperature was 68 degrees, maintained by the steam boiler (50 degrees was the minimum temperature for operations). The temperature of the room was monitored and annunciated in the control room. An annunciator response procedure instructs the operator to check heat tracing if the room temperature alarms were received. The inspector verified that the temperature in the room had not dropped below 50 degrees since September 30.

The violation: A licensee procedural requirement was not met.

Minor because: This is a failure to implement a procedural requirement that had no safety impact under the given situation. The temperature had not dropped below the minimum temperature for operations.

Not minor if: The annunciator was inoperable or the room temperature fell below 50 degrees.

Review Conclusion: The "Not minor if" description involves an actual environmental condition (low temperature) with potential impact on safety-related plant equipment.

Example g. An operating procedure requires the shift supervisor to advise the station manager prior to making any mode changes. A mode change is made without this notification due to an oversight by the shift supervisor.

The violation: The licensee is required to follow their procedures per Technical Specification 6.8.1, if applicable.

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Minor because: This is a minor procedural error that had no impact on safety equipment and caused no safety consequences. All requirements for the mode change were met except this notification.

Not minor if: A mode change was made without all required equipment being operable.

Review Conclusion: The “Not minor if” description involves an actual condition that resulted in the plant being placed in a mode without the safety-related plant equipment credited for that mode. The consequence is only if a design-basis event occurs requiring the unavailable equipment.

Example h. The NRC requires licensees to maintain the total effective dose equivalent (TEDE) to five rem per year. The licensee established by procedure an administrative limit of 2 rem per year. Radiation protection manager or general manager approval was required for any individual to exceed the procedural limit. Contrary to the licensee’s program, a technician received 2.7 rem in one year without approval from the radiation safety officer because the technician, the technician’s supervisor and the HP personnel failed to notice that the technician had exceeded the administrative limit.

The violation: The licensee is required to follow their procedures per license conditions.

Minor because: This was an (sic) licensee administrative limit. The worker was within federal limits.

Not minor if: Multiple examples were identified of failures to satisfy station radiation protection procedures indicating a failure to maintain and implement programs to keep exposures as low as reasonably achievable.

Review Conclusion: The “Not minor if” description involves multiple actual occurrences of personnel exposures being higher than expected due to a program weakness.

3. Non-significant Dimensional, Time, Calculation, or Drawing Discrepancies

Example a. A temporary modification was installed on one of two redundant component cooling water system surge tanks to restore seismic qualification. The supporting calculations did not receive a second-level review due to engineers failing to adhere to licensee’s requirements on review of calculations. The calculations were found to contain technical errors that did not result in the train being inoperable.

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The violation: 10 CFR 50, Appendix B, Criterion III design control measures for verifying the adequacy of design were not implemented. Design changes are required to be subjected to design control measures commensurate with those applied to the original design.

Minor because: These are non-significant calculation errors. The calculation errors were minor and the installed modification restored seismic qualification of the tank.

Not minor if: The calculation errors were significant enough that the modification required revision or rework to correctly resolve seismic concerns.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example b. A controlled design drawing shows a plug valve where a ball valve is actually installed. This deficiency occurred because of an oversight by the licensee. The valve design was changed to a ball valve but the licensee failed to update the drawing.

The violation: The design is required to be correctly translated into drawings.

Minor because: This is a non-significant drawing deficiency.

Not minor if: Operation of the system was adversely affected by the difference in valves.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example c. A licensee procedure required that all valves specified on a locked valve list be indicated as locked on the plant drawings. Inspectors identified safety-related valves on the locked valve list that were not indicated as locked on the plant drawings. All valves on the locked valve list were properly positioned and locked, as determined by field verification.

The violation: Activities were not performed in accordance with procedures.

Minor because: This is a non-significant drawing discrepancy. All valves required to be locked were locked and properly positioned.

Not minor if: More than one valve was in the required position, but not locked.

Review Conclusion: The “Not minor if” description involves an actual plant condition with potential impact on safety-related plant equipment. The

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potential impact is restricted to inadvertent mispositioning of the valve that should have been locked AND the design basis conditions requiring the valve to be in its specified locked position occurring.

Example d. The technical specification required a primary sample to be taken and analyzed within two hours of a power change in excess of 20 percent. The inspector found that the chemistry sample was taken and analyzed within 2 hours and 35 minutes after a recent power increase from 60 to 85 percent. The sample was within specification requirements.

The violation: The technical specification was violated.

Minor because: This is a failure to implement a requirement that has no safety impact. The sample delay was not significant.

Not minor if: The sample had not been conducted or was delayed to the extent that the sample results were not reliable.

Review Conclusion: The “Not minor if” description involves an actual performance deficiency. The deficiency would only have actual impact if the conditions that the sampling is intended to identify actually occur.

Example e. An inspector found that the radiological survey instruments were beyond the required calibration frequency. The instruments were actually in calibration tolerance (when later checked).

The violation: The licensee is required to calibrate radiological survey instruments at specified intervals.

Minor because: This is a failure to calibrate the survey instruments that has no safety impact because the instruments were actually in tolerance.

Not minor if: The instruments were out of calibration tolerance, resulting in a lack of reasonable assurance that the surveys performed were representative of the actual radiological conditions.

Review Conclusion: The “Not minor if” description involves a condition that only has conditional consequences. The out-of-tolerance condition of the survey instruments would only have adverse consequences if the OOT resulted in non-conservative survey results AND personnel actually entered the affected areas.

Example f. An inspector noted that the radiation protection training for a worker was not completed as required due to licensee personnel failing to conduct the

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periodic training which was scheduled. The training was not conducted because the licensee failed to notify the instructor of the scheduled training.

The violation: The licensee is required to provide radiation protection training to workers through their radiation protection program procedures.

Minor because: The periodic training was not performed, but the initial training had been performed and training had been scheduled. There was no actual consequence from the radioactive material shipments.

Not minor if: An actual consequence occurred that was attributed to the lack of training.

Review Conclusion: The “Not minor if” description involves an actual consequential event. The example could be strengthened by providing some examples of the consequences that might occur. Note: The description of “Minor because” mentions “radioactive material shipments” although the description of the condition does not indicate clearly that the missed training involved training on material shipments.

Example g. During construction of a safety-related concrete wall, a licensee quality control inspector observed that an imbedded Richmond insert is cocked at an angle of 6 degrees. The specification required plus-or-minus 3 degrees. The licensee discovered that the worker who placed the insert failed to use a level as required. For reasons unknown, the condition report was closed without implementing corrective actions. Subsequent to this incident, the same worker mis-oriented three other inserts. All of the inserts were later abandoned in place.

The violation: The condition adverse to quality was not corrected and it recurred.

Minor because: These mis-oriented inserts represent a failure to implement a corrective action that has no safety impact. It had no direct safety impact because the out-of-specification inserts were abandoned in place.

Not minor if: A safety-related attachment had been made to an out-of-specification insert and placed in service.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example h. The licensee's security fence is required to be 12 feet tall. The NRC discovers that, in one section, the fence is only 11 feet 10 ½ inches tall.

The violation: A license condition requires that the licensee meet their Physical Security Plan, which states that the security fence is required to be 12 feet tall.

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Minor because: This is not a significant dimensional discrepancy.

Not minor if: The fence was significantly shorter (e.g. 11 feet).

Review Conclusion: The “Not minor if” description involves an actual condition with potential impact on security-related equipment. No criterion is offered as to what constitutes a significant dimensional discrepancy. Evidently, the threshold is somewhere between 1 and 1/2 inches and 1 foot, but it is not clear exactly at what point the discrepancy becomes significant.

Example i. The FSAR states the volume of the refueling water storage tank is 250,000 gallons. The actual volume is 248,000 gallons.

The violation: The facility was not consistent with the FSAR.

Minor because: This is a non-significant dimensional discrepancy.

Not minor if: The accident analysis assumed 250,000 gallons of useable volume above the suction point and the actual volume required accident analysis calculations to be re-performed to assure the accident analysis requirements were met.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example j. The licensee used a non conservative value for condensate storage tank temperature as an input to an accident analysis calculation. The value used was 118 degrees Fahrenheit where the actual value can be as high as 120 degrees Fahrenheit. As a result of this error, there was a slight reduction in the net positive suction head available to the safety injection pumps under accident conditions. The reduction was only a few percent of the available margin. No other similar concerns were identified and there were no programmatic concerns identified with this issue that could lead to worse errors if uncorrected.

The violation: 10 CFR 50, Appendix B, Criterion III design control measures for verifying the adequacy of design were not implemented. Design changes are required to be subjected to design control measures commensurate with those applied to the original design.

Minor because: This was a non significant calculation error that had minimal effect on the outcome of the calculation and there were no programmatic concerns identified associated with the issue that could lead to worse errors if uncorrected.

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Not minor: If the engineering calculation error results in a condition on where there is now a reasonable doubt on the operability of a system or component, or if significant programmatic deficiencies were identified with the issue that could lead to worse errors if uncorrected.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example k. In its analysis to support a safe shutdown of the plant from the alternate control panel, the licensee assumed operators could complete the required tasks in ten minutes, when in fact, completing the required tasks could take as long as eleven minutes. The outcome of the licensee’s analysis was unaffected, as up to 30 minutes of time was allowable to complete these actions. No other similar concerns were identified and there were no programmatic concerns identified with this issue that could lead to worse errors if uncorrected.

The violation: 10 CFR 50, Appendix B, Criterion III design control measures for verifying the adequacy of design were not implemented. Design changes are required to be subjected to design control measures commensurate with those applied to the original design.

Minor because: This was a non significant calculation error that had minimal effect on the outcome of the calculation and there were no programmatic concerns identified associated with the issue that could lead to worse errors if uncorrected.

Not minor: If the engineering calculation error results in a condition where there is now a reasonable doubt on the operability of a system or component, or if significant programmatic deficiencies were identified with the issue that could lead to worse errors if uncorrected.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Note: The intent behind examples “j” and “k” is to illustrate that equipment inoperability is not a prerequisite to an issue being more than minor.

4. Insignificant Procedural Errors

Example a. A scaffold erected between safety-related plant service water strainers was wedged tightly between the system piping. Licensee procedures required an engineering evaluation be performed for all scaffolding located above or near safety-related equipment. No engineering evaluation was performed to

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assess the seismic impact of the scaffold. A later engineering evaluation determined that there is no safety concern.

The violation: 10 CFR 50, Appendix B, Criterion V requires that activities affecting quality shall be performed in accordance with procedures.

Minor because: This is a procedural error that has no safety impact.

Not minor if: The licensee routinely failed to perform engineering evaluations on similar issues, or if the later evaluation determined that safety-related equipment was adversely affected.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example b. While performing a reactor protection procedure, an operator inadvertently operated the bypass switch which caused a single channel trip condition. The operator failed to follow the procedure and adequately self-check to ensure the right switch was manipulated.

The violation: 10 CFR 50, Appendix B, Criterion V requires that activities be accomplished in accordance with procedures.

Minor because: This was an insignificant procedural error and there were no safety consequences.

Not minor if: The error caused a reactor trip or other transient.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition that resulted in a plant event.

Example c. A valve motor operator was test wired for reading operating current during testing required by Generic Letter 89-10. The valve was successfully cycled, the data recorded and determined to be within the acceptable range, and the valve was returned to service. However, the ammeter used a 0-100 amp scale instead of a 0-10 amp scale as required by the procedure. Subsequent retest with the proper meter resulted in satisfactory amperage readings.

The violation: The test procedure was not followed.

Minor because: This was a procedural error that had no impact on safety equipment. The mistake did not result in an actual equipment problem.

Not minor if: The retest revealed that the data was actually outside of the acceptable range.

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Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example d. During a review of the lighting in the safety injection pump room, an inspector-identified that the lighting was less than FSAR design levels for operator action. The licensee informed the inspector that this condition was previously identified. However, the corrective action to increase the lighting was given a low priority and was not completed in the two years since initial identification. Interviews with operators revealed that some had difficulties conducting surveillance or emergency drills without the use of flashlights in the pump room.

The violation: The licensee failed to take prompt corrective action for a condition adverse to quality.

Minor because: This is a failure to implement a corrective action that has no safety impact. Operators are procedurally required to carry flashlights and had no problems functioning in this light condition as evidenced by the lack of operational errors due to poor lighting.

Not minor if: The degraded lighting condition contributed to an operator error or was shown to significantly impact the operator’s ability to do the task.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on ability to respond to a postulated design basis event.

Example e. The inspector identified a valve with a missing name-plate, a violation of plant procedures requiring that all equipment be labeled. Discussions with operators revealed that this condition had existed for several years, but because operators routinely referred to the plant drawings, even though the valve was routinely operated, the missing name-plate had no safety consequences.

The violation: Plant procedures required that equipment be labeled.

Minor because: This is a failure to meet procedural requirements that had no safety impact. The operators used the drawings and had no trouble identifying the valve location.

Not minor if: Improper valve manipulation occurred due to the missing name-plate.

Review Conclusion: The “Not minor if” description involves an actual condition that had an adverse impact on plant operations.

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Example f. A small leak occurs on a welded connection in the diesel generator day tank causing a slow drip of fuel oil onto the floor in the diesel room. Maintenance used a sealant to temporarily repair the leak and wrote a work order for a permanent repair, which was scheduled for the next outage. Later, the seal failed and additional leakage occurred, which soaked a safety-related solenoid. The licensee subsequently determined that the wrong sealant was used in the temporary repair.

The violation: The licensee failed to adequately correct a condition adverse to quality.

Minor because: This is a failure to implement a corrective action that had no safety impact because the problem did not affect the operability of the diesel generator.

Not minor if: The damage to the solenoid affected diesel operability or caused a fire hazard.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example g. The reach rod for a safety-related valve was jammed and could not be used. However, the valve could be operated manually one level down. This condition existed for two years and, despite complaints from the operators, it was not fixed. The NRC inspector noted that this work-around cost about one minute in operator response time and recognized that manual manipulation of this valve was required by certain off-normal procedures. The valve was accessible during all these off-normal events.

The violation: The licensee failed to identify and correct a condition adverse to quality as required by 10 CFR 50, Appendix B, Criterion XVI.

Minor because: This is a failure to implement a corrective action that had little to no safety impact. The valve could still be operated and the extra time requirement would not affect recovery operations.

Not minor if: There were occasions where access to the valve would be restricted for environmental reasons (heat, radiation, oxygen).

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on the ability to operate safety-related plant equipment during a postulated design basis event.

Example h. An inspector discovered that 3 of 150 emergency response organization members who are on the duty roster in different functional areas

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were not current in their training. The licensee's emergency plan required that all members be trained annually.

The violation: 10 CFR 50.54(q) requires that the licensee follow and maintain in effect emergency plans. The plan was not followed.

Minor because: There are others on the duty roster in each functional area whose qualifications are current.

Not minor if: Emergency response personnel qualification lapses are wide spread or occur in such a manner that positions cannot be staffed by qualified individuals.

Review Conclusion: The "Not minor if" description involves a breakdown in a safety-related program that resulted an actual reduction in effectiveness of the ability of Emergency Response Organization (ERO) to respond to a potential radiological emergency.

Example i. An inspector found out of calibration survey instruments or less than the required number of instruments in storage cabinets in emergency facilities.

The violation: 10 CFR 50.54(q) requires that the licensee follow the emergency plan. The emergency plan requires that calibrated survey instrumentation at set quantities be available.

Minor because: There are other instruments readily available and the emergency preparedness procedures require the calibration to be verified prior to use.

Not minor if: The failure was wide spread or timely response of a function was compromised.

Review Conclusion: The "Not minor if" description involves a breakdown in a safety-related program that resulted an actual reduction in effectiveness of the ability of Emergency Response Organization (ERO) to respond to a potential radiological emergency.

Example j. An inspector found that the evaluation of the adequacy of emergency preparedness procedures in the annual audit was not in sufficient depth in one functional area. The licensee reviewed the areas not covered and found no problems.

The violation: 10 CFR 50.54(t) requires that the audit be conducted and that it contain the evaluation of the adequacy of EP procedures.

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Minor because: No problems were identified and the revisions of the procedures that were not audited addressed improvements identified in drills.

Not minor if: The procedures that were not evaluated were in a condition that would affect the licensee's response to an emergency.

Review Conclusion: The “Not minor if” description involves a breakdown in a safety-related program that resulted an actual reduction in effectiveness of the ability of Emergency Response Organization (ERO) to respond to a potential radiological emergency.

Example k. NRC Inspectors identified three ten-foot lengths of wood left from a scaffold disassembled the previous week, in the auxiliary Feedwater pump room. The licensee had not completed an engineering evaluation approving this temporary storage location for transient combustible materials as required by the fire protection plan. The violation: These transient combustible materials were not reflected in the fire hazards analysis and the licensee failed to complete the required engineering evaluation.

Minor because: This is a failure to implement a fire protection plan requirement that has little or no safety impact. The licensee was able to show that the transient combustibles were well below the fire hazards analysis limits.

Not minor if: The fire loading was not within the fire hazard analysis limits.

Review Conclusion: The “Not minor if” description involves a breakdown in a safety-related program that resulted an actual reduction in effectiveness of the ability to respond to a postulated plant emergency (fire).

Example l. The technical specifications required that one-third of all safety-related molded case circuit breakers be tested each refueling outage (such that all are tested every three outages) and that the instantaneous trip currents be recorded for trending purposes. The NRC inspector found that two outages ago during testing, the instantaneous trip current for a breaker was not tested due to the breaker not being listed for the instantaneous trip current test. The last recorded trip current for this breaker was five outages ago. The subject breaker was subsequently found to be in specification.

The violation: The technical specification is violated, because all required tests were not performed on the breaker within three outages.

Minor because: This is a failure to implement a procedural requirement that has no safety impact. All other tests on the breaker were satisfactory at the time of testing and the trip was subsequently found to be in specification.

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Not minor if: The subject breaker was out of specification.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example m. The technical specifications require that 10 percent of all safety-related snubbers be tested each refueling outage and that if one failure occurs, an additional 10 percent sample be tested during the same outage. One snubber in the original population of 17 snubbers (there are a total of 168 snubbers) fails, necessitating an additional sample of 17 snubbers. However, because of an oversight by the licensee, only 16 additional snubbers are tested with no failures.

The violation: The technical specification was violated because the required number of snubbers were not tested.

Minor because: This is a failure to implement a procedural requirement that has no safety impact since none of the additional snubbers tested failed.

Not minor if: A failure had occurred in the additional sample, necessitating yet another expansion of the sample, and this was not accomplished.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with potential impact on the ability of safety-related plant equipment to respond to a design basis event.

Example n. An inspector discovered a small pile of low level radioactive material in the radwaste building that was not properly posted. This problem occurred because of an oversight by the licensee.

The violation: The material should be posted as per 10 CFR 20.1902.

Minor because: This is a small area with low level radioactive material and access was restricted by a fence around the area. Other areas were sufficiently posted.

Not minor if: Other areas were also not posted or the radioactive material presented an accessible hazard.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

5. Work in Progress Findings

Example a. Prior to system restoration following a modification, the licensee determined that the modification package that replaced the spent fuel pool

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cooling system suction piping did not include the siphon hole called for by the original system design because the engineers failed to realize that the requirements of the original design. The siphon hole was not installed. Due to the location of the piping, a siphoning event would lower spent fuel pool level below the point allowed in Technical Specifications but not to the point where fuel would have been uncovered.

The violation: The pipe design was not correctly translated into work instructions and drawings.

Minor because: This was work in progress. The error was identified and corrected during turnover of the modification prior to system restoration.

Not minor if: The system was returned to service without installation of the siphon hole or completion of an evaluation to remove the requirement for the siphon hole.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example b. During installation of a modification, the licensee failed to follow the installation procedures and a check valve is installed backward. Quality control did not find the error. During a post-modification test, prior to returning the system to service, the licensee discovered the problem.

The violation: The licensee failed to correctly translate the design to the as-built configuration.

Minor because: It is work in progress and there are no safety consequences.

Not minor if: The system was returned to service.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example c. A solenoid that did not meet the specification was screened through receipt inspection and placed in the warehouse. When the solenoid was withdrawn to be installed, an electrician noted that it was not the correct type.

The violation: The licensee is supposed to establish controls to prevent nonconforming parts from being used inadvertently and the wrong part could have been installed.

Minor because: It was work in progress and no adverse consequences resulted.

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Not minor if: The valve was installed and the system returned to service.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

6. ALARA Planning or Work Controls Issues

Example a. While reviewing the ALARA planning packages for the previous outage, the inspector finds that the actual collective dose received to complete a work activity (i.e., hanging temporary shielding to support ISI work) was 12.5 person-rem as opposed to the 10 person-rem estimated in the planning process.

The issue: The dose that the licensee determined was ALARA for this work activity was not achieved.

Minor because: The actual dose achieved did not exceed the planned, intended dose (i.e., estimated collective dose planned for) by more than 50 percent. This 50 percent criteria represents the NRC’s expectation of reasonably achievable precision in the ALARA planning process.

Not minor if: The planned, intended collective dose for this work activity is unjustifiably higher than industry norms, or the licensee’s past experience, for this (or similar) work activity.

Review Conclusion: The “Not minor if” description involves an actual plant condition that actually resulted in higher than expected radiological exposure.

Example b. While reviewing the collective dose results for work activities completed in the previous refueling outage, the inspector finds a work activity where the actual collective exceeds the planned, intended dose by 50 percent but is not greater than five person-rem

The issue: The dose that the licensee determined was ALARA for this work activity was not achieved.

Minor because: Although the resulting dose is outside the expectation for ALARA planning precision, a five person-rem work activity is not a significant contribution to the overall ALARA performance.

Not minor if: If several such issues are identified and it appears that the licensee has arbitrarily divided up the radiological work into very small "work activities" for the purpose of avoiding inspection findings.

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Review Conclusion: The “Not minor if” description involves actual plant conditions that resulted in unexpected radiological exposure. NOTE: The example strongly implies willful misconduct on the part of licensee personnel.

7. Maintenance Rule Issues

Example a. Violations of Paragraph 10 CFR 50.65(a)(1): Violations of (a)(1) are for failing to set goals and monitor, having goals that are not commensurate with safety, failing to take industry operating experience into account where practicable, or for inadequate corrective action when goals are not met. Violations of (a)(1) are almost never minor because licensees only carry MR SSCs in (a)(1) status when there have already been significant equipment problems. See Enforcement Manual Section 8.1.11 and IP 71111.13.

Example b. Violations of Paragraph 10CFR50.65(a)(2): Violations of (a)(2), failure to demonstrate effective control of performance or condition and not putting the affected SSC(s) in (a)(1), are not minor because they necessarily involve degraded SSC performance or condition. See Enforcement Manual Section 8.1.11 and IP 71111.13.

Example c. Violations of 10 CFR 50.65(a)(3): Most 10 CFR 50.65(a)(3) violations, including failure to perform the periodic evaluation within the time requirements, will usually be minor unless they have other consequences such as equipment problems attributable to failure to take industry operating experience into account where practicable. The inspectors identified that during an (a)(3) periodic evaluation, the licensee failed to include the system unavailability time during T/S required surveillance testing of the emergency diesel generators.

Although the licensee conducts monthly EDG testing, the EDGs are unavailable to perform their intended safety function during T/S surveillance testing for a few minutes during each monthly test. The unavailability time due to surveillance testing was insignificant when compared against total unavailability such that the (a)(3) balancing was not affected.

The violation: The licensee failed to consider all unavailability when conducting the (a)(3) evaluation.

Minor if: The small contribution to unavailability due to the surveillance testing is insignificant when compared to total unavailability.

Not minor if: The contribution to unavailability due to surveillance testing was significant enough to affect the balancing determination.

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Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example d. Violations of 10 CFR 50.65(b): The inspectors identified that the licensee had not included some components of the augmented offgas system within the scope of its program for implementation of the Maintenance Rule. Failure of these components could result in a plant transient or scram for which vulnerability, they were required to be in scope by paragraph (b)(2) of the rule. However, the licensee was performing appropriate preventive maintenance and no equipment performance problems had been identified for the components in question.

The violation: The SSCs were not scoped within the maintenance rule as required by paragraph (b)(2) and if failures had occurred, they could have caused a transient or scram to an operating unit.

Minor because: This is a failure to implement a maintenance rule requirement that had no equipment performance implications in this example. Had the SSCs been scoped, the appropriate preventive maintenance being performed on the system would presumably be demonstrating effective control of performance or condition (absent equipment problems) as provided in paragraph (a)(2) of the maintenance rule.

Not minor if: An actual failure had occurred causing a transient or if equipment performance problems were such that effective control of performance or condition through appropriate preventive maintenance under (a)(2) could not be demonstrated.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with impact on safety-related plant equipment.

Example e. In accordance with the guidance of IP 71111.13, the inspectors first reviewed the plant’s maintenance risk assessment performed pursuant to 10 CFR 50.65(a)(4) for maintenance activities in progress and identified that the risk assessment was inadequate (i.e., it underestimated the risk because of personnel error) because (of one or more reasons including, but not limited to the following): (a) not all on-going maintenance activities affecting SSCs within the licensee’s established (a)(4) scope had been taken into account, (b) one or more maintenance activities were taking longer than assumed in the risk assessment, (c) plant conditions or operations, including technical specifications requirements, were not consistent with the assumptions used in the risk assessment, and (d) any other relevant information provided to the risk assessment tool or process was inaccurate and/or incomplete...or the risk assessment tool or process was being employed in a manner inconsistent with its design, capabilities and

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limitations, e.g., more maintenance activities than the tool can model, plant conditions not modeled by the tool, etc.

The violation: Failure to perform an adequate risk assessment when required by 10 CFR 50.65(a)(4)

Note that inspectors are expected to review risk assessments for maintenance activities in progress first as they are the most risk significant. Then if no deficiencies are identified, risk assessments for planned, but not yet commenced maintenance activities are reviewed. However, if a risk assessment for a planned maintenance activity that has not yet been commenced (or the plant has not yet been reconfigured in support of that activity) is found to be inadequate and there are no other inadequately assessed conditions or other activities that would invalidate the existing maintenance risk assessment, then the inadequacy of the risk assessment for the planned, but not yet commenced, maintenance activity does NOT in itself constitute a violation of (a)(4). However, inadequate risk assessments for the planned, but not yet commenced maintenance activity can be a performance deficiency. The lowest maintenance risk assessment review priority is risk assessments for completed maintenance activities for which the associated plant configuration no longer exists. Deficiencies in such risk assessments are treated the same as deficiencies in current risk assessments; even if reviewed at a lower priority.

Minor If: Overall elevated plant risk (when attributable at least in part to maintenance activities), computed in terms of incremental core damage probability (ICDP), (i.e., taking exposure time into account during the period of elevated, but not adequately assessed, core damage frequency (CDF)), when assessed correctly, is not greater than $1.0E-6$ - or - would not otherwise put the plant into a higher, licensee-established risk category or would not require risk management actions (RMAs) or additional RMAs under licensee procedures* - and - none of the conditions under Appendix B, Section 3, Items (5)(a) through (5)(h) apply.

More than Minor if: The elevated overall plant risk, as described above, when correctly assessed, is greater than $1.0E-6$ (ICDP) or would otherwise put the plant into a higher risk category or would require under plant procedures,* RMAs or additional RMAs - or - any of the conditions under Appendix B, Section 3, Items (5)(a) through (5)(h) applies.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with postulated impact on overall plant risk during a maintenance activity.

Example f. In accordance with the guidance of IP 71111.13, the inspectors first reviewed the plant’s maintenance risk assessment for maintenance activities in

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progress required by 10 CFR 50.65(a)(4) and identified that a risk assessment had not been performed because of personnel error (or reperformed/ updated) when required, by one or more circumstances including, but not limited to the following: (a) prior to commencing maintenance activities or maintenance support activities that could increase plant risk (b) prior to change(s) in plant configuration, conditions, or operations that would invalidate the existing risk assessment, and (c) as soon as practicable after an emergent condition that would invalidate the existing risk assessment, not to interfere with immediate plant stabilization and restoration (unless the condition is fully corrected/plant restored before the risk assessment can reasonably be performed or updated).

The violation: Failure to perform a risk assessment when required by (a)(4)

Minor if: The elevated overall plant risk, as described above, when assessed correctly, is not greater than 1.0E-6 (ICDP) or would otherwise not put the plant into a higher licensee-established risk category or would not require RMAs or additional RMAs under licensee procedures* - *and* - none of the conditions under Appendix B, Section 3, Items (5)(a) through (5)(h) apply.

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with postulated impact on overall plant risk during a maintenance activity.

Note that when no risk assessment has been performed at all, the risk deficit in terms of ICDP is equal to the entire amount by which the increase in plant risk (whenever the increase is attributable at least in part to maintenance activities) exceeds 1.0E-6. Not minor if: The elevated overall plant risk as described above, when correctly assessed, is greater than 1.0E-6 (ICDP) or otherwise would put the plant into a higher risk category or would require, under plant procedures*, RMAs or additional RMAs risk management actions - *or* - any of the conditions under Appendix B, Section 3, Items (5)(a) through (5)(h) applies.

* Note that under certain circumstances, the inspector may identify RMAs that based on judgment, should be taken at the correctly assessed risk level, but would not be required at that risk level by licensee procedures. In such cases, in accordance with IP71111.13, management review is required for a more-than-minor determination, including consultation with the Maintenance Rule cognizant branch in NRR.

Example g. In accordance with the guidance of IP 71111.13, the inspectors first reviewed the plant’s maintenance risk assessment for maintenance activities in progress required by 10 CFR 50.65(a)(4) and determined that a risk assessment had been performed when required and was adequate. Upon inspection of the plant, the inspectors identified that one or more of the RMAs prescribed by the licensee had not been effectively implemented.

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The violation: Failure to manage risk as required by 10 CFR 50.65(a)(4)

Minor if: All key safety functions are preserved and the increase in plant risk due to maintenance is less than or equal to the industry guidance threshold for taking risk management actions (i.e., $ICDP < 1.0E-6$).

Not minor if: Any key safety functions are lost or degraded or the increase in plant risk is greater than the industry guidance threshold for taking risk management actions (i.e., $ICDP > 1.0E-6$).

Review Conclusion: The “Not minor if” description involves an actual Degraded Condition with postulated impact on overall plant risk during a maintenance activity.

Additional Examples of Minor Violations/Findings

Example 1: NRC inspectors identified that a licensee employee inadvertently entered a zone that was not surveyed for the radiation work permit he/she was working under. The employee was properly signed in on a radiation work permit. The employee was equipped with an alarming electronic dosimeter. Upon entry to the zone that was not surveyed, the employee's electronic dosimeter alarmed on a high rate alarm. The employee immediately exited the area and reported to site radiation protection personnel.

The violation: Site procedures require employees to remain within areas covered in the radiation work permit applicable to the assigned work. .

Minor because: The employee was signed in on a radiation work permit and was equipped with electronic dosimetry similar to what would have been required to enter the area not covered by the radiation work permit survey. The employee followed proper work practices in responding to the ED alarm and consequently did not receive additional radiation exposure.

Not minor if: The employee received exposure above the limits of the assigned work permit or if the employee failed to exhibit proper radiation work practices by properly responding to the alarming ED. Also would not be minor if the employee transgressed barriers or failed to acknowledge postings that indicated they were entering a higher than expected radiation area.

Although the finding is *associated* with one of the cornerstone attributes listed at the end of Attachment B of MC0612, (Occupational Radiation Safety, Attribute 2) and *could* have affected the associated cornerstone objective (i.e., to ensure adequate protection of worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation), it was determined that the finding/violation was of minor significance because the employee was properly equipped with an alarming ED and exhibited proper work practices and:

- The situation could not reasonably be viewed as a precursor to a significant event (significant overexposure) and
- If left uncorrected the finding was unlikely to become a more significant safety concern.
- The finding did not result in a performance indicator (PI) increase that would have caused the PI to exceed a threshold.
- The finding was unassociated with maintenance risk assessment and risk management issues.

Additional Examples of Minor Violations/Findings

Example 2: NRC inspectors identified that licensee employees failed to properly implement procedural requirements and engineering controls by failing to obtain proper permission to bring certain materials into the containment while the plant was at power.

The violation: Site procedures require obtaining a permit prior to bringing certain materials into the containment while the plant is at power. The permit is used to track the amounts of certain materials to ensure that the amount of those materials does not exceed design limitations. The procedure establishes conservative amounts of the material (with margin to design limits).

Minor because: Although the employee failed to obtain the proper permit, the amount and type of material introduced into containment did not exceed the administrative limits.

Not minor if: The amount or type of material introduced into containment exceeded the administrative procedural limits and/or design limits.

Although the finding is *associated* with one of the cornerstone attributes listed at the end of Attachment B of MC0612, (Mitigating Systems, Attribute 2) and *could* have affected the associated cornerstone objective (i.e., to ensure the availability, reliability, and capability of systems that mitigate plant transients and the reactor accidents), it was determined that the finding/violation was minor because the amount of material introduced into containment did not exceed procedural or design limits and:

- The situation could not reasonably be viewed as a precursor to a significant event (impacted the ability of mitigating systems to perform their design function)
- If left uncorrected the finding was unlikely to become a more significant safety concern
- The finding did not result in a performance indicator (PI) increase that would have caused the PI to exceed a threshold.
- The finding was unassociated with maintenance risk assessment and risk management issues.

Additional Examples of Minor Violations/Findings

Example 3: NRC inspectors identified that licensee employees failed to perform a required radiological survey of the external surface of a package prior to release.

The violation: Site procedures require performing a radiological survey of packages before releasing them from the site. A contact dose rate limit of 0.5 millirem per hour is set by procedure and by regulation.

Minor because: When it was discovered that the surveys had not been conducted as required, surveys were conducted that concluded that the external surface dose rate on the package would not have exceeded the limit at the time of release.

Not minor if: When it was discovered that the surveys had not been conducted, surveys were conducted and it was determined that the external dose rate on the package exceeded the limit.

Although the finding is *associated* with one of the cornerstone attributes listed at the end of Attachment B of MC0612, (Public Radiation Safety, Attribute 4) and *could* have affected the associated cornerstone objective (i.e., to ensure adequate protection of public health and safety from exposure to radioactive material released into the public domain as a result of routine civilian nuclear reactor operations), it was determined that the finding/violation was of minor significance because the external radiation on the packages did not exceed the regulatory and procedural limits and:

- The situation could not reasonably be viewed as a precursor to a significant event (significant overexposure to a member of the public) and
- If left uncorrected the finding was unlikely to become a more significant safety concern.
- The finding did not result in a performance indicator (PI) increase that would have caused the PI to exceed a threshold.
- The finding was unassociated with maintenance risk assessment and risk management issues.

Section 3. Minor Questions

A finding should be compared to Appendix E examples to determine if it is similar to a minor example. If not, then answer the following questions to determine if the finding is more than minor.

Is the finding associated with one of the cornerstone attributes listed at the end of this attachment and does the finding affect the associated cornerstone objective?

If so, then the finding is more than minor if any of the following questions are answered in the affirmative.

- 1) Could the finding be reasonably viewed as a precursor to a significant event?
- 2) If left uncorrected would the finding become a more significant safety concern?
- 3) Does the finding relate to a performance indicator (PI) that would have caused the PI to exceed a threshold?
- 4) Does the finding relate to any of the following maintenance risk assessment and risk management issues?
 - a) Licensee risk assessment failed to consider risk significant SSCs and support systems (included in Table 2 of the plant specific Phase 2 SDP risk informed inspection notebook) that were unavailable during the maintenance.
 - b) Licensee risk assessment failed to consider unavailable SSCs such as Residual Heat Removal Systems (PWR and BWR) that prevent or mitigate Interfacing System LOCAs.
 - c) Licensee risk assessment failed to consider SSCs that prevent containment failure such as containment isolation valves (BWR & PWR), BWR drywell/containment spray/containment flooding systems, and PWR containment sprays and fan coolers.
 - d) Licensee risk assessment failed to consider unusual external conditions that are present or imminent (e.g., severe weather, offsite power instability).
 - e) Licensee risk assessment failed to consider maintenance activities that could increase the likelihood of initiating events such as work in the electrical switchyard (increasing the likelihood of a loss of offsite power) and RPS testing (increasing the likelihood of a reactor trip).
 - f) Licensee risk assessment failed to consider the uncompensated removal or impairment of plant internal and/or external flood barriers.
 - g) Licensee risk assessment failed to account for any unavailability of a single train of a system (primary or back-up) that provides a shutdown key safety function.
 - h) Licensee's risk assessment has known errors or incorrect assumptions that have the potential to change the outcome of the assessment.

- i) Licensee failed to implement any prescribed significant compensatory measures or failed to effectively manage those measures.