

Potential Fire Protection Issue at River Bend

Background:

On 8/01/01, the residents conducted a fire protection inspection of the Standby Service Water (SSW) Standby Cooling Tower (SBCT) Division I and Division II pump and switchgear rooms. The residents identified a 3 hour fire barrier which was penetrated by an "unused" equipment floor drain which had not been routed to a drain tank. This fire barrier was subsequently determined to be inoperable and a CR was written. This will likely be captured in this period's inspection report as an NCV. It was noted that another NCV regarding an NRC identified degraded fire barrier was issued in report 2000-0016.

During discussion of the above fire barrier issue with licensee fire protection engineers, it was pointed out that this fire protection feature provided a fire barrier between the Division II SSW switchgear room and fire area PT-1 (comprised of the E, F, and G tunnels). Located in these tunnel areas are cables from both divisions of SSW. The residents questioned how protection of redundant safe shutdown equipment, as discussed in Appendix R, was being met. The licensee stated that for fire area PT-1, the Normal Service Water (NSW) system was considered to be a redundant division to the SSW system assuming no loss of offsite power (LOOP). Since the NSW system is not safety related or generally associated with safe shutdown equipment, and since Appendix R does not seem to address this condition (i.e., utilizing a non-safety related system to meet the function of a safety related and safe shutdown system, under the assumption of no LOOP) and since Appendix R and other fire protection guidance seem to indicate the need to assume a LOOP for at least 72 hours, the resident staff at River Bend is requesting regional fire protection staff review and consideration of the following issues and concerns.

Issue Timeline:

8/6/91 and 12/6/91 -

Information Notice 91-47 and 91-79 discuss failure of Thermo-Lag during fire protection testing. Thermo-Lag had been used to provide Appendix R, III.G.2 separation criteria for Division I and II SSW cables located in the PT-1 fire area. River Bend initiated a Thermo-Lag fire barrier resolution project to reduce/eliminate the need for Thermo-Lag in various areas of the plant, including fire area PT-1.

7/10/96 -

Calculation G13.18.3.6*12, Rev O, 10 CFR 50 Appendix R Analysis of Fire Area PT-1, was approved by the licensee on July 10, 1996, to address the use of the NSW system as a required safe shutdown system which provides a redundant function to the SSW system, assuming no LOOP. Several recommendations were made for cable and fuse changes in the PT-1 fire area.

6/16-20/97 and 6/30/97-7/30/97 -

NRC NRR conducts a fire protection functional inspection of River Bend station. NRC inspection report 50-458/97-201 is issued.

Approx. 9/97 to 10/97 -

Recommendations for cabling and fuse changes from the calculation are completed on components in fire area PT-1.

8/01/01 -

Resident Staff conduct fire protection inspection procedure (IP) 71111.05Q, Fire Protection, in Division I and II SSW SBCT switchgear rooms.

Licensee position/discussion:

This is [redacted] area of the plant where a non-safety related, non-Appendix B system was identified as providing a safe shutdown redundancy due to the design safe shutdown redundant components (SSW Division I and II) cabling being routed through the same fire area. [redacted]

[redacted] NSW is capable of providing cooling to the safety related loads supplied by SSW. Since NSW is being considered by them to be "redundant" to the SSW system, and since it has no components or cabling routed through fire area PT-1, the licensee considers that redundant trains of safe shutdown equipment are not located in fire area PT-1 and therefore the requirements of section III.G.2 and III.G.3 (and III.L) are not applicable. The licensee goes on to say that, "since the requirements of section III.G.3 (and III.L) of Appendix R are not applicable to Fire Area PT-1, a loss of offsite power is not required to be deterministically assumed."

The licensee also discusses in this calculation that the "use of analyses to determine the post-fire availability of offsite power has been acknowledged by the NRC as an acceptable method of Appendix R compliance." Also, "This method is acknowledged by the NRC in discussions on the proposed Fire Protection Rule, 10 CFR 50, Appendix S..." The CFR currently shows Appendix S as "Earthquake Engineering Criteria for Nuclear Power Plants" and the residents could not find similar discussion in the current Appendix R.

The licensee also references NRC generic letter 81-12, Staff Position - Safe Shutdown Capability, in the calculation. The licensee has recently stated that the only purpose of this reference in the calculation was for the "associated circuits" guidance in GL 81-12 and not to indicate this approach was applicable to III.G.2 or III.G.3. The licensee has also provided NRC NRR memo dated 3/22/82 on the fire protection rule which provided clarifications on alternative or dedicated shutdown system, and the definition of and information concerning "associated circuits".

The licensee has identified wording in AOP-0009, "Loss of Normal Service Water", that requires a fire watch be established in fire area PT-1 (E, F, and G tunnels) within one hour of a loss of NSW while in modes 1, 2, or 3. [redacted]

The licensee also indicated that the fire protection functional inspection conducted in June and July of 1997 reviewed this safe shutdown calculation and assumption of redundancy. When questioned further by the resident staff, the licensee stated they did not intend this to mean this inspection provided authorization. Instead, the fire protection engineer stated that this change did not meet the definition of a change to the fire protection program as defined in Attachment 4 to the facility license. That is, the change was not considered to "significantly decrease" the level of fire protection program at River Bend.

Concerns:

Calculation G13.18.3.6*12 -

- The calculation essentially determines that there is no equipment/cables/etc., that run through fire area PT-1 that would affect NSW or offsite power in the event of a fire in fire area PT-1.

implementation of the recommendations. However, the appropriateness of this calculation hinges on the assumption that they made, concerning the use of NSW as a redundant system to SSW under no LOOP conditions, is a sound one.

- The calculation states, "...based upon literal interpretations of Appendix R and associated generic Nuclear Regulatory Commission (NRC) correspondence (NRC Generic Letter 81-12, Staff Position - Safe Shutdown Capability - Reference 7.10.2) it is now understood that a deterministic assumption of a loss of offsite power is not required for plant fire areas that do not fall under the requirements of Sections III.G.3 and III.L of Appendix R." It goes on to state, "The NSW system, for the purposes of this analysis for fire area PT-1, is considered to be a normal safe shutdown system that is providing a redundant function to the Standby Service Water System."

Specifically, "...it can be determined that Fire Area PT-1 complies with Section III.G.1 of Appendix R. Therefore, redundant trains of safe shutdown equipment are not located in Fire Area PT-1 and the requirements of Sections III.G.2 and III.G.3 (and III.L) of Appendix R are not applicable to Fire Area PT-1, a loss of offsite power is not required to be deterministically assumed." It is not clear from Appendix R that a LOOP assumption is only required if section III.G.2 and/or III.G.3 apply. Also, it is not clear where it is stated that a non-safety related system can provide the function of a safe shutdown system given there is no LOOP (NSW is not capable of being powered from the onsite EDGs).

- The calculation states, "The use of analyses to determine the post-fire availability of offsite power has been acknowledged by the NRC as an acceptable method of Appendix R compliance. This method is acknowledged by the NRC in discussions on the proposed Fire Protection Rule, 10 CFR 50, Appendix S contained in the Federal Register, Volume 60, No. 108 dated June 6, 1995 (Reference 7.10.4, page 29794)." Appendix S of 10 CFR 50 currently addresses "earthquake criteria" and not fire protection requirements.

- The calculation states that one of the assumptions it utilizes is that, "Equipment required for safe shutdown is available." It bases this assumption on the fact that activities are being governed by Technical Specification, Technical Requirements Manual, or are required to support normal plant operation. NSW is not covered by technical specification or technical requirements manual. It also states that this is reasonable since NSW is required to support turbine operation during normal plant operation. Also, "Any reduced capability in the NSW, its support systems, or offsite power would promptly be restored due to the critical nature of the systems in support of plant operation and safety." The

resident staff asked the licensee if any compensatory measures were put into place (e.g., fire watch) in the event of a reduced capability in the NSW system, etc. The licensee indicated there were no such actions or procedural guidance. The residents then pointed out that in April 2001, one Service Water Cooling (SWC) pump (which cools NSW) had failed and was unavailable for approximately 18 days. The plant safety index (PSI), an equipment out of service "plant risk" measure, was 8.2 (yellow and an increase in plant risk) during this time due to the impact on plant risk of this SSC being out of service. There were no compensatory measures put into place as a result of this "redundant safe shutdown" system degradation as you would find if one division of SSW was degraded (i.e., LCO in effect). Also, calculation G13.18.3.6*12 assumes SWC system available, SWP surge tank available, and all 3 NSW pumps available as a success path for NSW safe shutdown logic (all "AND" gates for these three systems including all 3 NSW pumps).

Safety Evaluation:

- The resident staff reviewed the safety evaluation for one of the modifications to implement the revised Post-Fire Safe Shutdown Analysis. The background section discusses many of the same references and assumptions discussed in the calculation (including reference to Appendix S) and concludes that this method is acceptable. The safety evaluation answered "No" to all of the questions.

Also, NSW had not been previously evaluated in the SAR as a redundant safe shutdown system to SSW. The SAR also did not previously address use of this system for this function under no LOOP conditions.

Nothing about using the NSW system as a redundant safe shutdown system for SSW is mentioned in the SSW technical specifications, technical specifications bases, or technical requirements manual. As a result, no compensatory considerations are discussed in the TS addressing any degradation of NSW as you would find if one of the SSW divisions were degraded or unavailable (e.g., 7 day S/D LCO for a degradation of one division of SSW).

Fire Protection Functional Inspection (NRC Inspection Report 50-458/97-201):

- This inspection report identifies the use of NSW in the Safe Shutdown Support functions in paragraph F7.3.1. The inspection report also concluded that the systems identified in the licensee's safe shutdown analysis (SSA) are capable of accomplishing the reactor performance goals specified in Appendix R. However, no explicit discussion of how this particular fire area or the acceptability of use of NSW was found during a "cursory" review

of the report by the resident staff. [REDACTED]

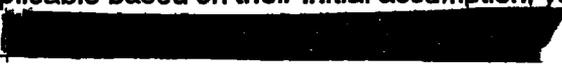
- Section F7.8 of the inspection report addresses fire area PT-1 under the IPEEE Fire Risk Analysis. In this discussion, the team concluded that the change in safe shutdown methodology in fire area PT-1 of using NSW in lieu of SSW "has introduced a residual fire safety concern." The report also states in this section that a fire in area PT-1 during a LOOP could result in damage to redundant SSW trains and a loss of NSW. It also addresses that this vulnerability is not identified in the IPEEE. [REDACTED]
- It should be noted that NRR recently sent the results of their evaluation of the River Bend IPEEE to the licensee. This evaluation effort by NRR would not have been aware of the assumptions made for fire area PT-1 since the IPEEE was issued in 1995 and the calculation and other documentation did not come into being until 1996 and 1997.
- It should also be noted that the SDP calculation performed by the licensee for the SSW SBCT fire barrier being inoperable utilized the PT-1 fire area fire frequency from the IPEEE. [REDACTED]

Maintenance Rule:

- The current listing of maintenance rule functions for NSW does not identify its designation as a redundant train of SSW in the event of a fire in PT-1. For example, assuming all 3 NSW pumps are required to meet the NSW safe shutdown logic, as stated in the NSW safe shutdown logic diagram, then an impairment of the NSW system, or its support systems, could result in a functional failure which would not currently be captured as a functional failure under the maintenance rule.

License/FSAR:

- Attachment 4 to the license states that, "EOI may make no change to the approved fire protection program which would significantly decrease the level of fire protection in the plant without prior approval of the Commission." Otherwise, the licensee must make application for amendment. The resident staff asked the licensee how they obtained authorization for this change from NRC, if at all. The licensee originally indicated that this had been reviewed by NRC previously during the fire inspection in 1997. The licensee then indicated that they had not requested authorization since they did not consider that the change significantly decreased the level of fire protection. They indicated that the change was submitted through periodic submittals of 50.59 evaluations and FSAR updates. [REDACTED]

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- One problem in the FSAR identified to the licensee by the NRC had the statement in the chapter for SSW "design basis", "Fire cannot render both redundant mechanical systems inoperable." The licensee wrote a CR and a "License Change Request" to delete the statement.
 - It should be noted that GL 81-12 and its associated clarification letter also discuss approvals by the NRC for meeting III.G, specifically, III.G.2 and III.G.3. The licensee draws the conclusion that these sections are not applicable based on their initial assumption, yet they do reference the GL in their calculation. 

Generic Letter 86-10, "Implementation of Fire Protection Requirements":

- The resident staff review of this guidance does not find any discussion to support the licensee position. In fact, some examples seem to support applicability of this situation to III.G.3 (see 86-10, paragraph 3.8.3) while others seem to indicate this is only applicable to a MCR fire (see 86-10 paragraph 5.3.11). A more expert review may find guidance applicable to this situation (i.e., non safety related system used to meet a safe shutdown function assuming no LOOP).

Regulatory Guide 1.189, "Fire Protection for Operating Nuclear Power Plants":

- The resident staff review of this guidance identified some discussion relative to "alternative" and "non-alternative" shutdown areas. Discussion on page 12 states that, "The fire event for considering the need for alternative or dedicated shutdown is a postulated fire in a specific fire area containing redundant safe shutdown cables/equipment where it has been determined that fire protection means specified in Regulatory Position 5.5 cannot be provided to ensure safe shutdown capability will be preserved." 
- (Regulatory Position 5.5 of Reg Guide 1.189 states the same requirements as section III.G.2 of Appendix R). However, the licensee would contend that due to their assumption of the NSW system being the "redundant" system to the SSW system, then the above discussion would not apply since these systems are not located in the same fire area. That is, NSW is considered by the licensee to be redundant to SSW and not an "alternative" system.
- There is also discussion under "Loss of Offsite Power/Station Blackout" on page 12 which may apply. This section states, in part, "however, loss of offsite power need not be considered for a fire in non-alternative or dedicated shutdown areas if it can be shown that offsite power cannot be lost due to a fire in that area." 

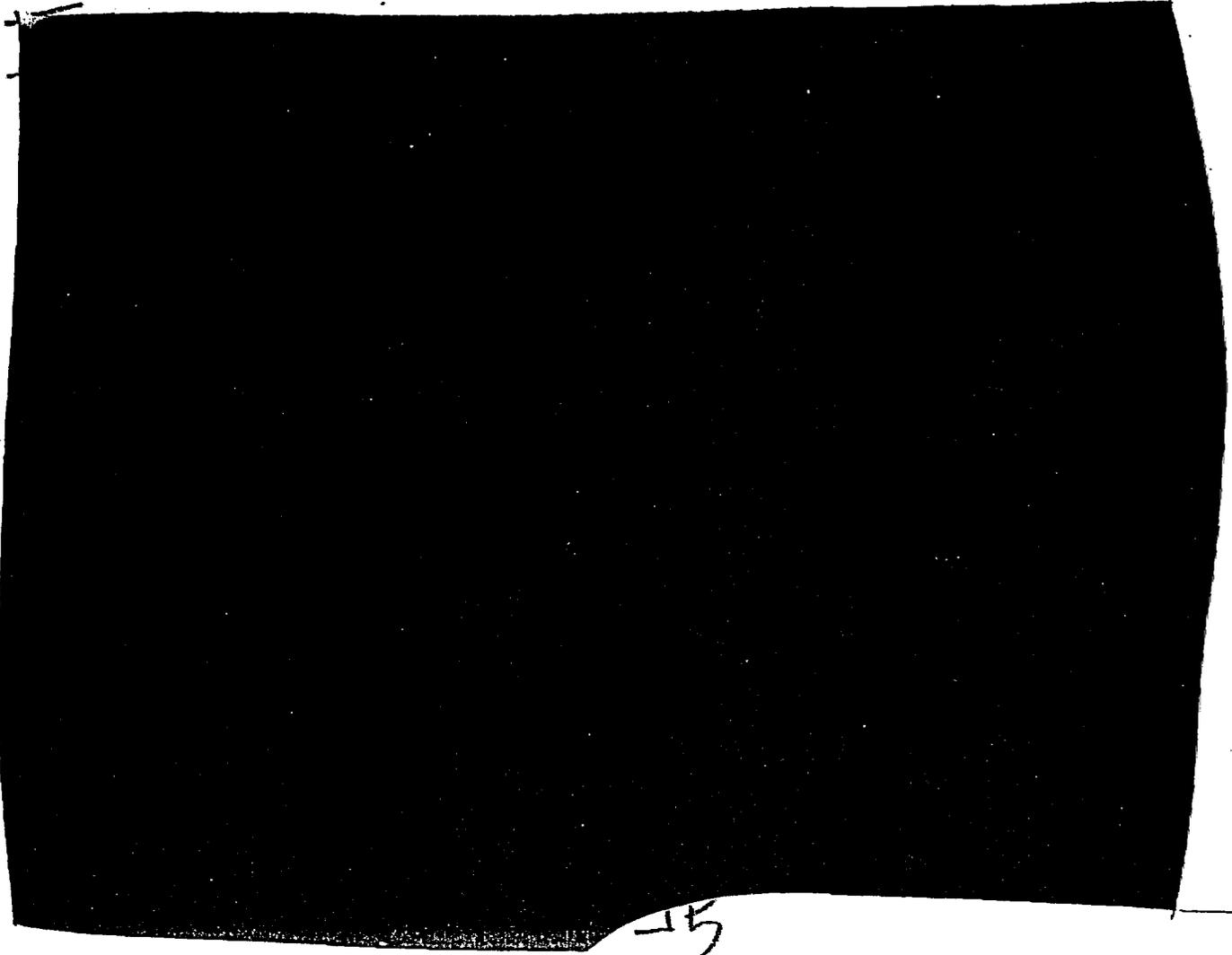
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There is a letter from David Wigginton regarding the Thermo-Lag approach at River Bend dated May 21, 1997. This indicated the approach by River Bend (consideration of change to safe shutdown approach) but does not discuss specific approval of the approach used in the calculation. It is also understood by the resident staff that such an approval would not be granted via an inspection report.

The resident staff have copies of all of the correspondence discussed above.

The resident staff request an evaluation of the following:



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