March 22, 2001

EA-01-070

Mr. M. Reddemann
Site Vice President
Kewaunee and Point Beach Nuclear Plants
Nuclear Management Company, LLC
6610 Nuclear Road
Two Rivers, WI 54241

SUBJECT: KEWAUNEE TRIENNIAL FIRE PROTECTION BASELINE INSPECTION REPORT NO. 50-305/01-02(DRS) AND PRELIMINARY YELLOW FINDING

Dear Mr. Reddemann:

On February 16, 2001, the NRC completed a fire protection triennial baseline inspection at the Kewaunee Nuclear Power Plant. The enclosed report presents the results of that inspection which were discussed on March 12, 2001, with Mr. Kyle Hoops and members of your staff.

The inspection examined the effectiveness of activities conducted under your license as they related to implementation of your NRC approved Fire Protection Program. The inspection consisted of a selected examination of design drawings, calculations, analyses, procedures, audits, field walkdowns, and interviews with personnel.

This report discusses an issue that appears to have substantial safety significance. As described in Section 1R05.2 of this report, a non-rated fire barrier was identified in the auxiliary feedwater pump 1B room which had been installed in 1983 to protect redundant trains of safe shutdown circuits. This issue was assessed using the applicable significance determination process as a potentially safety significant finding that was preliminarily determined to be Yellow, i.e., an issue with substantial importance to safety that will result in additional NRC inspection and potentially other NRC action. This issue is of apparent substantial safety significance because a fire in the auxiliary feedwater pump 1B room could cause cables protected by the fire barrier to fail. As a result, both trains of auxiliary feedwater pumps and component cooling water pumps, and all three chemical volume control system charging pumps could fail, increasing the risk of core damage.

The fire barrier issue is an apparent violation of NRC requirements and is being considered for escalated enforcement action in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600. The current Enforcement Policy is included on the NRC's website at www.nrc.gov/OE.

Before the NRC makes a final decision on this matter, we are providing you an opportunity to request a Regulatory Conference where you would be able to provide your perspectives on the significance of the finding, the bases for your position, and whether you agree with the apparent violation. If you choose to request a Regulatory Conference, we encourage you to submit your evaluation and any differences with the NRC evaluation at least one week prior to the

conference in an effort to make the conference more efficient and effective. If a conference is held, it will be open for public observation. The NRC will also issue a press release to announce the conference.

Please contact Mr. Ronald N. Gardner at (630) 829-9751 within seven days of the date of this letter to notify the NRC of your intentions. If we have not heard from you within 10 days, we will continue with our significance determination and enforcement decision and you will be advised by separate correspondence of the results of our deliberations on this matter.

Since the NRC has not made a final determination in this matter, no Notice of Violation is being issued for this inspection finding at this time. In addition, please be advised that the number and characterization of apparent violations described in the enclosed inspection report may change as a result of further NRC review.

The inspectors also identified two issues that were designated as unresolved items (URIs). These issues are discussed in the enclosed report. These two issues require additional information to support your position that specific fire protection features are functional. Specific issues requiring additional response are identified in Enclosure 2. Please provide a written response to the issues identified in Enclosure 2 within 30 days of receipt of this letter.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your responses will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room).

Sincerely,

/RA/

John A. Grobe, Director
Division of Reactor Safety

Docket No. 50-305
License No. DPR-43

Enclosures: 1. Inspection Report 50-305/01-02
2. Request for Additional Information

cc w/encl: K. Hoops, Manager, Kewaunee Plant
D. Graham, Director, Bureau of Field Operations
Chairman, Wisconsin Public Service Commission
State Liaison Officer

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Docket No. 50-305
License No. DPR-43

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cc w/encl: K. Hoops, Manager, Kewaunee Plant
D. Graham, Director, Bureau of Field Operations
Chairman, Wisconsin Public Service Commission
State Liaison Officer

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DATE	03/19/2001	03/19/2001	03/19/2001	03/19/2001

OFFICE	NRR per email/phone	R-III	OE per email/phone	
NAME	RGardner for WDean	JGrobe	RGardner for CNolan	
DATE	03/22/2001	03/22/2001	03/22/2001	

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U.S. NUCLEAR REGULATORY COMMISSION
REGION III

Docket No:	50-305
License No:	DPR-43
Report No:	50-305/01-02
Licensee:	Nuclear Management Company, LLC
Facility:	Kewaunee Nuclear Power Plant
Location:	N 490 Highway 42 Kewaunee, WI 54216
Dates:	January 29 - February 16, 2001
Lead Inspector:	R. Langstaff, Senior Reactor Inspector Mechanical Engineering Branch
Inspectors:	D. Chyu, Reactor Inspector Electrical Engineering Branch G. Hausman, Senior Reactor Inspector Electrical Engineering Branch
Approved By:	Ronald N. Gardner, Chief Electrical Engineering Branch Division of Reactor Safety

NRC's REVISED REACTOR OVERSIGHT PROCESS

The federal Nuclear Regulatory Commission (NRC) recently revamped its inspection, assessment, and enforcement programs for commercial nuclear power plants. The new process takes into account improvements in the performance of the nuclear industry over the past 25 years and improved approaches of inspecting and assessing safety performance at NRC licensed plants.

The new process monitors licensee performance in three broad areas (called strategic performance areas) reactor safety (avoiding accidents and reducing the consequences of accidents if they occur), radiation safety (protecting plant employees and the public during routine operations), and safeguards (protecting the plant against sabotage or other security threats). The process focuses on licensee performance within each of seven cornerstones of safety in the three areas:

Reactor Safety	Radiation Safety	Safeguards
● Initiating Events	● Occupational	● Physical Protection
● Mitigating Systems	● Public	
● Barrier Integrity		
● Emergency Preparedness		

To monitor these seven cornerstones of safety, the NRC uses two processes that generate information about the safety significance of plant operations: inspections and performance indicators. Inspection findings will be evaluated according to their potential significance for safety, using the Significance Determination Process, and assigned colors of GREEN, WHITE, YELLOW or RED. GREEN findings are indicative of issues that, while they may not be desirable, represent very low safety significance. WHITE findings indicate issues that are of low to moderate safety significance. YELLOW findings are issues that are of substantial safety significance. RED findings represent issues that are of high safety significance with a significant reduction in safety margin.

Performance indicator data will be compared to established criteria for measuring licensee performance in terms of potential safety. Based on prescribed thresholds, the indicators will be classified by color representing varying levels of performance and incremental degradation in safety: GREEN, WHITE, YELLOW, and RED. GREEN indicators represent performance at a level requiring no additional NRC oversight beyond the baseline inspections. WHITE corresponds to performance that may result in increased NRC oversight. YELLOW represents performance that minimally reduces safety margin and requires even more NRC oversight. And RED indicates performance that represents a significant reduction in safety margin but still provides adequate protection to public health and safety.

The assessment process integrates performance indicators and inspection so the agency can reach objective conclusions regarding overall plant performance. The agency will use an Action Matrix to determine in a systematic, predictable manner which regulatory actions should be taken based on a licensee's performance. The NRC's actions in response to the significance (as represented by the color) of issues will be the same for performance indicators as for inspection findings. As a licensee's safety performance degrades, the NRC will take more and increasingly significant action, which can include shutting down a plant, as described in the Action Matrix.

More information can be found at: http://www.nrc.gov/NRR/OVERSIGHT/index.html.

SUMMARY OF FINDINGS

IR 05000305-01-02(DRS), on 01/29 - 02/16/01, Nuclear Management Company, LLC, Kewaunee Nuclear Power Plant, Unit 1. Fire Protection.

The inspection was conducted by a team of three Region III inspectors. The inspection identified one issue of substantial safety significance (Yellow) which was an apparent violation. The significance of findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process."

A. Inspector-Identified Findings

Cornerstone: Mitigating Systems

- TBD. The inspectors identified that a fire barrier in the auxiliary feedwater pump B room was not rated. The fire barrier was required to have a 3-hour rating for protection of redundant safe shutdown equipment. The failure to have a rated 3-hour barrier was considered an apparent violation of 10 CFR Part 50, Appendix R, Section III.G.2.

  This issue has been preliminarily determined to have substantial safety significance (Yellow). As a result of the barrier not being rated, a fire in the auxiliary feedwater pump B room could result in the loss of both trains of auxiliary feedwater pumps and component cooling water pumps, and all three chemical volume control system charging pumps which would increase the risk of core damage (Section 1R05.2).

B. Licensee-Identified Findings

Violations of very low significance which were identified by the licensee have been reviewed by the inspectors. Corrective actions taken or planned by the licensee appeared reasonable. These violations are listed in Section 4OA7 of this report.

Report Details

Summary of Plant Status: Unit 1 operated at or near full power throughout the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events and Mitigating Systems

1R05 Fire Protection (71111.05)

The purpose of this inspection was to review the Kewaunee Nuclear Power Plant fire protection program for selected risk-significant fire areas. Emphasis was placed on verifying that the post-fire safe shutdown capability and the fire protection features were maintained free of fire damage to ensure that at least one post-fire safe shutdown success path was available. The inspection was performed in accordance with the new NRC regulatory oversight process using a risk-informed approach for selecting the fire areas and attributes to be inspected. The lead inspector and a Region III senior reactor analyst used the Kewaunee Individual Plant Examination for External Events (IPEEE) to choose several risk-significant areas for detailed inspection and review. The fire zones chosen for review during this inspection were:

- AX-30, Relay Room
- TU-92, Diesel Generator B Room
- TU-93, Diesel Generator B Day Tank Room
- TU-95B, Safeguards Alley

For each of these fire zones, the inspection was focused on the fire protection features, the systems and equipment necessary to achieve and maintain safe shutdown conditions, determination of license commitments, and changes to the fire protection program.

.1 Systems Required to Achieve and Maintain Post-Fire Safe Shutdown

10 CFR Part 50, Appendix R, Section III.G.1, required the licensee to provide fire protection features that were capable of limiting fire damage to structures, systems, and components important to safe shutdown. The structures, systems, and components that were necessary to achieve and maintain post-fire safe shutdown were required to be protected by fire protection features that were capable of limiting fire damage to the structures, systems, and components so that:

- One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) was free of fire damage; and
- Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) could be repaired within 72 hours.

Specific design features for ensuring this capability were specified by 10 CFR Part 50, Appendix R, Section III.G.2.

a. Inspection Scope

The inspectors reviewed the plant systems required to achieve and maintain post-fire safe shutdown to determine if the licensee had properly identified the components and systems necessary to achieve and maintain safe shutdown conditions for each fire zone selected for review. Specifically, the review was performed to determine the adequacy of the systems selected for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring, and support system functions. This review included the fire protection safe shutdown analysis.

The inspectors also reviewed the operators' ability to perform the necessary manual actions for achieving safe shutdown including a review of procedures, accessibility of safe shutdown equipment, and the available time for performing the actions.

The inspectors reviewed the updated final safety analysis report and the licensee's engineering and/or licensing justifications (e.g., NRC guidance documents, license amendments, technical specifications, safety evaluation reports, exemptions, and deviations) to determine the licensing basis.

b. Findings

No findings of significance were identified.

.2 Fire Protection of Safe Shutdown Capability

10 CFR Part 50, Appendix R, Sections III.G.2, required separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3-hour rating. If the requirements cannot be met, then alternative of dedicated shutdown capability and its associated circuits, independent of cables, systems or components in the area, room, or zone under consideration should be provided (Section III. G.3).

a. Inspection Scope

For each of the selected fire areas, the inspectors reviewed the licensee's safe shutdown analysis to ensure that at least one post-fire safe shutdown success path was available in the event of a fire. This included a review of manual actions required to achieve and maintain hot shutdown conditions and make the necessary repairs to reach cold shutdown within 72 hours. The inspectors also reviewed procedures to verify that adequate direction was provided to operators to perform these manual actions. Factors, such as timing, access to the equipment, and the availability of procedures, were considered in the review.

The inspectors also evaluated the adequacy of fire suppression and detection systems, fire area barriers, penetration seals, and fire doors to ensure that at least one train of safe shutdown equipment was free of fire damage. To do this, the inspectors observed the material condition and configuration of the installed fire detection and suppression systems, fire barriers, and construction details and supporting fire tests for the installed fire barriers. In addition, the inspectors reviewed license documentation, such as deviations, detector placement drawings, fire hose station drawings, carbon dioxide pre-

operational test reports, smoke removal plans, fire hazard analysis reports, safe shutdown analysis, and National Fire Protection Association (NFPA) codes to verify that the fire barrier installations met license commitments.

b. Findings

Non-Rated Fire Barrier

A finding was identified involving a non-rated fire barrier that was preliminarily determined to have substantial safety significance (Yellow). The inspectors determined that the failure of the fire barrier had a credible impact on safety and affected mitigating systems, specifically both auxiliary feedwater pumps, components cooling water pumps, and all three charging pumps. In addition, this non-rated fire barrier involved impairment of a fire protection feature and defense-in-depth elements.

(a) Issue Description

The inspectors identified that a fire barrier, designated as electrical cable pull box (PB) 2105 and located in the auxiliary feedwater (AFW) pump 1B room, had been installed in 1983 to protect cabling associated with AFW pump 1A and other train A circuits. PB 2105 was of box-type construction with an approximate size of three feet long by three feet wide by three feet high. Two sides of PB 2105 were attached to the concrete walls. The top, bottom, and remaining two sides were exposed surfaces and were constructed with 2-inch by 2-inch angle irons with Marinite boards attached to them. The Marinite boards were attached using 3/8-inch bolts, eight inches on center. A structural support extended from the ceiling to support one corner of PB 2105. PB 2105 and the structural support were covered with Flamemastic material. The inspectors noted that Flamemastic material is a combustible material which does not provide fire barrier protection. Installation drawings showed that PB 2105 was packed with about 10 inches of Cerafiber wool wherever possible. However, the licensee was unable to locate any installation records which confirmed that PB 2105 was packed with Cerafiber wool. There were 25 cables in five conduits with one additional conduit retained as a spare. Of the 25 cables, 21 cables were designated as required for safe shutdown purposes. In addition, there was a 2-inch diameter service water pipe and a pipe hanger which penetrated the top and bottom surfaces of the box. These surfaces of the box had to be patched to accommodate the penetrations. In addition, the metal passing through the box provided a means to conduct heat into the box interior.

The licensee's Generic Letter 86-10 evaluation for this fire barrier indicated:

- Fire Zone TU-95B, which included the AFW pump 1B room, had a combustible loading that resulted in an equivalent fire severity of approximately 90 minutes.
- The hazards in the area required a minimum two-hour rated construction for the box.
- A fire rating could not be assigned to the box because it had not been tested.
- The box should provide an adequate level of protection until the arrival of the fire brigades.

The inspectors disagreed with this evaluation. The inspectors identified that the evaluation for PB 2105 did not demonstrate that the fire barrier for PB 2105 and the supporting structural member provided an adequate level of protection for the potential fire severity in that zone. In addition, the inspectors concluded that this configuration does not meet the requirements of 10 CFR Part 50, Appendix R, Section III.G.2 When questioned by the inspectors, the licensee was not able to locate test information with a similar configuration to demonstrate equivalency to a 3-hour rated fire barrier. On February 14, 2001, the licensee declared the barrier inoperable because PB 2105 did not meet the 3-hour rated barrier requirement specified by 10 CFR Part 50, Appendix R, Section III.G.2.(a). The licensee made a 10 CFR 50.72 notification (Event Number 37750) to inform the NRC of this unanalyzed condition and initiated corrective action via Kewaunee Assessment Process (KAP) Work Order (WO) 01-001965.

(b) Analysis of Significance - Fire Scenario

The inspectors performed a Phase 2 evaluation consistent with NRC Inspection Manual Chapter (IMC) 609, Appendix F, "Fire Protection Significance Determination Process," to determine the safety significance of this issue. As part of the evaluation, the inspectors postulated a fire scenario in which a fire originated as a result of an AFW pump 1B lubricating oil leak.

For this scenario, the inspectors assumed the following:

- The AFW pump 1B contains four gallons of lubricating oil. An oil leak or spill would create a pool of lubricating oil that has a diameter of eight feet. The inspectors noted that there were no curbs around the pump to limit the size of an oil leak or spill.

- An oil pool having a diameter of four feet could produce flame height impinging on the unrated pull box and the north set of cables trays. Therefore, the lubricating oil pool fire was postulated to ignite the unprotected control cables in the north set of cables trays located directly above the pump.

- The cables inside PB 2105 fail due to the direct flame impingement from the oil fire and close proximity of the fire in the cable trays above the pump.

- An oil pool fire of eight feet in diameter could develop hot gas layers temperatures (about 795°F) in excess of the 700°F temperature needed to ignite IEEE qualified cables.

- The cables in the south set of cable trays (10 to 12 feet away laterally) fail due to high temperatures from the hot gas layers. The inspectors noted that hot gases from the lubricating oil and cable tray fires would be retained by an overhead beam pocket approximately three feet deep. Both sets of cable trays were located directly below the beam pocket. The inspectors determined that the hot gas layer developed could reach sufficient temperatures to fail the cables located on the south side of the room.

An additional four or more gallons of lubricating oil could be in the room as a transient combustible due to maintenance activities, such as changing the oil in the pump.

(c) Analysis of Significance - Equipment Affected

The inspectors identified that such a fire, as described above, would adversely affect the following equipment:

Initial Source of Fire
AFW Pump 1B

Cables Within PB 2105
AFW Pump 1A - power cable
Component Cooling Water (CCW) Pump 1A - control power to breaker
Chemical Volume Control System (CVCS) Charging Pump 1C - control cable
CVCS Valve CVC-1 (Volume Control Tank Supply to Charging Pumps) - only affected if control had been transferred to remote shutdown panel
CVCS Valve CVC-301 (Refueling Water Storage Tank Supply to Charging Pumps) - only affected if control had been transferred to remote shutdown panel
Diesel Generator 1A - power to exciter controls
Residual Heat Removal Pump 1A - control power to breaker
Safety Injection Pump 1A - control power to breaker
Service Water Pump 1A1 - control power to breaker

Cables Withing AFW Pump 1B Room
CCW Pump 1B - power cable
CVCS Charging Pump 1A - control cable
CVCS Charging Pump 1B - control cable
Service Water Pump 1B1
Service Water Pump 1B2
Safety Injection Pump 1B - power cable
Turbine Driven AFW Pump - control cable

(d) Analysis of Significance - Operational Impact if Operations Control from Control Room Retained

For simplicity, the inspectors assumed that plant operators, for the fire scenario previously described, would retain control of the plant from the control room and that the 10 CFR Part 50, Appendix R safe shutdown procedure for the area, procedure E-O-06, “Fire in Alternate Fire Zone,” would not be entered. As such, off-site power was assumed to not be affected by the fire and would be available. Consequently, main feedwater and condensate were assumed to still be available. In addition, service water pump 1A2 would not be affected by the fire and, consequently, service water was assumed to be available.

The inspectors determined that the most limiting sequence would involve loss of both auxiliary water pumps, CCW pumps, and all three CVCS charging pumps. Power to CCW pump 1B would be lost because the pump power cable goes through the AFW pump 1B room. CCW pump 1A would be affected because control power to the breaker for the pump goes through PB 2105. All three CVCS charging pumps would be affected because the control cables for pumps 1A and 1B go through AFW pump 1B room and the control cable for CVCS charging pump 1C goes through PB 2105.

Normally, only one of the two CCW pumps would be running. The licensee periodically alternated the running and standby pumps between CCW pumps 1A and 1B. The standby pump would automatically start upon low CCW header pressure should the running pump stop. Loss of control power to the breaker for CCW pump 1A would not cause the pump to trip if it was already running. However, if control power was lost and the pump was not running, the pump could not be started remotely because the breaker for the pump required control power to engage the breaker. The breaker could be closed locally at the motor control center located near the remote shutdown panel. However, doing so required the skills of an electrician (versus an on-shift operator). Electricians were not normally on-site except for normal work hours during weekdays. (Refer to Inspection Report 50-305/00-15 Section 1EP3 for a discussion of response by electricians for emergency response drills.) For this scenario, the inspectors assumed that CCW pump 1A was not running initially, the cable which provided control power to the breaker for CCW pump 1A failed and, subsequently, the power cable for CCW pump 1B failed thereby causing a loss of CCW. The inspectors assumed that neither CCW pump would be recovered.

Failure of the control cables for the CVCS charging pumps would cause the pumps to stop. Re-starting CVCS charging pumps 1A and 1B would require lifting leads and installing electrical jumpers in the motor control center for the pumps. There were no procedures or pre-staged equipment for performing this potential recovery action. CVCS Charging pump 1C could not be re-started if the control cable for the pump failed. The inspectors assumed that none of the CVCS charging pumps would be recovered. The concern with the loss of AFW pumps, CCW pumps, and charging pumps is the potential for RCP seal failures leading to a small loss of coolant accident.

The ignition frequency was assumed to be 7.87E-4/year based on the ignition frequency given in the licensee's updated IPEEE (Table 9.1-1, Kewaunee Fire Ignition Frequencies) for AFW pump 1B located in the room. The fire barrier (PB 2105) was assumed to be highly degraded because it was not rated nor was it tested for its configuration. Manual suppression was assumed to be in the normal operating state (functional). A finding discussed in Section 4OA2.1 relating to inadequate smoke detector coverage did not affect this fire scenario because a smoke detector was located in the beam pocket directly above AFW pump 1B. No credit was given for automatic suppression because there was no automatic suppression for the area and none was required. Based on the above information, the inspectors preliminarily determined that the finding had substantial safety significance (Yellow).

(e) Analysis of Significance - Operational Impact if Operations Transferred Control to the Dedicated Shutdown Panel

For the evaluation outlined above, the inspectors assumed that operators would retain control from the control room. This assumption was made for purposes of simplifying the evaluation process. However, plant operating procedure E-FP-08, "Emergency Operating Procedure - Fire," directed operators to enter the procedure E-O-06 for controlling the plant from the dedicated shutdown panel if a fire resulted in the inability to monitor and control major plant parameters. Because of the number of cables which went through the AFW pump 1B room, it is possible that operations personnel would

decide to enter procedure E-O-06 and control the plant from the dedicated shutdown panel if a substantial fire in the AFW pump 1B room occurred. Based on discussions with the licensee, the inspectors were not able to definitively determine whether control from the control room would be retained if such a fire occurred. The inspectors noted that with regards to an AFW pump 1B oil fire, Section 9.6.5.G of the licensee's IPEEE stated:

> Fire-induced disabling of the vulnerable cable trays causes damage to cables that control components vital to safe shutdown, giving rise to a high core damage frequency. Failure of safeguards 4160V electrical bus 6 ["B" train] is assumed because the cables for the source breakers for these components are vulnerable to fire-induced damage.
>
> Since this fire renders operation of equipment from the control room impossible, it is assumed that the operators evacuate the control room and go to the dedicated shutdown panel using procedure E-O-06, Fire in Alternate Zone. Therefore, it is assumed that offsite power is not available and that operators manually restore power to safeguards 4160V electrical bus 5 ["A" train].

If procedure E-O-06 was entered, the following operational impacts would be induced by the procedure:

- Non-safety buses would be de-energized (affecting main feedwater and condensate)
- "B" train bus would be de-energized
- Non-essential "A" train equipment would also be de-energized (such as safety injection pump 1A)
- Breakers supplying off-site power would be opened
- Power to "A" train equipment would be supplied by diesel generator 1A

As a result of cable failures in PB 2105, all alternating current power to "A" train equipment would subsequently be lost due to loss of power to diesel generator 1A exciter controls. Consequently, a station blackout would occur. Some equipment could potentially be recovered by restoring off-site power and re-energizing some equipment. However, such actions would be beyond the scope of existing procedures. The inspectors noted that in terms of the significance determination process, the primary differences would be that main feedwater and condensate would not initially be available but could potentially be recovered. The inspectors preliminarily determined that the finding would have comparable safety significance (substantial safety significance or "Yellow") regardless of whether control from the control room had been retained.

(f) Regulatory Requirement

10 CFR Part 50, Appendix R, Section III.G.2 (a) requires separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be

protected to provide fire resistance equivalent to that required of the barrier. Contrary to the above, the licensee did not separate redundant trains of safe shutdown equipment by a fire barrier having a 3-hour rating in the AFW pump 1B room. In addition, the structural steel supporting the fire barrier was not evaluated to ascertain its fire resistance. The inspectors determined that the non-rated fire barrier, PB 2105, did have a credible impact on safety because the fire barrier could not be relied upon to protect redundant trains of equipment necessary for safe shutdown. The non-rated fire barrier involved degradation of a fire protection feature which the inspectors preliminarily determined to be of substantial safety significance (Yellow). This is an apparent violation of 10 CFR Part 50, Appendix R, Section III.G.2(a) (EEI 50-305/01-02-01).

.3 Post-fire Safe Shutdown Circuit Analysis

10 CFR Part 50, Appendix R, Section III.G.1., required that structures, systems, and components important to safe shutdown be provided with fire protection features capable of limiting fire damage to ensure that one train of systems necessary to achieve and maintain hot shutdown conditions remained free of fire damage. Options for providing this level of fire protection were delineated in 10 CFR Part 50, Appendix R, Section III.G.2. Where the protection of systems whose function was required for hot shutdown did not satisfy 10 CFR Part 50, Appendix R, Section III.G.2, an alternative or dedicated shutdown capability and its associated circuits, was required to be provided that was independent of the cables, systems, and components in the area. For such areas, 10 CFR Part 50, Appendix R, Section III.L.3, specifically required the alternative or dedicated shutdown capability to be physically and electrically independent of the specific fire areas and capable of accommodating post-fire conditions where offsite power was available and where offsite power was not available for 72 hours.

a. Inspection Scope

On a sample basis, the inspectors investigated the adequacy of separation provided for the power and control cabling of redundant trains of shutdown equipment. This investigation focused on the cabling of selected components in systems important for safe shutdown. The inspectors' review also included a sampling of components whose inadvertent operation due to fire may adversely affect post-fire safe shutdown capability. The purpose of this review was to determine if a single exposure fire, in one of the fire areas selected for this inspection, could prevent the proper operation of both safe shutdown trains.

b. Findings

No findings of significance were identified.

.4 Alternative Safe Shutdown Capability

10 CFR Part 50, Appendix R, Section III.G.1., required that structures, systems, and components important to safe shutdown be provided with fire protection features capable of limiting fire damage to ensure that one train of systems necessary to achieve and maintain hot shutdown conditions remained free of fire damage. Options for providing this level of fire protection were delineated in 10 CFR Part 50, Appendix R,

Section III.G.2. Where the protection of systems whose function was required for hot shutdown did not satisfy 10 CFR Part 50, Appendix R, Section III.G.2, an alternative or dedicated shutdown capability independent of the area under consideration was required to be provided. Additionally, alternative or dedicated shutdown capability must be able to achieve and maintain hot standby conditions and achieve cold shutdown conditions within 72 hours and maintain cold shutdown conditions thereafter. During the post-fire safe shutdown, the reactor coolant process variables must remain within those predicted for a loss of normal AC power, and the fission product boundary integrity must not be affected (i.e., no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary).

a. Inspection Scope

The inspectors reviewed the licensee's systems required to achieve alternative safe shutdown to determine if the licensee had properly identified the components and systems necessary to achieve and maintain safe shutdown conditions. The inspectors also focused on the adequacy of the systems to perform reactor pressure control, reactivity control, reactor coolant makeup, decay heat removal, process monitoring, and support system functions.

b. Findings

No findings of significance were identified.

.5 Operational Implementation of Alternative Shutdown Capability

10 CFR Part 50, Appendix R, Section III.L.2.d, required that the process monitoring function should be capable of providing direct readings of the process variables necessary to perform and control the functions necessary to achieve reactivity control, reactor coolant makeup, and decay heat removal.

a. Inspection Scope

The inspectors performed a walkdown of a sample of the actions defined in Procedure E-O-06, which was the procedure for performing a plant alternative shutdown from outside the control room. The inspectors verified that operators could reasonably be expected to perform the procedure actions within the identified applicable plant shutdown time requirements and that equipment labeling was consistent with the procedure.

The inspectors' reviews of the adequacy of communications and emergency lighting associated with these procedures are documented in Sections 1R05.6 and 1R05.7 of this report.

b. Findings

No findings of significance were identified.

.6 Communications

For a fire in an alternative shutdown fire area, control room evacuation is required and a dual unit shutdown is performed from outside the control room. Radio communications are relied upon to coordinate the shutdown of both units and for fire fighting and security operations. 10 CFR Part 50, Appendix R, Section III.H., required that equipment provided for the fire brigade include emergency communications equipment.

a. Inspection Scope

The inspectors reviewed the adequacy of the communication system to support plant personnel in the performance of alternative safe shutdown functions and fire brigade duties.

b. Findings

No findings of significance were identified.

.7 Emergency Lighting

10 CFR Part 50, Appendix R, Section III.J., required that emergency lighting units with at least an 8-hour battery power supply be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

a. Inspection Scope

The inspectors performed a walkdown of a sample of the actions defined in Procedure E-O-06. As part of the walkdowns, the inspectors verified that sufficient emergency lighting existed for access and egress to areas and for performing necessary equipment operations. The inspectors verified that testing of emergency lighting for the remote shutdown panel area and the “A” diesel generator room ensured a minimum of 8-hours of emergency lighting.

b. Findings

No findings of significance were identified.

.8 Cold Shutdown Repairs

10 CFR Part 50, Appendix R, Section III.L.5, required that equipment and systems comprising the means to achieve and maintain cold shutdown conditions should not be damaged by fire; or the fire damage to such equipment and systems should be limited so that the systems can be made operable and cold shutdown achieved within 72 hours. Materials for such repairs shall be readily available onsite and procedures shall be in effect to implement such repairs.

a. Inspection Scope

The inspectors reviewed the licensee's procedures to determine if any repairs were required to achieve cold shutdown. The inspectors determined that the licensee did require repair of some equipment to reach cold shutdown based on the safe shutdown methods used.

b. Findings

No findings of significance were identified.

.9 Fire Barriers and Fire Zone/Room Penetration Seals

10 CFR Part 50, Appendix R, Section III.M, required that penetration seal designs be qualified by tests that are comparable to tests used to rate fire barriers.

a. Inspection Scope

The inspectors reviewed the test reports for 3-hour rated barriers installed in the plant and performed visual inspections of selected barriers to ensure that the barrier installations were consistent with tested configuration.

b. Findings

One finding was identified and is discussed in Section 1R05.2.

.10 Fire Protection Systems, Features and Equipment

a. Inspection Scope

The inspectors reviewed the material condition, operations lineup, operational effectiveness, and design of fire detection systems, fire suppression systems, manual fire fighting equipment, fire brigade capability, and passive fire protection features. The inspectors reviewed deviations, detector placement drawings, fire hose station drawings, carbon dioxide pre-operational test reports, and fire hazard analysis reports to ensure that selected fire detection systems, carbon dioxide systems, portable fire extinguishers, and hose stations were installed in accordance with their design, and that their design was adequate given the current equipment layout and plant configuration.

b. Findings

b.1 Relay Room Carbon Dioxide System Testing

The inspectors determined that the relay room carbon dioxide (CO_2) had never been satisfactorily tested to demonstrate its ability to extinguish deep-seated electrical fires. To be considered acceptable, the CO_2 system must be capable of producing a CO_2 concentration of greater than 50 percent that would be maintained for a substantial period of time (20 minutes). The safety significance of this issue involving the relay room CO_2 system has not yet been determined. At the time of the inspection, the relay

room CO_2 system had been declared inoperable by the licensee. However, functionality had not yet been determined.

The inspectors reviewed the design specifications and acceptance tests for the CO_2 system for the relay room (Fire Zone AX-30). The relay room was located directly below the control room and included the cable spreading area. The CO_2 system for the relay room was a manually actuated system. The hazards in the relay room were mostly electrical panels and cables (i.e., hazards associated with deep-seated fires).

The first discharge test of the system was performed in April 1978. The test results indicated that the 50 percent concentration requirement was not met. Modifications were made to improve the sealing capability of the enclosure. In June 1979, the discharge test was re-performed but was aborted after 105 seconds due to problems such as:

- Major vapor contamination was observed in the control room;
- The exhaust fans did not shut down upon CO_2 system actuation; and
- The dampers to the relay room opened automatically at the end of timer-motor cycle (six minutes).

The 1979 field test showed that the relay room was able to hold the required concentration of 50 percent for only five minutes. The five minute hold time would have been insufficient to ensure complete extinguishment of a deep-seated fire. After the test was aborted, additional modifications were made to the relay room to improve sealing capability. In June 1980, another test was performed during which no concentration measurements were taken.

In 1983, the relay room volume was increased by about 13 percent. To account for the added volume, the licensee increased the discharge time of the CO_2 gas to 171 seconds. In 1984, another discharge test of the CO_2 system was performed to ensure that the timer operated appropriately. However, no concentration measurements were taken during this test.

The inspectors determined that there was no acceptance test which demonstrated that the CO_2 system could maintain a CO_2 concentration of 50 percent for a substantial period of time. On February 1, 2001, the licensee declared the CO_2 system for the relay room inoperable and initiated compensatory actions for the area, including an hourly fire watch. The licensee initiated KAP WOs 01-001664 and 01-001727 to initiate corrective actions.

To demonstrate operability, the licensee attempted to quantify the room leakage by performing a door fan test on February 14, 2001. The licensee believed that, in conjunction with the 1979 test measurements for CO_2 concentration, the door fan test results could be used to analytically demonstrate that a CO_2 concentration greater than 50 percent would be maintained for a substantial period of time. However, the February 14, 2001, test results were inconclusive.

The inspectors noted that door fan tests, when performed in accordance with NFPA 12A, “Halon 1301 Fire Extinguishing Systems,” were intended for Halon systems. The

inspectors further noted that Halon and CO_2 extinguishing systems operate on two different principles. Specifically, a Halon extinguishing system interacts with fires chemically and only requires low concentrations of about three to five percent for a short period of time. Since Halon is an environmental hazard, NFPA 12A discusses using door fan tests as a method for quantifying enclosure leakage. However, CO_2 systems work to replace the oxygen thereby suffocating fires. Consequently, CO_2 systems require a much higher concentration (50 percent) for a substantial period of time (20 minutes for deep-seated fires). Consequently, door fan tests, such as the test the licensee performed, may not be appropriate for demonstrating operability of CO_2 systems. At the time of the inspection, the licensee had not determined how to demonstrate operability of the relay room CO_2 system.

Kewaunee Nuclear Power Plant (KNPP) Facility Operating License No. DPR-43, Section 2.C.(3), stated, in part, that the licensee shall implement and maintain in effect all provisions of the approved Fire Protection Program as described in the KNPP Fire Plan, as referenced in the Updated Safety Analysis Report, and as approved in the Safety evaluation reports, dated November 25, 1977, and December 12, 1978. Section 4.1 of the Fire Protection Program Plan (Fire Plan), Revision 3, stated, in part, that the Fire Protection Program Analysis and the Appendix R Design Description supported the Fire Plan by providing detailed descriptions of detection and suppression systems and other methods of limiting fire damage. Appendix E, "NFPA [National Fire Protection Association] Code Conformance," of the Fire Protection Program Analysis indicated that the code of record for the Kewaunee plant was NFPA 12, "Carbon Dioxide Systems," 1973. This code required that the CO_2 system meet the requirements of Sections 212, 213, 222, 241, and 2421 as stated below:

Section 212 This type of system [total flooding systems] may be used where there is a permanent enclosure about the hazard that is adequate to enable the required concentration to be built up, and to be maintained for the required period of time to insure the complete and permanent extinguishment of the fire in the specific combustible material or materials involved.

Section 213 Total flooding systems shall be designed, installed, tested, and maintained in accordance with the applicable requirements.

Section 222 Since the efficiency of carbon dioxide systems depends upon the maintenance of an extinguishing concentration of carbon dioxide, leakage of gas from the space shall be kept to a minimum and compensated for by applying extra gas.

Section 241 The quantity of carbon dioxide for deep-seated fire is based on fairly tight enclosures because the concentration must be maintained for a substantial period of time to assure complete extinguishment. Any possible leakage must be given special consideration since no allowance is included in the basic flooding factors.

Section 2421 Design concentration for dry electrical, wiring insulation hazards in general should be 50 percent.

The inspectors determined that this issue had potential safety significance because the CO_2 system may not be capable of extinguishing a deep-seated electrical fire. Failure to

extinguish a deep-seated electrical fire could result in greater damage to equipment important to safety. The safety significance of this issue has not been determined because the licensee has not demonstrated the functionality of the relay room CO_2 system. The inspectors considered this issue to be an unresolved item (URI) pending review of additional information to be provided by the licensee as identified in Enclosure 2 of this report (URI 50-305/01-02-02).

b.2 Diesel Generator Room Heat Detector Placement

The inspectors noted that the heat detectors in the diesel generator 1B room were installed about 8 to 12 feet below the ceiling level. There were two flame detectors at the room ceiling which provided an alarm function only. There were six heat detectors which would automatically actuate the CO_2 system. Three detectors were placed above the 4160 V bus switchgear and the other three were placed approximately above the diesel generator. These heat detectors were required to be installed upon the ceiling in accordance with the code of record.

The safety significance of this issue involving the placement of heat detectors with the diesel generator 1B room has not been determined. At the time of this inspection, the licensee considered the diesel generator 1B room heat detectors to be operable. However, due to the placement of the heat detectors, the inspectors questioned the functionality of the heat detectors. Based on review of the licensee's IPEEE, the inspectors determined that the functionality was potentially risk significant.

When the inspectors questioned the placement of the heat detectors, the licensee stated that the heat detectors were placed in the as-built configuration because they were acting as a hazard-specific detection system. Since the heat detectors were placed close to the hazards, there would be a faster response for actuating the CO_2 system. In addition, they were placed away from the ceiling due to the overhead location of the diesel generator ventilation system. The concern with the ventilation was that when hot gases rose to the ceiling, the ventilation could cool the hot gases and reduce the temperature sensed by the heat detectors resulting in a delayed response. The licensee stated that in the case of a catastrophic failure or fire engulfing the diesel generator, the heat generated from the fire would be great enough to actuate the heat detectors. The licensee stated that the flame detectors would detect smaller fires which may not be detected by the heat detectors. When the flame detectors provided an alarm in the control room, an operator would then be sent to investigate the severity of the fire. After that, a decision would be made whether to dispatch the fire brigade team. When the fire brigade team arrived, they then could decide whether to manually actuate the CO_2 system if it had not already actuated.

The inspectors disagreed with the licensee's assessment. The inspectors noted that since it is difficult to predict the location and spread of potential fires, the heat detectors may not have been located in the direct plume of hot gases from potential fires. The ventilation system may or may not be in operation when a fire occurred in that area. If a fire occurred when the ventilation was not in operation, automatic actuation of the CO_2 system would be delayed because of the time required for the hot gas layer to extend down to the detectors. In addition, the damage to equipment from a small fire may be limited if fire suppression activities were initiated in a timely manner. However, due to the inherent time delay of the fire brigade, an initially small fire may develop into a larger

fire which may damage more equipment than necessary. NFPA 72E had provisions to account for air movement by reducing the detector spacing. The code did not provide a provision to place the detectors away from the ceiling.

KNPP Facility Operating License No. DPR-43, Section 2.C(3), stated, in part, that the licensee shall implement and maintain in effect all provisions of the approved Fire Protection Program as described in the KNPP Fire Plan, as referenced in the Updated Safety Analysis Report, and as approved in the Safety evaluation reports, dated November 25, 1977, and December 12, 1978. Section 4.1 of the Fire Protection Program Plan (Fire Plan), Revision 3, stated, in part, that the Fire Protection Program Analysis and the Appendix R Design Description support the Fire Plan by providing descriptions of detection and suppression systems and other methods of limiting fire damage. Appendix E, "NFPA Code Conformance," of the Fire Protection Program Analysis indicated that the code of record for detectors was NFPA 72E, "Automatic Fire Detectors," 1974. Section 3-4.1 of NFPA 72E-1974, stated spot-type heat detectors shall be located upon the ceiling not less then 6 inches from the side wall, or on the side walls between 6 inches and 12 inches from the ceiling. Section B-1.7 of the same code stated that reduction of listed spacing may be required for special considerations such as air movement. The licensee did not install the heat detectors upon the ceiling in diesel generator 1B room as required. The licensee entered this issue into the corrective action program as KAP WO 01-1999.

Based on review of the licensee's IPEEE, the inspectors concluded that the functionality of the heat detectors had potential risk significance. Table 9.6-2 of the IPEEE identified the diesel generator B room's contribution to core melt due to fire as 2.7E-5 per year which was about 14 percent of the total core melt contribution due to fire. Figure 9.6-4 of the Individual Plant Examination for External Events identified that the failure rate for automatic detection and suppression was assumed to be 0.04. The ignition frequency for the room was assumed to be 1.24E-3 per year. The IPEEE assumed that success of automatic detection and suppression would not lead to core damage whereas failure of automatic detection and suppression could lead to core damage. No credit was given in the IPEEE for manual suppression. Based on this information, the inspectors concluded that appreciable degradation of the detectors could have potential risk significance. The inspectors considered this issue to be an unresolved item pending review of additional information to be provided by the licensee as identified in Enclosure 2 of this report (URI 50-305/01-02-03).

.11 Compensatory Measures

a. Inspection Scope

The inspectors conducted a review to verify that adequate compensatory measures were put in place by the licensee for out-of-service, degraded or inoperable fire protection and post-fire safe shutdown equipment, systems, or features. The inspectors also verified that short term compensatory measures were adequate to compensate for a degraded function or feature until appropriate corrective actions were taken.

b. Findings

One finding was identified and is discussed in Section 4OA2.1

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems

.1 Inadequate Smoke Detector Coverage in Fire Zone TU-95B

One finding of very low safety significance (Green) was identified.

The licensee had identified that smoke detector coverage in Fire Zone TU-95B was not consistent with the requirements of the code of record (NFPA 72E-1974). Specifically, the licensee had documented in Appendix E, Section 1.8.14 of the Fire Protection Program Analysis that the detectors did not meet the code of record. However, the licensee had inappropriately evaluated the condition as being acceptable. Consequently, the licensee had not instituted appropriate compensatory measures to address the deficiency until questioned by the inspectors. This issue was then entered into the licensee's corrective action program as KAP WOs 01-001914 and 01-001940.

The inspectors determined that the failure to take appropriate compensatory actions, such as a one-hour fire watch, had a credible impact on safety because compensatory measures were necessary to address inadequate smoke detector coverage. Since the issue involved degradation of a fire protection feature (i.e., smoke detector coverage), the inspectors evaluated the issue using NRC Manual Chapter 609, "Appendix F, Fire Protection Significance Determination Process." Using Phase 1 of the significance determination process, the issue screened out for further evaluation because no 3-hour fire barrier separating redundant safe shutdown functions were affected by the finding. Consequently, this finding is considered to be of very low safety significance (Green). The Non-Cited Violation associated with inadequate smoke detector coverage is discussed in Section 4OA7.

4OA5 Other

.1 (Closed) Inspection Follow-Up Item 50-305/96004-03: Combustible control program. The inspectors toured the turbine deck and noted that the fire loading in that area was small. The use of wood packing material was limited. In addition, the inspectors inspected a sample of fire-proof cabinets which contained combustible material and the amount stored within the cabinets was within the limit set by NFPA-30. This item is closed.

.2 (Closed) Inspection Follow-Up Item 50-305/96004-04: Leakage in fire protection header caused the jockey pump to operate continuously. Since this item had been identified, the licensee had replaced several check valves to reduce leakage. As a result, the jockey pump would run for 50 seconds and then be off for about 7 minutes. The inspectors considered the cycle time for the jockey pump to be acceptable. This item is closed.

.3 (Closed) Violation 50-305/96004-05: Failure to initiate compensatory measure for inoperable fire barriers. During this inspection, the inspectors reviewed the most recently performed surveillance, PMP 08-33, "Fire Protection System Penetration Fire Barrier Inspection," Revision C, which indicated that, at that time, there were no degraded or inoperable fire barriers. Therefore, no compensatory actions were required. The inspectors verified that the licensee had implemented the appropriate compensatory actions for equipment such as an emergency light (TRM-13 in September 2000), CO_2 systems for the relay room and diesel generator rooms, and a degraded fire barrier in the AFW pump 1A room. No discrepancies were identified concerning these compensatory actions. The inspectors considered the corrective actions to this violation to be adequate. This violation is closed.

.4 (Closed) Inspection Follow-Up Item 50-305/96004-06: Fire extinguisher surveillance program. The inspectors inspected a sample of the extinguishers installed in the 606 foot and 626 foot elevations of the turbine building. Each location had the correct number and type of extinguishers as indicated on the procedure. However, the inspectors noted that there was a new carbon dioxide wheeled unit located in the area which had not been entered in the procedure to be surveilled. The inspectors considered this discrepancy to be minor and this item is closed.

.5 (Closed) Inspection Follow-Up Item 50-305/96004-07: Fire damper visual inspection. The inspectors reviewed the last completed fire damper surveillance procedure, PMP 08-21, "FP - Fire Damper Visual Inspection," and noted that each entry was properly checked and reviewed. This item is closed.

.6 (Closed) Inspection Follow-Up Item 50-305/97010-02: Potential generic deficiency with electrical penetrations. This item tracked an inspector's concern that resistive imbalances among conductor leads in electrical penetrations could be a source of impending age related degradation at other nuclear plants where cable conductors were split at the containment penetration. This item was evaluated by the licensee as documented in Licensee Event Report 1998-004-00 (see Section 4OA5.7). No findings of significance were identified. This event did not constitute a violation of NRC requirements. This item is closed.

.7 (Closed) Licensee Event Report 305/1998-004-00: DG O'Brien containment electrical penetration - electrical failure potential (voluntary Licensee Event Report). The inspectors reviewed the licensee's corrective actions as documented in the Licensee Event Report. No findings of significance were identified. This event did not constitute a violation of NRC requirements. This Licensee Event Report is closed.

.8 (Closed) Licensee Event Reports 50-305/1998-005-00 and 305/1998-005-01: Reactor trip due to improperly adjusted engineered safeguards feature relay following relay replacement. The inspectors reviewed the licensee's corrective actions as documented in Licensee Event Report 1998-005-01. This event constituted a violation of NRC requirements as previously issued in NRC Inspection Report 50-305/98-02-01 (Section M1.1) and subsequently closed in NRC Inspection Report 50-305/99-04-01 (Section M8.1). These License Event Reports are closed.

4OA6 Management Meetings

Exit Meeting Summary

On February 16, 2001, at the conclusion of the on-site inspection activities, the inspectors presented their initial findings to Mr. M. Reddemann, and other members of licensee management at Kewaunee Nuclear Power Plant. On March 12, 2001, NRC management presented preliminary inspection results to Mr. Kyle Hoops and other members of licensee management during an exit meeting held by telephone. Licensee representatives acknowledged the findings presented.

The licensee was asked whether any materials examined during this inspection should be considered proprietary. No proprietary information was identified.

4OA7 Licensee Identified Violations

The following finding of very low significance was identified by the licensee and was a violation of NRC requirements which meet the criteria of Section VI of the NRC Enforcement Policy, NUREG 1600 for being dispositioned as a Non-Cited Violation (NCV).

If you deny the Non-Cited Violation, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region III; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Kewaunee facility.

NRC Tracking Number	Requirement Licensee Failed to Meet
NCV 50-305/01-02-04	KNPP Facility Operating License No. DPR-43, Section 2.C(3) stated, in part, that the licensee shall implement and maintain in effect all provisions of the approved Fire Protection Program as described in the KNPP Fire Plan, and as referenced in the Updated Safety Analysis Report, and as approved in the Safety Evaluation Reports, dated November 25, 1977, and December 12, 1978. Section 4.1 of the Fire Protection Program Plan (Fire Plan), Revision 3, stated, in part, that the Fire Protection Program Analysis and the Appendix R Design Description support the Fire Plan by providing detailed descriptions of detection and suppression systems and other methods of limiting fire damage. Appendix E, “NFPA Code Conformance,” of the Fire Protection Program Analysis indicated that the code of record for detector is NFPA 72E, “Automatic Fire Detectors,” 1974. Section 4-4.6, “Beam Construction,” of NFPA 72E-1974, stated if the beam exceeded 18 inches in depth and are more than eight feet on centers, each bay shall be treated as a separate area requiring at least one detector. Contrary to the above, the licensee failed to install a detector in each beam pocket in Fire Zone TU-95B which

was considered a violation of the licensee's operating license. This issue was entered into the licensee's corrective action program as KAP WOs 01-001914 and 01-001940.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

K. Hoops, Plant Manager
R. Pulec, Assessment Manager
M. Reddemann, Site Vice-President
J. Schweitzer, Engineering Manager
T. Taylor, Operations Manager
T. Webb, Site Licensing Director

NRC

R. Gardner, Chief, Electrical Engineering Branch
J. Grobe, Division of Reactor Safety Director, RIII
J. Lara, Senior Resident Inspector, Division of Reactor Projects

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

050-305/01-02-01	EEI	Non-Rated Fire Barrier
050-305/01-02-02	URI	Relay Room Carbon Dioxide System Testing
050-305/01-02-03	URI	Diesel Generator Room Heat Detector Placement

Closed

50-305/96-04-03	IFI	Improvement of Combustible Control Program
50-305/96-04-04	IFI	Fire Protection Jockey Pump Mode of Operation
50-305/96-04-05	VIO	Corrective Action for Fire Barrier Seal
50-305/96-04-06	IFI	Fire Extinguisher Data Sheets
50-305/96-04-07	IFI	Fire Damper Surveillance
50-305/97-10-02	IFI	Generic Cable Phase Splitting Accuracy
50-305/98-04-00	LER	DG O'Brien Containment Electrical Penetration - Electrical Failure Potential
50-305/98-05-00	LER	Reactor Trip Due to Improperly Adjusted ESF Relay Following Relay Replacement
50-305/98-05-01	LER	Reactor Trip Due to Improperly Adjusted ESF Relay Following Relay Replacement
50-305/01-02-04	NCV	Inadequate Smoke Detector Coverage in Fire Zone TU-95B

LIST OF ACRONYMS USED

AFW	Auxiliary Feedwater
CCW	Component Cooling Water
CFR	Code of Federal Regulations
CO_2	Carbon Dioxide
COMTRAK	Commitment Tracking System
CVCS	Chemical and Volume Control System
DCR	Design Change Request
DPR	Demonstration Power Reactor
DRS	Division of Reactor Safety
EEI	Escalated Enforcement Item
ESF	Engineered Safeguards Features
IMC	Inspection Manual Chapter
IPEEE	Individual Plant Examination of External Events
IR	Inspection Report
KAP	Kewaunee Assessment Process
KNPP	Kewaunee Nuclear Power Plant
LER	Licensee Event Report
LLC	Limited Liability Company
NFPA	National Fire Protection Association
NCV	Non-Cited Violation
NRC	U.S. Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
PB	Pull Box
SDP	Significance Determination Process
URI	Unresolved Item
V	Volt
WPSC	Wisconsin Public Service Corporation

LIST OF DOCUMENTS REVIEWED

The following is a list of licensee documents reviewed during the inspection, including documents prepared by others for the licensee. Inclusion on this list does not imply that NRC inspectors reviewed the documents in their entirety, but, rather that selected sections or portions of the documents were evaluated as part of the overall inspection effort.

Analyses

Appendix R Modifications - DCR-1195, Emergency Lighting Analysis, Revision 1Design Description, Safe Shutdown Systems (10 CFR 50 - Appendix R), Revision 3 Fire Protection Program Plan, Revision 4Fire Protection Program Analysis Probabilistic Risk Assessment, Section 9.0, Fire Analysis, dated January 9, 2001

Safety Evaluation Reports

Safety Evaluation Report, dated December 12, 1978
Safety Evaluation Report, dated February 13, 1981

Calculations and Evaluations

Chemetron Calculation for Low Pressure Carbon Dioxide Flow Calculation
Chemetron Calculation of Low Pressure CO_2 Hydraulic Flow Calculation for Diesel Generator Room
COMPBRN file, AX-30: Relay Room - Fire Near Vertical Cable Trays
COMPBRN file, TU-92: Diesel Generator Room B - Diesel Generator Oil Fire, no revision
COMPBRN file, TU-92: Diesel Generator Room B - Fire Near MCC-62A, no revision
COMPBRN file, TU-95B: Auxiliary Feedwater B Oil Fire, no revision

Engineering Planning and Management, Inc, Hydraulic Calculation, dated November 29, 1990

611.1098.M5	Steam Generator Dry Out Due to Loss of Feedwater or Loss of Secondary Heat Sink, Revision 0
611.1098.M7	Steam Generator Dry Out Calculations, Revision 0
611.1098.M8	Steam Generator Dryout Calculation, Revision 0
C-038-006	Elect Overcurrent Protective Device Coord Battery BRD-101, 125Vdc, Revision A
C-038-007	Elect Overcurrent Protective Device Coord Battery BRA-101, 125Vdc, Revision C
C-038-008	Elect Overcurrent Protective Device Coord Battery BRB-101, 125Vdc, revision C
C11015	App R Associated Circuit Protective Device Review, dated October 15, 1999
KPS-9984	Response Time For Initiating Auxiliary Feedwater Flow, dated April 13, 1987
KPS-10022	Appendix R Response Time For Initiating AFW Flow, dated April 29, 1987
XK-204-2023	Hydraulic Calculation, dated October 2, 1972

Codes and Standards

NFPA 12, Carbon Dioxide Systems, dated 1973
NFPA 24, Outside Protection, dated 1973
NFPA 72E, Automatic Fire Detectors, dated 1974
Pioneer Service & Engineering Co. Standard Specification for Piping Material, dated November 1967

Procedures

E-FP-08 Emergency Operating Procedure - Fire, Revision AD
E-O-06 Fire in Alternate Fire Zone, Revision M
E-O-06 Fire in Alternate Fire Zone, Revision N
E-O-07 Fire in Dedicated Fire Zone, Revision N
E-O-07 Fire in Dedicated Fire Zone, Revision O
FPP 08-02 Fire Watch Patrol, Revision B
FPP 08-06 Portable Radio Inspection, Revision A
FPP 08-07 Control of Ignition Sources, Revision D
FPP 08-08 Control of transient Combustibles, Revision A
FPP 08-09 Barrier Control, Revision C
FPP, 08-15 Appendix R Fire Wrap Inspection, Revision A
GIP-016 Bench Testing MG-6 and BF Type Relays (Draft), Revision A
GMP-240 ELV-480V Supply, Source, and/or Tie Breaker Maint & Testing, dated October 31, 2000
GMP-244 Molded Case Circuit Breaker Testing, dated April 14, 2000
GNP-04.03.03, Plant Physical Change Control, Revision B
GNP-11.08.01, Instructions for the Kewaunee Assessment Process (KAP), Revision D
GNP-11.08.03, Operability Determinations, Revision A
PMP 08-05 FP - CO_2 System (Cardox) Dry Test, Revision O
PMP 08-19 FP - Inspection of Fire Doors, Revision F
PMP 08-20 FP - Portable Fire Extinguisher Inspection, Revision D
PMP 08-21 FP - Fire Damper Visual Inspection, Revision E
PMP 08-22 FP - Operability Test of Fire Dampers (Fusible Linked Style), Revision F
PMP 08-31 FP - Fire Pump Flow Test, Revision E
PMP 08-33 Fire Protection System Penetration Fire Barrier Inspection, Revision C
PMP 18-10 RBV - Motor Amperage Readings QA-1, Revision B
PMP 41-06 Lighting System Big Beam Emergency Light Maintenance - Appendix R, Revision H
N-FP-08 Fire Protection System, Revision J
N-FP-08-CL Fire Protection Systems Checklist, Revision AL
N-FP-08-CLA Fire Protection System Seal Checklist, original
NAD-4.3 Plant Physical Change, Revision B
NEP 4.8 Design Considerations, Revision B
NEP 4.9 Electrical Requirements for Load Changes, Revision A
NEP 4.11 App R Design Compliance, dated April 30, 1996
RT-SAE-38 Control Room/Dedicated Shutdown System Emergency Equipment Inventory, Revision I
SP 55-155A Engineered Safeguards Train A Logic Test, Revision J
SP 55-155B Engineered Safeguards Train B Monthly Logic Channel Test, Revision J
STP-FP-08-01, Relay Room Air Leakage Test, Revision A

Design Change Requests

DCR-2069 App R Control Circuits, dated January 10, 1995
DCR-2350 Instrument Air Lines to IA Containment Leak Rate Valve IA 101-1, dated April 7, 1989
DCR 2677 Relocate/Replace Lube Oil Pressure Switches/Gauges on AFWPs, dated December 16, 1994
DCR 2934 Rewire MOV S120B Electrical Penetration 12/01/98
DCR 3049 Replace Plant Fire Alarm System

Pre-Fire Plans

PFP-2 1B Diesel Generator and DG Day Tank Rooms, TU-92, TU-93, Elevation 586', no revision
PFP-4 480 V Switchgear Bus 1-51 and 1-52 Room, TU-95A, Elevation 586', no revision
PFP-5 480V Switchgear Bus 1-61 and 1-62 Room and AFW Pump Area, TU-95B, Elevation 586', no revision
PFP-10 Battery Rooms 1A and 1B, TU-97, TU-98, Elevation 606', no revision
PFP-11 Relay Room and Loft, AX-30, Elevation 606' & 616', no revision

Work Requests

214661 Relay Rack RR128 Engrd Safeguard Train A 1C, dated November 17, 1998
214662 Relay Rack RR127 Engrd Safeguard Train B 1C, dated November 17, 1998

Completed Tests/Surveillances

Carbon dioxide system flow test for diesel generator room 1B (job No. Fl-16663), dated November 1, 1973
1195-567 Emergency Lighting Sfgrd Alley, Dsl RM1A and Cardox Room, Revision 2

Commitment Tracking System Items

98-025 Report Occur 1998-005: Rx Trip Following ESF Relay Replacement, Febuary 1, 2001
98-026 Report Occur 1998-005: VETIP Process, dated July 7, 1998
98-027 Report Occur 1998-005: VETIP Manual, dated May 5, 1998
98-028 Report Occur 1998-005: Vendor Contacts, dated January 12, 1999
98-038 Report Occur 1998-004: Motor/Circuits, dated February 23, 1999
98-039 Report Occur 1998-004: Motor/Circuits, dated August 6, 1998

Kewaunee Assessment Process Work Orders

98-001084 Electrical Penetration Degraded/Failure, dated February 18, 1998
00-003407 E-O-06 Security, dated October 3, 2000
01-000304 Fire Plan Revisions, dated January 14, 2001
01-000485 Review DCR 2456 for effect on Appendix R Design Description, dated January 21, 2001

Kewaunee Assessment Process Work Orders Initiated as a Result of Inspection

01-001664 CO2 System Pre-op Testing Concerns, dated January 30, 2001
01-001671 NRC Concerns Relating to Routing of AFW Piping Through AFW Pump B Fire Area, dated January 31, 2001
01-001674 TDAFWP Appendix R Design Requirements, dated January 31, 2001
01-001699 Area access through some security doors is only by having Security electronically unlatch the door, dated February 1, 2001
01-001705 During the NRC Fire Protection Inspection, one of the inspectors expressed a concern that Operations Procedure E-FP-08, Emergency Operating Procedure - Fire, does not provide adequate guidance on the transition to the Appendix R fire procedure, dated February 1, 2001
01-001727 This KAP documents the inability to develop an acceptable operability determination resulting in declaring portions of the Carbon Dioxide (CO2) fire protection system inoperable, February 1, 2001
01-001728 Design Change Failed to Designate Several Appendix R Cables and Components, February 1, 2001

01-001733 Appendix R Design Description minor changes, February 2, 2001
01-001752 There is a reference error in NEP 4.11 or the statement contained in the NEP is incorrect, dated February 2, 2001
01-001764 Discovered penetration 492 in a degraded condition, dated February 5, 2001
01-001769 PMP 8-33 is inadequate for performing penetration inspections, dated February 6, 2001
01-001774 Last Performance of PMP 8-33 could not locate penetration #833, dated February 6, 2001
01-001878 While performing a partial walkdown of PMP 8-20 (Portable Fire Extinguisher Inspection) during the fire protection inspection, February 11, 2001
01-001880 A review of hydraulic calculations for plant sprinkler systems was performed in 1990 by EMP, dated February 11, 2001
01-001914 The A motor driven AFW pump room fire detectors do not appear to meet code requirements, dated February 13, 2001
01-001930 During the NRC Fire Protection Inspection, a question was raised to whether emergency lighting was required in the BAST Tank room, dated February 13, 2001
01-001940 KAP/WO #1914 failed to capture the true concern, dated February 14, 2001
01-001965 During the NRC fire protection inspection, the qualification of electrical pull box (PB) 2105 was questioned regarding its ability to meeting Appendix R requirements, dated February 14, 2001
01-001971 During the NRC fire inspection, the calculation that determined the B and C instrument air compressors' capacity to support Appendix R required loads was requested, dated February 15, 2001
01-001999 During the February 2001 Fire Protection Inspection, an NRC inspector noted a lack of documentation regarding NFPA code deviations, dated February 15, 2001

<u>Correspondence</u>

Letter to Wisconsin Public Service from Pioneer Service & Engineering Co., dated December 29, 1967
Letter WPS-S-829 to Wisconsin Public Service from Westinghouse, "Safeguards Relay Racks (MG6 Relays)," dated May 1, 1974
Letter to Wisconsin Public Service from Chemetron, "Fire System Final Test Report," dated June 27, 1979
Letter to NRC from Wisconsin Public Service, licensee to NRC, titled, "Fire Protection Modifications: 10 CFR 50.48," dated March 19, 1981
Letter to Wisconsin Public Service from NRC, "Fire Protection Modifications: 10 CFR 50.48," dated April 9, 1981
Letter to Wisconsin Public Service from NRC, "10 CFR 50.48 and 10 CFR 50 Appendix R Items III.G.3 and III.L Concerning Fire Protection of Safe Shutdown," dated December 22, 1981
Letter to Fluor Engineers, Inc., from Wisconsin Public Service, dated February 9, 1983
Letter to Wisconsin Public Service from NRC, "Exemption from Certain Requirements of Section III.G.2 Appendix R to 10 CFR Part 50, Inside Containment Building - Kewaunee Nuclear Power Plant," dated June 19, 1986
Letter to Wisconsin Public Service from NRC, "Exemption from Certain Requirements of 10 CFR Part 50, Appendix R, Section III.G - Kewaunee Nuclear Power Plant - TAC 65783," dated May 12, 1988

Drawings, Diagrams, and Figures

A-392	App R Shutdown Systems Screenhouse, Revision A
A-393	App R Shutdown Systems Turbine & Admin Building Bsmt Flr, Revision A
A-394	App R Shutdown Systems Turbine & Admin Building Mezz Flr, Revision D
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A-512	Fire Zones, Mezzanine Floor Elev. 606'-0" Fig. 4.4-4, original
A-513	Fire Zones, Elevation 616'-0" Fig. 4.4-5, original
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OPER M-202, Flow Diagram, Service Water System, sheet 3, Revision CP
OPER M-203, Flow Diagram, Main Aux. Steam and Steam Dump, Revision EF
OPER M-204, Flow Diagram, Condensate & Gland Seal Systems, Revision HF
OPER M-205, Flow Diagram, Feedwater System, Revision AU
OPER M-213, Flow Diagram, Station Air System in Aux Bldg. & Containment Locations, Revision BM
OPER M-217, Flow Diagram, Internal Containment Spray System, Revision AK
OPER M-220, Flow Diagram, Fuel Oil Systems, Revision AF
OPER M-436, Flow Diagram, Steam Generator Blowdown System Modification, Revision AG
OPER M-547, Flow Diagram, Service Water System Containment Cooling, Revision R
OPER M-601, Flow Diagram Turbine & Auxiliary Building Ventilation, Revision CH

OPER M-602, Flow Diagram, Reactor & Shield Bldg. Ventilation, Revision AX
OPER M-606, Flow Diagram Air Conditioning Cooling Water Piping, Revision BL
OPER XK100-10, Flow Diagram, Reactor Coolant System, Revision BE
OPER XK100-18, Flow Diagram, Auxiliary Coolant System, Revision AK
OPER XK100-19, Flow Diagram, Auxiliary Coolant System, Revision AD
OPER XK100-28, Flow Diagram, Safety Injection System, Revision AK
OPER XK100-29, Flow Diagram, Safety Injection System, Revision Y
OPER XK100-35, Flow Diagram, Chemical and Volume Control Sys., Revision AA
OPER XK100-36, Flow Diagram, Chemical & Volume Control Sys., Revision AT
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XK-100-35 Flow Diagram, Chemical and Volume Control Sys., Revision AA
XK-100-36 Flow Diagram, Chemical & Volume Control System, Revision AT
XK-208-1 REDA Gasoline Submergible Pumps, dated May 11, 1972
XK-208-2 REDA Pump Conduit Cable Seal (Figure 10), dated January 26, 1970
XK-208-3 REDA Pump Manifold Assembly (Figure 9), dated May 11, 1972
XK-248-22(1) Outline P290A Explosion-Proof Diff Press Inc Switch Lo, Hi or Dual Adj, dated May 22, 1972
XK-248-22(2) ITT Barton Reference Number 179425, May 22, 1972

Miscellaneous Documents

Work Required 8020 (CM 14343), "TestCO_2 Fire Protection System in the Relay Room," dated June 3, 1980
Decision Unit For RC No. 237, "Upgrade obsolete panels, detectors," dated July 9, 1998
Fire Protection Line Management Self-Assessment, dated October 2000
PORC Meeting minutes, "Evaluation of 14 day Administrative LCO Requirement for Relay Room CO_2 Suppression System Out-of-Service," dated February 15, 2001

ENCLOSURE 2

REQUEST FOR ADDITIONAL INFORMATION TO SUPPORT RESOLUTION OF UNRESOLVED ITEMS

Issue 1: Provide an evaluation, supported by test data, which demonstrates that the relay room carbon dioxide system can suppress a deep seated fire, i.e., maintain a carbon dioxide concentration of least 50 percent for a substantial period of time. If testing to support such an evaluation has not yet been performed, provide a plan and a schedule for performing such testing. If the test methodology used or planned is by alternative means (i.e., other than full carbon dioxide discharge testing), provide a justification for the use of the alternative test methodology. This issue will be tracked as Unresolved Item 50-305/01-02-02.

Issue 2: Provide an evaluation which demonstrates that the existing placement of heat detectors in Diesel Generator B Room will provide acceptable detection response. If the risk assessment of the heat detection function for the Diesel Generator B Room presented in the Individual Plant Examination for External Events is not considered accurate, provide an updated risk assessment of the heat detection function. Such an updated assessment should discuss and quantify how failure of the heat detection function can contribute towards core damage. This issue will be tracked as Unresolved Item 50-305/01-02-03.