



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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July 30, 2008

James R. Douet,
Vice President, Operations
Entergy Operations, Inc.
Grand Gulf Nuclear Station
P.O. Box 756
Port Gibson, MS 39150

SUBJECT: GRAND GULF NUCLEAR STATION - NRC TRIENNIAL FIRE PROTECTION
INSPECTION REPORT 05000416/2008006

Dear Mr. Douet,

On July 1, 2008, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Grand Gulf Nuclear Station. The enclosed report documents the inspection findings, which were discussed at an exit meeting on April 18, 2008, with Mr. M. Krupa, General Manager of Plant Operations, and other members of your staff. A supplemental exit meeting was conducted on July 1, 2008, with Mr. D. Barfield, Director of Engineering, and other members of your staff.

During this inspection, the team examined activities conducted under your license related to safety and compliance with the Commission's rules and regulations and the conditions of your license. The inspection consisted of selected examination of procedures and records, observations of activities and installed plant systems, and interviews with personnel.

This report documents four NRC identified findings. These findings were evaluated under the risk significance determination process as having very low safety significance (Green). Because of the very low safety significance of these violations and because they were entered into your corrective action program, the NRC is treating these findings as noncited violations consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest these noncited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission Region IV, 612 East Lamar Blvd, Suite 400, Arlington, Texas 76011-4005; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington DC 20555-0001; and the NRC Resident Inspector at the Grand Gulf Nuclear Station.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure 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/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Russell L. Bywater, Jr., Chief
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Division of Reactor Safety

Docket: 50-416
License: NPF-29

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NRC Inspection Report 05000416/2008006
w/attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket: 50-416

License: NPF-29

Report: 05000416/2008006

Licensee: Entergy Operations, Inc.

Facility: Grand Gulf Nuclear Station

Location: Waterloo Road
Port Gibson, Mississippi 39150

Dates: March 31 through July 1, 2008

Inspectors: N. O'Keefe, Team Leader
R. Mullikin, Senior Reactor Inspector
P. Qualls, Reactor Inspector
S. Alferink, Reactor Inspector

Accompanying Personnel K. Sullivan, Brookhaven National Laboratory

Approved By: Russell L. Bywater, Jr., Chief
Engineering Branch 1
Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000416/2008006; 03/31/08 – 7/01/08; Grand Gulf Nuclear Station; Triennial Fire Protection Inspection; Fire Brigade; Passive Fire Barriers; Circuit Analysis; Fire Protection Review of Modifications.

The report covered a 2-week period of inspection by region-based inspectors and a contractor and subsequent in-office review. Four Green noncited violations were identified. The significance of most findings is indicated by its color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, "Significance Determination Process." Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

- Green. A noncited violation of License Condition 2.C(41), "Fire Protection Program," was identified because the licensee failed to evaluate vendor fire test results to ensure that deviations from the acceptance criteria did not result in a reduction in the effectiveness of the approved Fire Protection Program. The licensee replaced existing fire barrier material installed on conduits with 3M Interam fire wrap without recognizing that applicable NRC test criteria were not met. As a result, the licensee failed to perform an evaluation to determine whether the test results would result in a reduction in the effectiveness of the fire protection provided to the cables inside the affected conduits. The new fire wrap was installed to protect redundant trains of cables necessary for safe shutdown between 2004 and 2007. This finding was entered into the licensee's corrective action program under Condition Report 2008-01910. The licensee took prompt compensatory measures and implemented hourly fire watches while the issue was being evaluated.

Failure to properly evaluate vendor fire test results that did not satisfy the acceptance criteria in Generic Letter 86-10, Supplement 1 prior to changing the existing fire wrap with 3M Interam fire wrap as required by the approved Fire Protection Program was a performance deficiency. This finding was more than minor because it affected the protection against external factors (fire) attribute of the Mitigating Systems Cornerstone Objective to ensure the availability, reliability, and capability of systems that respond to initiating events in order to prevent undesirable consequences. This performance deficiency was also similar to the "more than minor" portion of Inspection Manual Chapter 0612, Appendix B, Example 3.i, in that an engineering evaluation was necessary to determine the acceptability of the existing fire wrap to perform its intended function. This finding was evaluated using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," because it affected fire protection defense-in-depth strategies involving post-fire safe shutdown systems. This finding screened as having very low safety significance because it involved a fire barrier with a low degradation, since the nonconforming condition was

subsequently determined to provide an acceptable margin to damage for the cables being protected. (Section 1R05.3)

- Green. A noncited violation of License Condition 2.C.(41) was identified for failure to maintain required staffing available to respond to a fire. Specifically, the approved Fire Protection Program requires that a five-person fire brigade be available onsite at all times and not assigned duties that conflict with the duties of the fire brigade. Contrary to this, on three occasions in March 2008, operators assigned as fire brigade members were directed to perform operator rounds at the radial wells. Because the Mississippi River was at flood stage, this required traveling by boat, so the operators were unable to return to the plant promptly for approximately 2 hours. This was further complicated by the fact that operator/fire brigade radios did not work during most of the boat trip and in the vicinity of the most distant well, meaning that operators could not be quickly recalled. This finding was entered into the corrective action program under Condition Report 2008-01616. This finding had a crosscutting aspect in the area of Human Performance – Work Control (H.3.b) because the licensee did not ensure that different job activities were coordinated to ensure that the fire brigade remained available at all times.

Failure to maintain a fully staffed fire brigade available onsite at all times was a performance deficiency. This finding was more than minor because it affected the protection from external factors (fire) attribute of the Mitigating Systems Cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding was evaluated using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," because it affected a fire protection defense-in-depth element. This finding was assigned a low degradation rating because the operations shift during the times when the fire brigade member was unavailable included extra fire brigade-trained personnel that could supplement the fire brigade. The delay in a replacement person reporting to the scene of a fire would not have impacted the initial fire fighting effort, since enough fire brigade personnel were available to perform the functions. (Section 1R05.4.b(1))

- Green. A noncited violation of License Condition 2.C.(41), "Fire Protection Program," was identified related to making a plant change that negatively impacted the effectiveness of the approved Fire Protection Program. The team identified that the licensee had permanently blocked the door to the abandoned Unit 2 portion of the joint control room without performing a fire protection impact evaluation. The only remaining access path was a small hatch that would have made it difficult for fire fighters to gain access with protective clothing and equipment. A fire in this area could threaten operations in the Unit 1 control room if not promptly suppressed. This finding was determined to have a cross-cutting aspect in problem identification and resolution timeliness (P.1.d) because fire protection personnel recognized that a new access door was needed in 2006, but no substantial action had been taken to install it by the time of this inspection.

This finding was entered in to the licensee's corrective action program under Condition Reports 2008-001893 and 2008-01913.

Blocking access to the Unit 2 control room area and not promptly restoring access to allow manual fire suppression was a performance deficiency. This finding was more than minor because it affected the protection against external factors (fire) attribute of the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events in order to prevent undesirable consequences. This finding was evaluated using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," because it affected a fire protection defense-in-depth element. This finding was determined to have very low safety significance because all potential fire ignition sources in the affected area screened out in Task 2.3.4 in the Phase 2 evaluation. There were no ignition sources because the licensee had removed electrical power from this area, and administratively prevented hot work and storage of transient combustible material from this area. (Section 1R05.4.(2))

- Green. A noncited violation of 10 CFR Part 50, Appendix R, Section III.G.1.a was identified because the licensee failed to evaluate the impact of a potential motor operated valve failure mechanism on the ability to implement post-fire safe shutdown following a control room evacuation. The team identified that the Residual Heat Removal Pump Minimum Flow Valve F064A could be damaged by fire in the control room and not be available to perform its safe shutdown function. This finding involved mechanistic damage due to hot shorts as described in Information Notice 92-18, "Potential for Loss of Remote Shutdown Capability During Control Room Fire." The licensee had incorrectly interpreted this operating experience and concluded that no action was required. This finding was entered into the corrective action program under Condition Reports 1999-0236 and 2008-01904.

The team determined that failure to ensure that components necessary to safely shutdown the reactor would remain operable following a fire was a performance deficiency. This deficiency was more than minor because it impacted the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to external events (fire) to prevent undesirable consequences. The Phase 3 risk evaluation performed by the senior reactor analyst determined this deficiency had very low safety significance because the probability of having a fire in either of the two control room panels where the postulated damage could occur and lead to a control room evacuation was very low. (Section 4OA5)

B. Licensee-Identified Findings

None

REPORT DETAILS

1. REACTOR SAFETY

1R05 Fire Protection

The purpose of this inspection was to review the implementation of the Grand Gulf Nuclear Station Fire Protection Program for selected risk-significant fire areas. The inspection was performed in accordance with Inspection Procedure 71111.05T, "Fire Protection (Triennial)," dated April 21, 2006. The inspection was performed in accordance with the NRC regulatory oversight process using a risk-informed approach for selecting the fire areas and attributes to be inspected. The team used the Individual Plant Examination for External Events for the Grand Gulf Nuclear Station to choose risk-significant areas for detailed inspection and review. Inspection Procedure 71111.05T requires selecting three to five risk-significant fire areas for review. The five fire areas reviewed during this inspection were:

- Fire Area 50, Control Room Areas
- Fire Area 40, Control Building Lower Cable Spreading Room
- Fire Area 21, Division 2 Switchgear Room
- Fire Area 20, Auxiliary Building Corridors, Elevation 119 ft
- Fire Area 11, Hot Machine Shop

For each of these fire areas, the inspection focused on fire protection features, systems, and equipment necessary to achieve and maintain safe shutdown conditions, and licensing basis commitments.

Documents reviewed by the team are listed in the attachment.

.1 Shutdown From Outside Main Control Room

a. Inspection Scope

The team reviewed the functional requirements identified by the licensee as necessary for achieving and maintaining hot shutdown conditions to ensure that at least one post-fire safe shutdown success path was available in the event of fire in each of the selected areas and alternative shutdown for the case of control room evacuation. The team reviewed piping and instrumentation diagrams of systems credited in accomplishing safe shutdown functions to independently verify whether the safe shutdown evaluation had properly identified the required components. The team focused on the following functions that must be available to achieve and maintain safe shutdown conditions:

- Reactivity control capable of achieving and maintaining cold shutdown reactivity conditions,
- Reactor coolant makeup capable of maintaining the reactor coolant inventory,
- Reactor heat removal capable of achieving and maintaining decay heat removal,

- Supporting systems capable of providing other services necessary to permit extended operation of equipment necessary to achieve and maintain hot shutdown conditions, and
- Ability to achieve and maintain safe shutdown conditions with or without offsite power available.

A review was also conducted to ensure that all required components in the selected systems were included in the licensee's safe shutdown analysis. The team identified the systems required for each of the primary safety functions necessary to achieve and maintain shutdown conditions. These systems were then evaluated to identify the systems that interfaced with the selected fire areas and were the most risk-significant systems required for reaching hot shutdown conditions.

b. Findings

No findings of significance were identified.

.2 Protection of Safe Shutdown Capability

a. Inspection Scope

The team reviewed the safe shutdown equipment list, safe shutdown design basis documents, and the post-fire safe shutdown analysis. Team members conducted plant walk downs to verify whether the shutdown components and systems necessary to achieve and maintain safe shutdown conditions for equipment in the fire areas selected for review were separated or protected so as to remain available in the event of a fire. The team also reviewed and observed walk downs of the post-fire procedures for achieving and maintaining safe shutdown to verify that the safe shutdown analysis provisions were properly implemented.

To determine if at least one post-fire safe shutdown success path would remain free of fire damage in the selected areas, the team reviewed a sample of the separation provided for cables and equipment required to achieve hot shutdown conditions. The team also examined the licensee's methodology for meeting the requirements of its fire protection licensing basis. The specific components selected are listed in the attachment.

b. Findings

No findings of significance were identified.

.3 Passive Fire Protection

a. Inspection Scope

For the selected fire areas, the team evaluated the adequacy of fire area barriers, penetration seals, fire doors, electrical raceway fire barriers, and fire-rated electrical cables. The team observed the material condition and configuration of the installed barriers, seals, doors, and cables. The team compared the as-installed configurations to the approved construction details and supporting fire tests. In addition, the team reviewed NRC safety evaluation reports and approved deviations from NRC regulations or the National Fire Protection Association (NFPA) codes to verify that fire protection features met license commitments.

b. Findings

Failure to Evaluate Fire Wrap Testing Discrepancies

Introduction. A Green noncited violation of License Condition 2.C(41), "Fire Protection Program," was identified because the licensee failed to evaluate vendor fire test results to ensure that deviations from the acceptance criteria did not result in a reduction in the effectiveness of the approved Fire Protection Program prior to replacing existing fire barrier material installed on conduits with 3M Interam fire wrap.

Description. The team reviewed documentation associated with plant modifications to replace the existing fire wrap with 3M Interam material on conduits. Fire test reports for the conduit applications were reviewed and compared to the acceptance criteria specified in Generic Letter 86-10, Supplement 1, Enclosure 1. The specific tests reviewed are listed in the enclosure. The team identified that the test report data indicated that some criteria were not met. The team also determined that the licensee had not recognized this nonconformance, and thus failed to perform an evaluation to determine whether the test results would result in a reduction in the effectiveness of the fire protection of the cables inside conduits. The new fire wrap was installed between 2004 and 2007 to protect redundant trains of cables necessary for safe shutdown.

This finding was entered into the licensee's corrective action program under Condition Report (CR) 2008-01910. The licensee took prompt compensatory measures and implemented hourly fire watches while the issue was evaluated. On May 8, 2008, the licensee completed a Generic Letter 86-10 evaluation, documented in Engineering Report GGNS-FP-08-00001, "One Hour Rated 3M Interam EW-54A Support and Heat Transfer Items," Revision 0. This report concluded that the vendor test data discrepancies would not adversely affect the ability of the conduit fire wrap configuration to provide adequate protection for 1 hour.

Analysis. Failure to recognize that vendor fire test results did not satisfy the requirements of Generic Letter 86-10, Supplement 1 prior to changing the existing fire wrap with 3M Interam fire wrap was a performance deficiency. This finding was more than minor because it affected the protection against external factors (fire) attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and

capability of systems that respond to initiating events in order to prevent undesirable consequences. This performance deficiency was also similar to the "more than minor" portion of Inspection Manual Chapter 0612, Appendix B, Example 3.i, in that an engineering evaluation was necessary to determine the acceptability of the existing fire wrap to perform its intended function.

Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," was used because the finding affected fire protection defense-in-depth strategies involving post-fire safe shutdown systems. The fire barrier was determined to have a low degradation, since the test results indicated that after 1 hour, the temperature on the protected side was well below the temperature at which the protected cables would be damaged. This finding screened as having very low safety significance because it involved a fire barrier with a low degradation.

Enforcement. License Condition 2.C(41)), "Fire Protection Program," requires that Entergy Operations, Inc., shall implement and maintain in effect all the provisions of the approved Fire Protection Program as described in Revision 5 to the Updated Final Safety Analysis Report and as approved in the Safety Evaluations dated August 23, 1991, and September 29, 2006, subject to the following provisions:

The licensee may make changes to the approved Fire Protection Program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

Part 50 of Title 10 of the Code of Federal Regulations, Appendix R, Section III.G.2 requires that where cables or equipment of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located in the same fire area, one of the redundant trains must remain free of fire damage using one of the listed methods. The method of Section III.G.2.c requires enclosure of cables and equipment of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic suppression system shall be installed in the fire area.

Generic Letter 86-10, Supplement 1, Enclosure 1, "Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used to Separate Redundant Safe Shutdown Trains Within the Same Fire Area," lists the NRC fire endurance test acceptance criteria for the fire barriers used to meet Appendix R, Section III.G.2. This document requires that fire barriers be tested in accordance with NFPA 251, "Standard Methods of Fire Tests of Building Construction and Materials," and American Society for Testing and Materials (ASTM) Standard E-119, "Fire Tests of Building Construction and Materials." In addition, Generic Letter 86-10, Supplement 1 specifies that the cold side temperature must be below 325°F, or a justification should be provided for the use of material which does not meet the 325°F criterion. This justification may be based on an analysis demonstrating that the maximum recorded temperature is sufficiently below the cable insulation ignition temperature. Generic Letter 86-10, Supplement 1 also specifies that the acceptable placement of test thermocouples for conduits shall be on the conduit exterior surface underneath the fire barrier material. Thermocouples should also be placed immediately adjacent to all structural members, supports, and barrier

penetrations. Test acceptance should include an assessment of the average temperature rise of any thermocouple group, and individual thermocouple conditions should not exceed the allowable temperature rise by more than 30 percent.

Contrary to the above, between 2004 and 2007, the licensee made changes to the approved Fire Protection Program without prior approval of the Commission without determining that those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire. Specifically, the licensee replaced the original fire wrap providing a 1-hour fire barrier for conduits described in the approved Fire Protection Program with 3M Interam fire wrap. The team identified deviations in the fire test results for conduits from the acceptance criteria stated in Generic Letter 86-10, Supplement 1, Enclosure 1. Specifically, the team identified that: (1) some thermocouples were not located immediately adjacent to all structural members or supports, and (2) one thermocouple exceeded the allowable temperature rise. Failure to determine that replacement of existing fire wrap material with 3M Interam fire wrap did not involve a reduction in the effectiveness of the approved Fire Protection Program was a violation of License Condition 2.C(41). Because this violation was of very low safety significance and was entered into the licensee's corrective action program, this will be treated as a noncited violation (NCV), consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000416/2008006-01, Failure to Evaluate Fire Wrap Testing Discrepancies.

4. Active Fire Protection

a. Inspection Scope

For the selected fire areas, the team evaluated the adequacy of fire suppression and detection systems. The team observed the material condition and configuration of the installed fire detection and suppression systems. The team reviewed design documents, supporting calculations, license basis documentation, such as NRC safety evaluation reports, and deviations from NRC regulations or the NFPA codes to verify that fire suppression and detection systems met license commitments. The team performed a detailed review of the automatic fire suppression system in the Division II switchgear room to assess its ability to automatically detect a fire and provide a sufficient quantity of carbon dioxide to suppress it.

The team also observed an unannounced site fire brigade drill and the subsequent drill critique using the guidance in Inspection Procedure 71111.05AQ, "Fire Protection Annual/Quarterly Inspection." The fire brigade simulated fighting a motor control center fire in the auxiliary relay room on the Control Building 903'-6" elevation. Team members verified that the licensee staff identified deficiencies, openly discussed them in a self-critical manner at the drill debrief, and took appropriate corrective actions. Specific attributes evaluated were: (1) proper wearing of turnout gear and self-contained breathing apparatus; (2) proper use and layout of fire hoses; (3) employment of appropriate fire fighting techniques; (4) sufficient fire fighting equipment brought to the scene; (5) effectiveness of fire brigade leader communications, command, and control; (6) search for victims and propagation of the fire into other plant areas; (7) smoke

removal operations; (8) utilization of pre-planned strategies; (9) adherence to the pre-planned drill scenario; and (10) completion of drill objectives.

b. Findings

(1) **Fire Brigade Members Assigned Work That Conflicted with Fire Brigade Responsibilities**

Introduction. A Green noncited violation of License Condition 2.C.(41), "Fire Protection Program," was identified for failure to maintain required staffing available to respond to a fire. Specifically, the approved Fire Protection Program requires that a five-person fire brigade be available onsite at all times and not assigned duties that conflict with the duties as a member of the fire brigade. Contrary to this, on three occasions in March 2008, operators assigned as fire brigade members were sent to perform operator rounds at the radial wells. Because the Mississippi River was at flood stage, this required traveling by boat, so the operators were unable to return to the plant promptly for approximately 2 hours.

Description: During the inspection, the nearby Mississippi River level was above flood stage. The site had four radial wells and a common power house located along the banks of the river, which are normally accessible by motor vehicles. The radial well pumps provide cooling water to non-vital balance of plant equipment and makeup water for the circulating water system. During prolonged periods with high river level, the radial wells were only accessible by boat. Operators were required to visit each radial well and the power house three times per week in order to check the condition of the equipment. Allowances were made to reduce this to once per week if there were accessibility problems.

The inspectors noted that on March 10, 2008, an operator who was assigned to the fire brigade was sent by boat to the radial wells. It took just under 2 hours to return to the plant. The position on the fire brigade was not reassigned to another qualified individual during this time. Operations personnel had not recognized that this degraded the capability of the fire brigade to make a timely response to a plant fire. The approved Fire Protection Program required that five qualified individuals be assigned to the fire brigade at all times. The team identified that there was no policy in place to ensure that fire brigade members were not assigned duties which conflicted with their assignment to the fire brigade. Upon further review, a fire brigade member was sent by boat to the radial wells a total of three times in March 2008.

The inspectors determined that the licensee's practice was to keep a small motor boat on a trailer near the plant for use in accessing the radial wells. The trailer was connected to a truck, driven 2.5 miles to the closest suitable boat launch, launched, and then driven to the wells. The operator was accompanied by two other personnel, usually from different departments. During a substantial portion of this trip, the operator's radio could not communicate with the site, but radio communications were effective once the operator was in the immediate vicinity of the radial wells.

The team assessed the potential for a rapid recall of an operator under these conditions. The operator could not be recalled when out of radio contact, which could be approximately 30 minutes each way. If in radio contact, the operator would need to get in the boat, drive straight toward the heavy haul road, and either be picked up in a vehicle or travel on foot back to the plant. The land portion of this distance was under a mile. Based on this, the team estimated that an operator in radio contact would take 20 to 30 minutes to return to the plant. The licensee's fire drill performance criteria specified that the fire brigade should be dressed out and at the fire within 20 minutes.

This issue was entered into the corrective action program under CR 2008-01616. The licensee took prompt compensatory measures to inform operations supervisors to send only non-fire brigade members to the radial wells. A more permanent policy was being developed at the close of the inspection.

Analysis. Failure to maintain a fully staffed fire brigade at all times was a performance deficiency. This finding was more than minor because it affected the protection from external factors (fire) attribute of Mitigating Systems Cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," was used because the finding affected fire protection defense-in-depth strategies involving post-fire safe shutdown systems.

The degradation of the fire brigade involved three periods of approximately 2 hours each. During this time, if the fire brigade was needed to respond to a fire, four members would have been available to respond. Because the trips were only made on the day shift, the licensee stated that additional fire brigade trained personnel would have been available to supplement the response, although this would still have involved a delay in response time. The fire brigade was organized with a fire brigade leader and two 2-person teams. One team would be designated to fight a fire, while the other team provided support outside the fire area and remained available to rescue the team fighting the fire. With one fire brigade member delayed in responding, team concluded that the remaining fire brigade capability would not significantly reduce the initial capability to fight a fire, since the fire brigade leader could serve in the role of support and rescue. If the fire was not extinguished before the first fire team needed to rotate out of the fire area before a replacement member was present, then the fire brigade would not be able to send the second team in to fight the fire until an additional fire brigade member arrived or one of the first fire team members replaced their air bottle. The fire drill demonstrated that the fire brigade was typically ready to fight a fire in 15 to 20 minutes. Under heavy physical activity, the fire brigade's air bottles would be expected to last 20 to 30 minutes. This means that a replacement fire brigade member would be needed by 35 to 50 minutes.

The licensee stated that during day shift, the operations staffing included one or more extra fire brigade trained personnel that would be available within this period of time. The team concluded that the need for a replacement fire brigade member could be identified and a replacement person could be assigned and still report to a fire with the required equipment in this amount of time in most cases. Therefore, this finding was

assigned a low degradation rating. This finding screened as having very low safety significance because it involved a fire barrier with a low degradation.

This finding had a crosscutting aspect in the area of Human Performance – Work Control (H.3.b) because the licensee did not ensure that different job activities were coordinated to ensure that the fire brigade remained available at all times. This finding was entered into the corrective action program under CR 2008-01616.

Enforcement. License Condition 2.C(41), "Fire Protection Program," requires that Entergy Operations, Inc., shall implement and maintain in effect all the provisions of the approved Fire Protection Program as described in Revision 5 to the Updated Final Safety Analysis Report and as approved in the Safety Evaluations dated August 23, 1991, and September 29, 2006, subject to the following provisions:

The licensee may make changes to the approved Fire Protection Program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

Updated Final Safety Analysis Report, Section 9B.7.1 states: "The fire brigade shall be composed of at least five members on each shift. The number of fire brigade personnel may be less than the minimum requirements for a period of time not to exceed 2 hours in order to accommodate unexpected absence, provided that immediate action is taken to fill the required positions."

Contrary to the above, the licensee failed to implement and maintain in effect one of the provisions of the approved Fire Protection Program. Specifically, on three occasions in March 2008, less than five members were available onsite to perform the duties of the fire brigade. On each of the three occasions, an operator assigned to the fire brigade was assigned duties which conflicted with the assignment to the fire brigade. Because this violation was of very low safety significance and was entered into the licensee's corrective action program, this will be treated as a noncited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000416/2008006-02, Fire Brigade Members Assigned Responsibilities That Conflicted with Fire Brigade Responsibilities.

(2) **Plant Modification Blocked Access for Manual Firefighting**

Introduction. A Green noncited violation of License Condition 2.C.(41), "Fire Protection Program," was identified for making a plant change that reduced the effectiveness of the approved Fire Protection Program. The team identified that the licensee had permanently blocked the door to the abandoned Unit 2 portion of the joint control room without evaluating the impact of the change on the approved fire protection program. The only remaining access path was a small hatch that would have made it difficult for fire fighters to gain access with protective clothing and equipment. A fire in this area could threaten operations in the Unit 1 control room if not promptly suppressed.

Description. Grand Gulf Nuclear Station was initially designed to be a two-unit facility with a joint control room. Prior to completing construction, Unit 2 was terminated. A non-fire rated wall was installed to separate the abandoned Unit 2 portion of the joint control room from the operating Unit 1 portion of the control room. The Unit 2 control room contained combustible material in the form of control cabinets and cabling.

A fire in the Unit 2 control room area could affect operations in the Unit 1 control room, since both control room spaces share a common ventilation system. The wall separating the Unit 1 and 2 control rooms had no fire rating, and the unrated false ceiling over the operating control room was open to the Unit 2 control room. The Unit 2 control room contained fire detection capability but had no automatic suppression system. Appendix R to 10 CFR Part 50, Section III.G.3 requires area-wide automatic fire suppression for this type of room, but the NRC Safety Evaluation Report (NUREG 0831) approved manual fire suppression using the fire brigade because the control room was continuously manned in lieu of requiring automatic suppression.

Until 2006, access for manual suppression by the fire brigade was through the access door to the Unit 2 control room from the turbine building. A fire hose station was located near the door, allowing fire brigade access with a hose stream to reach any location within the room. In 2006, a plant modification blocked access to the Unit 2 control room via this door. After this modification was completed, the only access to the Unit 2 control room was by a 2 foot by 2.5 foot hatch in the non-rated wall separating the control rooms. The team noted that this was insufficient clearance for fire brigade members wearing turnout gear and a self-contained breathing apparatus to safely access the room to suppress a fire. The team also measured the distance from the nearest fire hose station through the hatch to various portions of the Unit 2 control room. The 100 foot long fire hose installed could only reach the furthest portion of the Unit 2 control room if it was run along one of the several possible paths, relying on the hose stream for the last several yards. The team noted that an additional fire hose was available in the fire brigade locker a short distance from the back door of the Unit 1 control room. The team also noted that the licensee had de-energized all electrical ignition sources in the abandoned control room and had removed all transient combustible material from the area in order to minimize the frequency of a fire in this area. Also, fire extinguishers were available in the Unit 2 control room.

The team determined that fire protection engineering personnel had identified that this modification had been made without notifying the fire protection group to perform a fire protection review. When this was discovered, fire protection personnel initiated CR 2006-01464 to improve access, since the licensee concluded that there may be some reduction in fire fighting capability and increased personnel safety risk for fire brigade members responding to a fire in this area. The team determined that this CR had an action to evaluate installing an access door in a different location, although there was no modification being developed by the close of this inspection.

This finding was entered in to the licensee's corrective action program under CRs 2008-01893 and 2008-01913.

Analysis. Blocking access to the Unit 2 control room area and not promptly restoring access to allow manual fire suppression was a performance deficiency. This finding was more than minor because it affected the protection against external factors (fire) attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events in order to prevent undesirable consequences. Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," was used because the finding affected fire protection defense-in-depth strategies involving post-fire safe shutdown systems. This finding was determined to have very low safety significance because all potential fire ignition sources screened out in Task 2.3.4 of Phase 2. There were no ignition sources because the licensee had removed electrical power from this area, and administratively prevented hot work and storage of transient combustible material from this area.

This finding was determined to have a cross-cutting aspect in Problem Identification and Resolution (P.1.d) because this performance deficiency was identified in 2006 but was not corrected in a timely manner.

Enforcement. License Condition 2.C.(41), "Fire Protection Program," requires that Entergy Operations, Inc., shall implement and maintain in effect all the provisions of the approved Fire Protection Program as described in Revision 5 to the Updated Final Safety Analysis Report and as approved in the Safety Evaluations dated August 23, 1991, and September 29, 2006, subject to the following provisions:

The licensee may make changes to the approved Fire Protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

The approved Fire Protection Program includes the Fire Hazards Analysis Report. Fire Hazards Analysis Report, Section 9A.5.50.4.e(2)(c) states that the Unit 2 control room area allows fire brigade accessibility for hose streams and extinguishers.

Contrary to the above, in 2006, the licensee made changes to the approved Fire Protection Program without prior approval of the Commission and without determining that the change would not adversely affect the ability to achieve and maintain safe shutdown. Specifically, the licensee modified the plant to block the access door from the Unit 2 turbine building to the Unit 2 control room without evaluating the impact to the approved Fire Protection Program. This modification was determined to have reduced the effectiveness of the approved Fire Protection Program because the only remaining access to this area was through a small hatch that would have challenged fire brigade members' safe access with firefighting clothes and equipment. Because this violation was of very low safety significance and was entered into the licensee's corrective action program, this will be treated as a noncited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000416/2008006-03, Plant Modification Blocked Access for Manual Firefighting.

.5 Protection From Damage From Fire Suppression Activities

a. Inspection Scope

For the sample areas, the team verified that redundant trains of systems required for hot shutdown were not subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems including the effects of flooding.

b. Findings

No findings of significance were identified.

.6 Alternative Shutdown Capability

a. Inspection Scope

The team reviewed the licensee's alternative shutdown methodology to determine if the licensee properly identified the components, systems, and instrumentation necessary to achieve and maintain safe shutdown conditions from the remote shutdown panel and alternative shutdown panels. The team focused on the adequacy of the systems selected for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring, and support system functions. The team verified that hot and cold shutdown from outside the control room could be achieved and maintained with offsite power available or not available. The team verified that the transfer of control from the control room to the alternative locations was not affected by fire-induced circuit faults by reviewing the provision of separate fuses for alternative shutdown control circuits.

The team also reviewed the operational implementation of the licensee's alternative shutdown methodology. Team members observed a walk-through of the control room evacuation procedures with both a licensed and non-licensed operator. The team observed operators simulate performing the steps of Procedure 05-1-02-II-1, "Shutdown from the Remote Shutdown Panel," which provided instructions for performing an alternative shutdown from the remote shutdown panel and for manipulating equipment in the plant.

The team verified that the minimum number of available operators, exclusive of those required for the fire brigade, could reasonably be expected to perform the procedural actions within the applicable plant shutdown time requirements and that equipment labeling was consistent with the procedure. Also, the team verified that procedures, tools, dosimetry, keys, lighting, and communications equipment were available and adequate to support successfully performing the procedure as intended. The team also reviewed records for operator training conducted on this procedure.

The team reviewed the time-critical actions identified by the licensee as necessary to support alternative shutdown from outside the control room. The team reviewed the calculations and analyses which provided the bases for these critical times. The

simulated completion times were recorded during the procedure walk-through and compared to the analytical values to verify that the procedure could be implemented as intended.

b. Findings

No findings of significance were identified. A finding involving possible damage to a safe shutdown component prior to gaining control at the remote shutdown panel is documented in Section 4OA5.

.7 Circuit Analyses

a. Inspection Scope

The team reviewed how systems would be used to achieve safe shutdown during and following a postulated fire in the fire zones selected for review. On a sample basis, the team verified that cables for equipment required to achieve and maintain hot shutdown conditions in the event of fire in the selected fire zones had been properly identified and either adequately protected from the potentially adverse effects of fire damage or analyzed to show that fire-induced faults (e.g., hot shorts, open circuits, and shorts to ground) would not prevent safe shutdown. The sample included components associated with the residual heat removal system. The team reviewed electrical elementary and block diagrams and identified power, control, or instrument cables necessary to support their operation. In addition, conduit and cable tray layout drawings and cable routing information were reviewed to verify that fire protection features were in place as needed to satisfy the separation and design requirements of 10 CFR 50, Appendix R, Section III.G. The team also walked down the selected fire areas to compare the actual plant configuration to the layout indicated on the drawings. Additionally, on a sample basis, the team also reviewed the licensee's analysis of electrical protective device (e.g., circuit breaker, fuse, relay) coordination. The components reviewed are listed in Attachment 1. Drawings, calculations, operating procedures and other documents reviewed are also included in the Attachment.

b. Findings

No findings of significance were identified.

.8 Communications

a. Inspection Scope

The team verified through inspection of the contents of designated emergency storage lockers and review of emergency control station alternative shutdown procedures, that the portable communication equipment was available, operable, and adequate for alternative shutdown procedure performance. The inspection considered communication issues, such as ambient noise levels, clarity of reception, reliability, and coverage patterns.

The team also reviewed condition reports and fire drill critiques to assess the effectiveness of the plant radio system. Problems and corrective actions were discussed with the communications engineer.

b. Findings

No findings of significance were identified.

.9 Emergency Lighting

a. Inspection Scope

The team reviewed the emergency lighting systems required to support plant personnel in the performance of alternative safe shutdown functions to verify it was adequate for supporting the performance of manual actions required to achieve and maintain hot shutdown conditions and for illuminating access and egress routes to the areas where manual actions are required.

The team reviewed repetitive tasks for testing and a sample of test data to verify that the individual battery-operated units were capable of supplying sufficient illumination for 8 hours. The team compared the testing and maintenance practices for the lighting units to accepted industry practice and the manufacturer's recommendations.

b. Findings

No findings of significance were identified.

.10 Cold Shutdown Repairs

a. Inspection Scope

The team reviewed the licensee's safe shutdown analysis and Procedure 05-1-02-II-1, "Shutdown from the Remote Shutdown Panel," to determine whether repairs were required to achieve cold shutdown. The licensee identified two repairs that were potentially required in order to reach cold shutdown based on the safe shutdown methodology implemented. The team verified that dedicated procedures, equipment, and material to accomplish these repairs were available on site. The team also evaluated whether cold shutdown could be achieved within the required time using the licensee's procedures and repair methods.

b. Findings

No findings of significance were identified.

.11 Compensatory Measures

a. Inspection Scope

The team reviewed the licensee's program with respect to compensatory measures in place for out-of-service, degraded, or inoperable fire protection and post-fire safe shutdown equipment, systems, or features.

The team reviewed the Technical Requirements Manual sections applicable to active and passive fire protection equipment and Fire Protection Procedure 10-S-03-1, "Fire Protection System Impairments," to determine whether the procedures adequately controlled compensatory measures for out-of-service, degraded, or inoperable equipment that could affect post-fire safe shutdown equipment, systems or features. The team also reviewed a sample of existing fire impairments to determine whether the licensee adequately implemented the specified compensatory measures.

b. Findings

No findings of significance were identified.

4OA2 Problem Identification and Resolution

a. Inspection Scope

The team reviewed a sample of condition reports associated with the licensee's fire protection program to verify that the licensee had an appropriate threshold for identifying deficiencies. In addition the team reviewed the corrective actions proposed and implemented to verify that they were effective in correcting identified deficiencies. A listing of condition reports reviewed is provided in the Attachment to this report.

b. Findings

No findings of significance were identified.

4OA5 Other Activities

(Closed) Unresolved Item 05000416/1999006-01: Consideration of the Effects of Fire-Induced Circuit Failures on Equipment Required For Safe Shutdown

Introduction. The team identified a Green noncited violation of 10 CFR 50, Appendix R, Section III.G.1.a because the licensee failed to evaluate the impact of a potential motor-operated valve failure mechanism on their ability to implement post-fire safe shutdown following a control room evacuation. The Residual Heat Removal Pump Minimum Flow Valve F064A could be damaged by fire in the control room and not be available to perform its safe shutdown function. This finding involved mechanistic damage due to hot shorts described in Information Notice 92-18, "Potential for Loss of

Remote Shutdown Capability During Control Room Fire." The licensee had incorrectly interpreted this operating experience and concluded that no action was required.

Description. The team reassessed this issue in light of changes in industry guidance since the issuance of this unresolved item. The concern was that the licensee did not perform an evaluation of the operating experience documented in NRC Information Notice 92-18, "Potential for Loss of Remote Shutdown Capability During Control Room Fire." This Information Notice discussed the possibility of fire damage in control room cabling which could cause a motor-operated valve to spuriously operate and damage itself such that it would not be available for later use as required for safe shutdown. This situation would be possible during the initial stages of a fire, prior to switching the control room portion out of the circuit while taking control from the remote shutdown panel.

The licensee had docketed their position on this issue in a letter to the NRC in 1999. The licensee stated that multiple spurious operations due to fire damage would have to occur in order for this issue to be of concern, and the licensee considered their licensing basis did not require them to consider multiple spurious operations. The paper went on to make a risk-based argument that the control room design was such that the increase in risk from this condition was very small, so it should not be necessary to consider the failure mechanism in their design.

Since this unresolved item was issued, the NRC and the Nuclear Energy Institute (NEI) issued guidance to the nuclear industry which clarified licensing basis requirements and NRC expectations with regard to the analysis of fire-induced circuit failures. These include the following documents:

- Regulatory Issue Summary 2004-03, Revision 1, "Risk-Informed Approach for Post-Fire Safe-Shutdown Circuit Inspections," (ML042440791) which provides inspector guidance for performing risk-informed circuit inspections,
- Regulatory Issue Summary 2005-30, "Clarification of Post-fire Safe Shutdown Circuit Regulatory Requirements," (ML053360069),
- Nuclear Energy Institute 00-01, "Guidance for Post-Fire Safe Shutdown Circuit Analysis," Revision 1 (ML050310295). As described in RIS 2005-30, the deterministic methodology presented in Chapter 3 of NEI 00-01, when applied in accordance with the regulatory expectations described in the RIS, is one acceptable approach to the analysis of post-fire, safe-shutdown circuits.

The team identified that the licensee had not reassessed their position in light of this new guidance. The licensee agreed to perform a new evaluation of the applicability of Information Notice 92-18. This was being tracked by CR 2008-01904.

The team reviewed the issue and concluded that the issue did not require multiple spurious operations to be of concern, as claimed by the licensee. The team reviewed a sample of Division 1 motor-operated valves that were relied upon for safe shutdown in the event of a control room evacuation that had cables in the control room. The team

identified one example of a valve circuit that was susceptible to spurious operation due to a single hot short which was relied upon for safe shutdown. Residual Heat Removal Pump Minimum Flow Valve F064A could be damaged by a single conductor-to-conductor short in a multi-conductor cable prior to actuation of isolation switches at the remote shutdown panel without protection from an over-thrust condition. This could cause the valve to close and be unable to be opened when needed to provide minimum flow protection for its associated residual heat removal pump.

This issue is addressed in the corrective action program under CRs 1999-0236 and 2008-01904.

The team confirmed that the licensee used cables with the following characteristics:

- The licensee utilized IEEE 383 qualified wire insulation and cable jackets.
- The valve had a seven-conductor cable that required a specific hot short from one conductor to the other.
- The valve had a control power transformer.

Analysis. The inspectors determined that failure to ensure that Residual Heat Removal Pump Minimum Flow Valve F064A would remain operable following a fire was a performance deficiency. This finding was more than minor because it affected the protection against external factors (fire) attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events in order to prevent undesirable consequences.

The senior reactor analyst used the fire ignition frequency for the control room listed in the Grand Gulf Nuclear Station Engineering Report for Individual Plant Examination of External Events Summary Report, Revision 1, as the best available information. The analyst multiplied the fire initiation frequency by an appropriate severity factor and a non-suppression probability indicating that operators failed to extinguish the fire within 20 minutes, assuming 2 minute detection, leading to abandonment of the main control room (NP_{CRE}). The resulting control room evacuation frequency (λ_{EVAC}) is:

$$\begin{aligned} \lambda_{EVAC} &= FIF_{CR} * SF * NP_{CRE} \\ &= 9.5E-03/year * 0.1 * 1.30E-02 \\ &= 1.24E-05/year \end{aligned}$$

The control room had 43 panels and 15 termination cabinets, with the affected valve circuit residing in only one panel and one termination cabinet. The resulting probability that a control room fire would affect the panel and/or cabinet of interest ($P_{Affected}$) is the fraction $2/(43 + 15) = 3.45E-2$. The intersection of fires that affect both the subject valve and lead to main control room abandonment ($\lambda_{intersection}$) is calculated as follows:

$$\lambda_{intersection} = P_{Affected} * \lambda_{EVAC}$$

$$= 3.45E-2 * 1.24E-05/\text{year}$$

$$= 4.26E-07/\text{year}.$$

The change in core damage frequency would be determined by multiplying the intersection determined above by an undetermined conditional core damage probability that must be equal to or less than 1.0 and the exposure period of 1 year. This would result in a change in core damage frequency of less than or equal to 4.26E-7. Therefore, the analyst determined this finding was of very low risk significance (Green). Given that sequences requiring low pressure systems are, by nature, not dominant contributors to the containment failure or bypass risk, the analyst also determined that this finding was of very low risk significance with respect to the large-early release frequency. This finding did not have cross cutting aspects since the performance deficiency occurred outside of the assessment period.

Enforcement. Part 50.48 of Title 10 of the Code of Federal Regulations, requires all plants to meet Appendix R, Section III.G. Section III.G.1.a requires that fire protection features shall be provided for structures, systems, and components important to safe shutdown. These features shall be capable of limiting fire damage so that one train of safe shutdown equipment necessary to achieving and maintaining hot shutdown conditions from either the control room or the emergency control station(s) is free of fire damage. Contrary to the above, the inspectors determined that the licensee failed to provide fire protection features for components important to safe shutdown. Specifically, the licensee failed to ensure that one train of safe shutdown equipment necessary to achieving and maintaining hot shutdown conditions from the emergency control station(s) would remain free of fire damage. For fires in one control panel and one termination cabinet in the control room, Residual Heat Removal Pump Minimum Flow Valve F064A could be damaged so that it would not be available to perform its safe shutdown function. Because this violation was of very low safety significance and was entered into the licensee's corrective action program, this will be treated as a noncited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000416/2008006-04, Failure to Ensure That Damage to Motor-Operated Valve Circuits Would Not Prevent Safe Shutdown.

40A6 Management Meetings

Exit Meeting Summary

On April 18, 2008, the team leader presented the inspection results to Mr. M. Krupa, General Manager of Plant Operations, and other members of licensee management. The team verified that they had returned all proprietary information reviewed during the inspection to the licensee.

A supplemental exit was conducted on July 1, 2008, with Mr. D. Barfield, Director of Engineering, and other members of licensee management to provide the results of the significance determination for each finding. The team confirmed that no additional proprietary information was reviewed.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

D. Barfield, Director, Engineering
T. Barnett, , Project Manager, Nuclear Plants
W. Cade, Operations Procedure Group
D. Chipley, Senior Design Engineer
D. Coulter, Senior Licensing Specialist
R. Gardner, Director, Nuclear Safety Assurance
M. Krupa, General Manager of Plant Operations
M. Larson, Acting Licensing Manager
G. Lantz, Supervisor, Electrical Design Engineering
R. McNemar, Fire Brigade Training Instructor
R. Sorrels, Senior Fire Protection Engineer
F. Wilson, Assistant Operations Manager
T. Worthington, Supervisor, Plant Programs

NRC

A. Barrett, Resident Inspector
D. Frumkin, Senior Fire Protection Specialist, NRR
N. Iqbal, Senior Fire Protection Specialist, NRR
G. Pick, Senior Reactor Inspector, RIV
R. Smith, Senior Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000416/2008006-01	NCV	Failure to Evaluate Fire Wrap Testing Discrepancies (Section 1R05.3)
05000416/2008006-02	NCV	Fire Brigade Members Assigned Responsibilities That Conflicted with Fire Brigade Responsibilities (Section 1R05.4.b(1))
05000416/2008006-03	NCV	Plant Modification Blocked Access for Manual Firefighting (Section 1R05.4.b(2))

05000416/2008006-04	NCV	Failure to Ensure That Damage to Motor-Operated Valve Circuits Would Not Prevent Safe Shutdown (Section 4OA5)
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Closed

05000416/1999006-01	URI	Consideration Of The Effects Of Fire-Induced Circuit Failures On Equipment Required For Safe Shutdown (Section 4OA5)
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Discussed

None

LIST OF DOCUMENTS REVIEWED

Procedures

- 01-S-02-1, Description and Use of the GGNS Operations Manual, Revision 28
- 02-S-01-2, Control and Use of Operations Section Directives, Revision 45
- 02-S-01-35, Operations Section Procedure Outside Rounds, Revision 40
- 04-1-01-E12-1, Residual Heat Removal System, Revision 129
- 04-1-01-P75-1, Standby Diesel Generator System, Revision 75
- 05-1-02-II-1, Shutdown from the Remote Shutdown Panel, Revision 30
- 05-1-02-II-1, Shutdown from the Remote Shutdown Panel, Revision 32
- 05-1-02-II-1, Shutdown from the Remote Shutdown Panel, Revision 33
- 06-OP-1C61-M-0001, Remote Shutdown Panel and Accident Monitoring Instrumentation Channel Check, Revision 103
- 06-OP-1C61-R-0002, Remote Shutdown Panel Control Check, Revision 107
- 07-S-12-108, General Inspection and Testing of Emergency Lighting, Revision 10
- 07-S-12-143, Big Beam Emergency Light Inspection, Battery Capacity Verification, and Functional Test, Revision 0
- 10-S-03-1, Fire Protection System Impairment, Revision 12

10-S-03-2, Response to Fires, Revision 19
10-S-03-5, Fire Investigation, Revision 101
10-S-03-7, Fire Protection Training Program, Revision 10
10-S-03-8, Fire Watch Program, Revision 9
EN-AD-102, Procedure Adherence and Level of Use, Revision 2
EN-AD-103-02, Document Control Activities, Revision 0
EN-OP-115, Conduct of Operations, Revision 5

Drawings

E-0627, Lighting & Communication Plan, Control Bldg. Elev. 148'-0", Revision 18
E-0628, Lighting & Communication Plan, Control Bldg. Elev. 166'-0", Revision 26
E-0629, Lighting & Communication Plan, Control Bldg. Elev. 189'-0", Revision 18
E-0637, Lighting & Communication Plan, Control Bldg. Elev. 111'-0", Revision 21
E-0638, Lighting & Communication Plan, Control Bldg. Elev. 133'-0", Revision 18
E-1161-014, Automatic Depressurization System Safety Relief Valves, Revision 13
E-1181-037, Residual Heat Removal System RHR Injection Valve F042A, Revision 11
E-1225-001, Standby Service Water System Control System A, Revision 12
E-1225-003, P41 Standby Service Water System SSW Pump C001A, Revision 16
E-1225-004, Standby Service Water System SSW Cooling Tower Fan C003A, Revision 13
E-1225-005, P41 Standby Service Water System SSW Pump 'A' Discharge MOVF001A-A, Revision 15
E-1623, Lighting & Communication Plan, Turbine Bldg., El. 166'-0" & 199'-0", Revision 16
E-1625, Lighting & Communication Plan; Auxiliary & Containment Bldg.; Elev. 114'-6", 119'-0", & 120'-10" Unit 1, Revision 18
E-1626, Lighting & Communication Plan; Auxiliary & Containment Bldg.; Elev. 135'-4", 139'-0", & 147' 0", Revision 22

E-1627, Lighting & Communication Plan; Auxiliary & Containment Bldg.; Elev. 161'-10", 166'-0", & 170' 0", Revision 17

E-1634, Lighting & Communication Plan, Diesel Generator Building, Area 12 Unit 1, Revision 11

Fire Test Reports

CTP-1199

CTP-2019

Miscellaneous Documents

Design Change Package 85/3100, "Intermittent Shutdown Emergency Lighting Additions/Modifications, Revision 0

Engineering Change Request 1941

Engineering Report GGNS-FP-08-00001, One Hour Rated 3M Interam EW-54A Support and Heat Transfer Items, Revision 0

Engineering Report GGNS-99-0007, Spurious Opening of Twenty Safety Relief Valves, Revision 0

Engineering Request ER-GG-2006-0069, Revision 0

Engineering Request ER-GG-2006-0156, Revision 0

EPRI TR-100249, Emergency Battery Lighting Unit Maintenance and Application Guide, dated June 1997

EPRI TR-106826, Battery Performance Monitoring by Internal Ohmic Measurements: Emergency Lighting Unit Batteries, dated December 1996

General Electric Letter MPGE-85/128, "Transmittal of Fire Protection Analysis for Grand Gulf Unit 1," dated June 17, 1985

GFIG-OPS-C6100, Remote Shutdown Panel – C61 (Tables and Figures), Revision 2

GLP-OPS-C6100, Remote Shutdown Panels – C61, Revision 7

Operator Training Records for Remote Shutdown – 2008

System Design Criteria, Remote Shutdown System (C61), Revision 0

Technical Special Test Instruction 1Z92-99-001-0-S, Big Beam Emergency Light Battery Capacity Verification

Vendor Manual 460001774, Emergency Lights

Vendor Manual 460004053, Midtron 3200 Battery Conductance Tester

UFSAR Section 9.5, Appendices 9.5A, 9.5B and 9.5C

Technical Requirements Manual, Section 6

Information Notice 95-33, Switchgear Fire and Partial Loss of Offsite Power at Waterford Generating Station, Unit 3

Vendor Manual 460000437, Chemtron Fire Systems, Carbox Extinguishing System, Revision 0

National Fire Protection Association Code NFPA 12, Carbon Dioxide Extinguishing Systems, 1973

NFPA 72E, Automatic Fire Detectors, 1975

NRC letter, "Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used to Separate Redundant Safe Shutdown Trains Within the Same Fire Area (Supplement 1 to Generic Letter 86-10, Implementation of Fire Protection Requirements)," dated March 25, 1994

Condition Reports

CR-GGN-1997-00779	CR-GGN-1997-00919	CR-GGN-1999-00236
CR-GGN-2005-00770	CR-GGN-2005-01872	CR-GGN-2005-02148
CR-GGN-2005-02369	CR-GGN-2005-02405	CR-GGN-2005-02468
CR-GGN-2005-04052	CR-GGN-2005-04066	CR-GGN-2006-01087
CR-GGN-2006-01128	CR-GGN-2006-01181	CR-GGN-2006-01464
CR-GGN-2006-01655	CR-GGN-2006-01786	CR-GGN-2006-02424
CR-GGN-2006-02664	CR-GGN-2007-03094	CR-GGN-2007-03103
CR-GGN-2007-03122	CR-GGN-2007-03571	CR-GGN-2007-03795
CR-GGN-2007-03797	CR-GGN-2007-04644	CR-GGN-2008-01264
CR-GGN-2008-01616	CR-GGN-2008-01629	CR-GGN-2008-01664
CR-GGN-2008-01695	CR-GGN-2008-01698	CR-GGN-2008-01855
CR-GGN-2008-01867	CR-GGN-2008-01890	CR-GGN-2008-01891
CR-GGN-2008-01893	CR-GGN-2008-01894	CR-GGN-2008-01900
CR-GGN-2008-01901	CR-GGN-2008-01902	CR-GGN-2008-01904
CR-GGN-2008-01905	CR-GGN-2008-01907	CR-GGN-2008-01908
CR-GGN-2008-01910	CR-GGN-2008-01911	CR-GGN-2008-01913

Work Orders

00067226	00074935	00082836	00102044	50294619	50299051
50992983	51007470	51021807	51037169	51050389	51098287

Fire Pre-Plans

A-12, Passage, 1A201, 1A211

A-32, Motor Control Center Room 1A407

C-13, Control Room, Control Panel, Suspended Ceiling and Support Areas OC501, OC502, OC503, OC504, OC516 and OC517

C-07-1, Division II Switchgear Room and Battery Room, OC211 and OC215

C-12-1, Lower Cable Spreading Room, H & J Battery Room & Corridor, OC401 and OC410

C-02, Hot Machine Shop, OC128

Calculations

FPP-1, Appendix A, Criteria for Safe Shutdown Equipment List, Revision 7

FPP-1, Appendix A, Data 2, Safe Shutdown Equipment List Indexed by Fire Area and Fire Zone
ER-GG-2000-0914-00-00, Use of 3M Fire Wrap System as Radiant Energy Shields, Attachment 3, Revision 0

ER-GG-2000-0916-00-00, Attachment 7, Evaluation of 3M Interam E-54A Flexible Wrap System for 6-Inch Conduits and 24 – 36-Inch Cable Trays, Revision 1

ER-GG-2000-0916-00-00, Attachment 8, Engineering Disposition/Justification of ERCN 0008, Revision 0

Entergy Letter GNRO-2006/00032, "Response to Generic Letter 2006-03, Potentially Nonconforming Hemyc and MT Fire Barrier Configurations," dated June 5, 2006

Fire Protection Self Assessments

GGNS Fire Protection Corporate Assessment, dated July 5, 2006

Quality Assurance Audit Report QA-9-2006-GGNS-1, Fire Protection, dated March 30, 2006

GLO-2007-0148, Fire Protection Pre-NRC Triennial Focused Assessment, dated September 17, 2007

Licensing Basis Documents

MP&L letter, "Fire Protection Responses to FSAR Questions," dated June 9, 1981

MP&L letter, "Appendix R to 10 CFR50, Proposed Exemption Related to Safe Shutdown Systems," dated June 18, 1985

MP&L letter, "Transmittal of Proposed FSAR Changes and Responses to NRC Questions Related to Fire Protection," dated August 7, 1981

NRC letter, "Issuance of Amendment No. 82 to Facility Operating License No. NFP-29 – Grand Gulf Nuclear Station, Unit 1, Regarding the Fire Protection Program," dated August 23, 1991

NUREG 0831, Safety Evaluation Report Related to the Operation of Grand Gulf Nuclear Station, Units 1 and 2

Supplemental 1 to NUREG 0831, Section 9.5.6
Supplemental 3 to NUREG 0831, Section 9.5.1.2
Supplemental 5 to NUREG 0831, Section 9.5.4

Fire Drill Scenario and Critique Forms

12/1/07 – Shifts B

12/1/07 - Shift C

12/22/07 – Shift E

12/23/07 – Shift B

12/25/07 – Shift D

1/23/08 – Shift B

1/31/08 – Shift A

2/16/08 – Shift C

3/21/08 – Shift E

4/2/08 – Shift D

Fire Brigade Leader System Training

SE2000-0016, 50.59 Evaluation for Change to Fire Brigade Leader Staffing, Revision 0

GLP-FBL-SYS00, Plant Knowledge, Revision 1

GG-1-LP-FBL-SYS01, Electrical Distribution Systems, Revision 1

GG-1-LP-FBL-SYS02, Emergency Core Cooling Systems, Revision 1

GG-1-LP-FBL-SYS03, Engineered Safety Feature Systems, Revision 1

GG-1-LP-FBL-SYS04, Plant Ventilation Systems, Revision 1

GG-1-LP-FBL-SYS05, Plant Knowledge, Revision 1

GLP-FP-FBLCLASS, Fire Brigade Leader Initial Training, Revision 0

GLP-FP-FBLDUTY, Fire Brigade Leader Generic Duties, Revision 0

GG-1-OTH-FBL-WLKTH, Fire Brigade Leader Walkthrough, Revision 0