Cross-Cutting Issue Assessment

Introduction

One of the fundamental premises of the Reactor Oversight Process (ROP) is that significant weaknesses in the cross-cutting areas of human performance, safety conscious work environment[1], and problem identification and resolution will be detected by performance indicators crossing thresholds or via inspection activities in sufficient time to allow for an appropriate Nuclear Regulatory Commission (NRC) response to ensure adequate public health and safety. In order to confirm the validity of this premise, the staff committed to perform a yearly assessment for all Accident Sequence Precursor (ASP)[2] events and those facilities that reached the degraded cornerstone column of the Action Matrix. The purpose of the assessment is to ensure that the ROP provides for an appropriate level of NRC engagement to detect and prevent an unacceptable safety risk. If the ROP can detect issues and provide for an appropriate level of NRC engagement prior to the creation of an unacceptable risk, the ROP premise regarding cross-cutting issues would tend to be supported.

Assessment

This assessment covers plants that reached the applicable columns of the action matrix during 2002, as well as plants that reached the applicable columns of the action matrix during 2001 that were not included as part of the last assessment. Three plants, Vermont Yankee, Harris 1, and Braidwood 1, reached the degraded cornerstone column of the Action Matrix. There were also three plants, Cooper, Oconee, and Point Beach, that reached the multiple/repetitive degraded cornerstone column of the Action Matrix. At Davis-Besse, facility management established an organizational culture that emphasized production facilitating acceptance of degraded conditions and reductions in safety margins causing reactor coolant system pressure boundary leakage going undetected for an prolonged period of time resulting in reactor pressure vessel head degradation and control rod drive nozzle circumferential cracking. This performance deficiency has preliminarily been characterized as a Red finding, but has not yet been finalized. Due to the time involved in completing ASP analyses, there were no ASP[3] analyses completed for events or conditions that occurred during calendar year (CY) 2001 or 2002.

Vermont Yankee reached the degraded cornerstone column of the Action Matrix due to a yellow inspection finding in the physical protection cornerstone identified in the third quarter of 2001. During the conduct of force-on-force exercises, response strategy weaknesses were identified. No additional risk significant issues were identified during the supplemental inspection conducted by the NRC.

ATTACHMENT 6

---

[1] In SECY-99-007, "Recommendations for Reactor Oversight Process Improvements," the terms "safety conscious work environment" and "safety culture" are used synonymously, and are defined as a willingness on the part of a licensee staff to raise and document safety issues to resolve risk-significant equipment and process deficiencies promptly, adhere to written procedures, conduct effective training, make conservative decisions, and conduct probing self-assessments.

[2] ASP events are events with a conditional core damage probability of equal to or greater than 1.0 X 10E-6.

[3] ASP analyses are currently being performed for a number of events in the CY 2001 and 2002 timeframe, including the Davis-Besse and Point Beach issues.

Harris 1 reached the degraded cornerstone column of the Action Matrix in the second quarter of 2002 due to two white findings in the mitigating systems cornerstone. The first white finding involved a violation of the fire protection program for a fire barrier assembly with an indeterminate fire resistance rating. The second white finding involved a violation of technical specifications resulting from inadequate foreign material controls which allowed foreign material to enter the containment sump suction piping. During a corresponding supplemental inspection, the inspectors determined that the licensee's problem identification, root cause evaluation, and extent of condition evaluation for both findings were adequate. Also for both issues, the licensee's root cause evaluation determined that there were prior opportunities to identify the findings. In addition, the corrective action program had not been utilized effectively in resolution of the Thermo-Lag fire barrier finding. As such, several corrective action deficiencies were subsequently identified and are under review. The inspectors conducted an independent assessment of the licensee's extent of condition evaluation for both issues. This assessment did not identify any additional areas affected by either finding which the licensee had not already identified. No additional risk significant issues were identified.

Braidwood 1 reached the degraded cornerstone column of the Action Matrix in the first quarter of 2002 due to one performance indicator (PI) and one inspection finding in the mitigating system cornerstone. The PI was the safety system unavailability for the heat removal system (auxiliary feedwater) and the inspection finding was associated with the pressurizer power operated relief air accumulator check valves. The inspectors concluded that the level of detail of the root cause evaluation for exceeding the performance indicator threshold was adequate. The licensee appropriately identified that the potential for a common cause failure mode based on the inappropriate application of the diesel fuel shutoff solenoid valve was applicable to the Braidwood and Byron diesel driven auxiliary feedwater pumps and the Byron essential service water makeup pumps. The valves for the auxiliary feedwater diesels were either replaced or are scheduled to be replaced. A supplemental inspection for the performance issue associated with the check valves has yet to be performed. No additional risk significant issues were identified during the supplemental inspection for the heat removal system PI.

Cooper entered the multiple/repetitive degraded cornerstone column of the Action Matrix at the start of the second quarter of 2002 based on two or more white findings in the emergency preparedness cornerstone existing for greater than 4 quarters. There were three separate white findings in the emergency preparedness cornerstone that contributed to entry into this column. There was also an additional white finding in the mitigating systems cornerstone. During a supplemental inspection performed for the emergency preparedness issues, the licensee's root cause evaluation was found to be inadequate, in that it was not sufficiently broad to address all the causes for the programmatic breakdown in the emergency preparedness program. After entering the multiple/repetitive degraded cornerstone column, an extensive supplemental inspection was conducted to review the adequacy of the licensee's improvement plan and to assess the extent of other risk significant issues. No additional risk significant issues were identified during this inspection; however, the inspection did find that a number of long-standing performance problems existed at Cooper Nuclear Station. Of greatest concern was the failure of Cooper Nuclear Station to correct recurring performance issues. For example, the improvement plan did not include actions to correct recurring equipment problems and was not comprehensive in addressing problems with the corrective action program.

Oconee reached the multiple/repetitive degraded cornerstone column of the Action Matrix in the second quarter of 2002 due to five consecutive quarters in the degraded cornerstone column of the Action Matrix. The mitigating systems cornerstone remained degraded due to a white PI for

heat removal system unavailability. The PI was the result of the unavailability of the 1B motor driven emergency feedwater pump due to a misaligned bearing sleeve. A supplemental inspection in accordance with Inspection Procedure (IP) 95002[4], "Inspection For One Degraded Cornerstone Or Any Three White Inputs In a Strategic Performance Area," was conducted to assess the licensee's root cause evaluation and to perform an independent evaluation of the extent of the issues. The licensee's root cause evaluation and extent of condition review were found to be adequate. No additional risk significant issues were identified.

A red performance deficiency associated with the auxiliary feedwater system was self identified by the licensee at Point Beach during the fourth quarter of 2001. In September 2002, a special inspection was performed to assess the licensee's corrective actions and whether the licensee should be given credit for self-identifying the issue under the "old design issue" provisions of Inspection Manual Chapter (IMC) 0305, "Operating Reactor Assessment Program." During that inspection, it was determined that the licensee's extent of condition evaluation was not sufficiently broad, as evidenced by additional issues identified by the inspection team with the auxiliary feedwater system, and credit under the "old design issue" provisions was not granted. The risk significance of these additional issues has been preliminarily evaluated as red. A supplemental inspection is being planned to assess the breadth and depth of risk significant issues at Point Beach.

At Davis-Besse, facility management established an organizational culture that emphasized production resulting in acceptance of degraded conditions and reductions in safety margins. That deficient safety culture impacted the effectiveness of a number of safety significant programs including the corrective action program and boric acid corrosion management program. Also, the emphasis on production resulted in multiple examples where adequate technical rigor was not applied to decisions and evaluations of degraded equipment and operating experience. The outcome of this deficient safety culture was that Davis-Besse allowed reactor coolant system pressure boundary leakage to occur undetected for an prolonged period of time resulting in reactor pressure vessel head degradation and control rod drive nozzle circumferential cracking. The preliminary significance determination associated with this performance issue was determined to be Red, an issue of high safety significance. In addition, the issue has resulted in an extended plant shutdown and the plant being placed in the NRC's IMC 0350, "Oversight of Operating Reactor Facilities in an Extended Shutdown as a Result of Significant Performance Problems," process.

Conclusion

The results of this analysis are summarized in the attached table. Weaknesses in the cross-cutting area of problem identification and resolution were a contributor at six facilities. Weaknesses in the cross-cutting area of human performance were a contributing factor at five facilities.

[4]On October 9, 2002, the EDO approved a deviation from the Action Matrix for Oconee to allow an inspection in accordance with IP 95002 in lieu of an inspection in accordance with IP 95003, "Supplemental Inspection For Repetitive Degraded Cornerstone, "Multiple Degraded Cornerstone, Multiple Yellow Inputs, or One Red Input," which is required for plants that enter the multiple/repetitive degraded cornerstone column of the Action Matrix.

Weaknesses in the cross-cutting area of safety conscious work environment were a contributing factor at Davis-Besse. Although individuals were not initially hesitant to raise concerns regarding many of the specific issues, the concerns were not adequately resolved due to a deficient safety culture. In addition, following the shutdown of the facility, the licensee identified a lack of employee confidence in their Employee Concerns Program, a key element of a safety conscious work environment.

At Harris, Braidwood, Oconee, and Vermont Yankee, the performance issues were found to be limited in scope and had not progressed to a degree that posed an unacceptable[5] safety risk. At Cooper, the performance issues were found to be more broad in nature. At Point Beach, the breadth and depth of risk significant issues have not yet been determined.

In conclusion, none of the individual performance issues involving cross-cutting concerns discussed above have been shown to represent an unacceptable safety risk to public health and safety; however, in the case of Davis-Besse, the integrated risk associated with multiple concurrent performance deficiencies has not been quantified. In addition, the Davis-Besse Lessons Learned Task Force identified a number of program and implementation issues that may have contributed to the ROP's inability to detect the issues at Davis-Besse in a more timely manner. The task force's recommendations are currently being evaluated and changes to the ROP will be made as appropriate. An evaluation will be performed to determine whether a more direct way is needed to assess and react to performance weaknesses in the cross-cutting areas of problem identification and resolution and safety conscious work environment (safety culture). The results of this evaluation will be communicated to the Commission in the next annual ROP assessment report.

[5] For the purposes of this assessment, the level of unacceptable risk is assumed to be equivalent to the NRC's definition of a significant precursor, which is defined as a change in core damage frequency or conditional core damage probability of greater than 10E-3.

Summary Table - Cross-Cutting Issue Assessment

	Quarter Reached and Reason	Cornerstones Affected	Cross-cutting Issues That Contributed	Supplemental Inspection Results Adequate	Unacceptable Safety Level Identified
Braidwood 1	1st quarter 2002 due to one white PI and one white inspection finding	mitigating systems	problem identification and resolution, human performance	ongoing	no
Vermont Yankee	3rd quarter 2001 due to yellow inspection finding	physical protection		yes	no
Harris 1	2nd quarter 2002 due to two white inspection findings	mitigating systems	problem identification and resolution, human performance	yes	no
Cooper	1st quarter 2002 due to three white findings	emergency preparedness	problem identification and resolution, human performance	no	no
Oconee	2nd quarter 2002 due to white PI for heat removal system combined with previous inspection findings	mitigating systems	problem identification and resolution, human performance	yes	no
Point Beach	4th quarter 2001	mitigating systems	problem identification and resolution	ongoing	indeterminate
Davis Besse	1st quarter 2002	initiating events	problem identification and resolution, human performance, safety conscious work environment	ongoing	indeterminate