UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

December 29, 2003

EA-03-077

Paul D. Hinnenkamp
Vice President - Operations
River Bend Station
Entergy Operations, Inc.
P.O. Box 220
St. Francisville, LA 70775

SUBJECT: RIVER BEND STATION - FINAL SIGNIFICANCE DETERMINATION FOR A WHITE FINDING AND NOTICE OF VIOLATION (NRC INSPECTION REPORT 05000458/2002007)

Dear Mr. Hinnenkamp:

The purpose of this letter is to provide you the final results of our significance determination of the preliminary White finding identified in the subject inspection report. The inspection finding was assessed using the Significance Determination Process and was preliminarily characterized as White, a finding with low to moderate increased importance to safety that may require additional NRC inspections. This White finding involved a failure to properly lock open River Bend Station Condensate Prefilter Vessel Bypass Flow Control Valve CNM-FCV200 in May 2002. This performance deficiency resulted in a loss of feedwater flow to the reactor on September 18, 2002, when Valve CNM-FCV200 unexpectedly closed following a reactor scram.

At your request, a Regulatory Conference was held on June 23, 2003, to further discuss your evaluation of this issue. During the meeting, your staff acknowledged the performance deficiency and described your assessment of the risk significance of the finding. In a supplemental letter dated July 9, 2003, you provided additional information regarding your risk evaluation of this event. In your July 9, 2003, letter, you agreed that the failure to control the position and properly lock Valve CNM-FCV200 was a performance deficiency and a violation of your Technical Specifications; however, you took exception to certain aspects of NRC's evaluation of risk associated with this event. After considering all of the information available, as explained further in the attached enclosures, the NRC has concluded that the finding is appropriately characterized as White.

In the supplemental information provided on July 9, 2003, you restated your assertion, presented during the Regulatory Conference, that the risk associated with this event would be very low, making this a finding characterized at a Green level. This assertion was based on your belief that it is inappropriate for NRC to use the Individual Plant Examination of External Events (IPEEE), in concert with "best effort" estimations, for the purpose of determining risk for inspection findings in today's regulatory environment without more detailed analyses to improve precision.

Specifically, you asserted that the overall risk associated with this event, including the change in core damage frequency from fire, was very low because: (1) the safety systems in the plant were functional, including the control rod drive system, which would have provided a high pressure injection source after the first 6 hours; (2) Valve CNM-FCV200 would have failed only during a plant scram and not during a controlled manual shutdown, as evidenced by the July 2002 plant shutdown; and (3) the fire risk from a fire area is nonexistent for evaluation of this event, if there is no plant scram caused by a fire in that area. While we took into account the first two considerations in our independent assessment of the risk of this event, we disagree with your assertion that fire risk from a fire area is nonexistent for the evaluation of this event. The basis for our position is discussed in greater detail below and in Enclosure 2 to this letter.

In your supplemental response, you indicated that the NRC's use of your IPEEE results, together with "best effort" estimations, was not appropriate for the purpose of evaluating the risk of inspection findings. However, NRC Manual Chapter 0609, "Significance Determination Process," Appendix A, Attachment 1, step 2.5, "Screening for the Potential Risk Contribution Due to External Initiating Events," states that the impact of external initiators should be evaluated and could increase the risk significance of a finding by as much as one order of magnitude. Step 2.5 also states that the evaluation may be qualitative or quantitative in nature. Qualitative evaluations of external events should, as a minimum, provide the logic and basis for conclusion and should reference all the documents reviewed. The NRC has qualitatively assessed the significance of the external events contribution to the risk of this finding. Additionally, quantitative methods used by the staff indicate that external factors would increase the risk significance of the subject finding by at least a factor of two over risk caused by internal initiators alone. More detail regarding our evaluation is contained in Enclosure 2 to this letter.

Your supplemental response indicated that it is inappropriate to import the results of the IPEEE screening method into the Significance Determination Process without fully appreciating the context in which they were developed. We agree that IPEEE data should be used carefully and that importing results directly from the IPEEE for those items that were screened in the process would result in significant overestimation of the risk. However, the results of the IPEEE were not directly imported for use in our preliminary evaluation. We reviewed your IPEEE to identify those fire areas in which feedwater was important to risk. In evaluating the change in risk from fire initiators in those 18 areas, our preliminary evaluation utilized your model of record to obtain quantitative results as opposed to directly importing the results from the IPEEE evaluation. Additionally, while industry and NRC tools for evaluating the risk associated with external initiators are not fully developed, the Significance Determination Process requires that we evaluate the total risk associated with a finding using the best available information.

For the risk determination under consideration, you contend that the external event contribution from various potential risk initiators, as well as numerous specific areas within the plant, screened out as being insignificant based on the IPEEE screening criteria. As a result, you believe these potential risk initiators and areas should not be used to adjust the risk of a specific internal event, such as the one in question. We have determined that the contribution to risk of selected external events, such as high winds, tornados, and hurricanes; transportation hazards; severe weather storms; and lightning, should not be excluded from consideration simply because they screened out during the initial development of your IPEEE.

In your assessment of the risk of the subject event, your staff chose to refine the assumptions used in the IPEEE for the fire areas that we specifically evaluated in our preliminary assessment. Your stated purpose was to demonstrate that the original screening criteria were correct and that these events should be screened as not significant to the risk analysis for this event. While we agree that increasing the precision of the analyses is appropriate, we have concluded, as described in our preliminary risk assessment, that the affected areas still contribute to increasing the overall risk of the event as described in our preliminary risk assessment. Additionally, your analysis of the impact of fires within the plant did not fully analyze the potential for fires to cause indirect reactor scrams. Your analysis used assumptions for fire severity factors, fire sizing, ignition frequencies, and fire modeling that were not fully supported by the information provided. Also, the increased risk to the plant from increased probability of human error as a result of the fires was not evaluated. Of the fire areas at the River Bend Station, only 32 were actually analyzed. The remaining areas were either quantified using generic industry data, assuming similarities to the 32 analyzed or, in one instance, was not assessed. Therefore, we conclude that you have provided an insufficient basis for determining that the increase in risk associated with fires was insignificant. A more detailed description of our evaluation of your risk assessment is included in Enclosure 2 to this letter.

After considering the information developed during the inspection, the information presented at the regulatory conference on June 23, 2003, and the additional information you provided in your letter dated July 9, 2003, the NRC has concluded that the risk significance of the subject inspection finding should be based on our preliminary risk assessment further supported by our assessment described in Enclosure 2. The assessment in Enclosure 2 is intended to address each of the points presented by Entergy Operations, Inc. during the regulatory conference and provide our position that those points did not provide a basis for concluding that the issue should be characterized as Green. Accordingly, NRC has concluded that the finding is appropriately characterized as White, an issue with low to moderate increased importance to risk, which may require additional NRC inspections or other NRC actions.

You have 30 calendar days from the date of this letter to appeal the staff's determination of significance for the identified White finding. Such appeals will be considered to have merit only if they meet the criteria given in NRC Inspection Manual Chapter 0609, Attachment 2.

The NRC has also determined that the failure to lock open Valve CNM-FCV200 properly is a violation of Technical Specification 5.4.1.a, as cited in the enclosed Notice of Violation (Notice). The circumstances surrounding the violation are described in detail in the subject inspection report. In accordance with the NRC Enforcement Policy, NUREG-1600, the Notice of Violation is considered escalated enforcement action because it is associated with a White finding.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response.

Because plant performance for this issue has been determined to be in the regulatory response band, we will use the NRC Action Matrix to determine the most appropriate NRC response for this event. We will notify you, by separate correspondence, of that determination.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction. The NRC also includes significant enforcement actions on its Web site at www.nrc.gov; select What We Do, Enforcement, then Significant Enforcement Actions.

Sincerely,

/RA/

Bruce S. Mallett
Regional Administrator

Docket: 50-458
License: NPF-47

Enclosure:
1. Notice of Violation
2. NRC Evaluation of Inadequately Secured Condensate Valve

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RIV:C:DRP/B	SRA:DRS	C:PSA/NRR	D:DRS	D:ACES
DNGraves;dlf	DPLoveless	MTschiltz	DDChamberlain	GFSanborn
RAKopriva for	***/RA/***	***E - DNGraves***	***/RA/***	***/RA/***
9/24/03	9/25/03	10/14/03	12/1/03	10/30/03

RC	OE	D:DRP	DRA	RA
KDSmith	FJCongel	ATHowell	TPGwynn	BSMallett
E - DNGraves	***E - JLDixon-Herrity***	***/RA/***	***/RA/***	***/RA/***
11/21/03	12/17/03	12/1/03	12/24/03	12/29/03

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ENCLOSURE 1

NOTICE OF VIOLATION

Entergy Operations, Inc.
River Bend Station
EA-03-077

Docket: 50-458
License: NPF-47

During an NRC inspection concluded on November 14, 2002, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violation is listed below:

> Technical Specification 5.4.1.a requires that written procedures be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978.
>
> Regulatory Guide 1.33, Revision 2, Appendix A4, "Procedures for Startup, Operation, and Shutdown of Safety-Related BWR Systems," Item n., lists "Condensate System (hotwell to feedwater pumps, including demineralizers and resin regeneration)."
>
> System Operating Procedure SOP-0007, "Condensate System," Revision 21, required Condensate Prefilter Vessel Bypass Flow Control Valve CNM-FCV200 to be locked open.
>
> Contrary to the above, on September 18, 2002, Valve CNM-FCV200 failed closed as a result of not having been properly locked open, as required by System Operating Procedure SOP-0007, "Condensate System." As a result, the feedwater flow transient resulting from a reactor scram on September 18, 2002, caused Valve CNM-FCV200 to close unexpectedly, causing a complete loss of feedwater flow to the reactor pressure vessel.
>
> This violation is associated with a White Significance Determination Process finding.

Pursuant to the provisions of 10 CFR 2.201, Entergy Operations Inc. is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555 with a copy to the Regional Administrator, Region IV, and a copy to the NRC Resident Inspector at the facility that is the subject of this Notice, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation; EA-03-077" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.790(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

Dated this 29th day of December 2003

ENCLOSURE 2

River Bend Station
Evaluation of Inadequately Locked Condensate Valve

Conclusions:

On the basis of the reconsideration of the NRC's preliminary risk evaluation and the additional information regarding the risk evaluation that was submitted by the licensee following the regulatory conference, the NRC staff concluded that the licensee's risk assessment was incomplete and contained nonbounding assumptions. Specifically, the licensee's risk assessment: (1) excluded external events other than fires, (2) used nonbounding assumptions to evaluate 32 fire areas, and (3) assumed that the quantitative risk of the remaining fire areas was similar to the risk determined for the first 32 areas without a clear basis. In the NRC's view, appropriate consideration of the risks associated with external events and internal fires would result in an increase in the estimated risk.

Accordingly, the NRC concluded that the final risk significance of the subject finding should be made on the basis of the NRC's preliminary risk evaluation, which included the qualitative assessment of external events, including internal fires. The following assessment, supported by quantitative methods, indicated that the risk associated with external initiators is at least the same as that of the internal events analysis previously documented in the preliminary risk evaluation. Therefore, the analyst's best estimate of external events was adjusted to 7.7×10^{-7}, which is equal to the internal event risk documented in the preliminary evaluation. This resulted in a final lower-bound best estimate for total risk associated with the finding of 1.5×10^{-6}, indicating that the finding is of low to moderate risk significance (WHITE). The basis for this conclusion, including quantitative methods utilized in supporting this qualitative assessment is documented in the following discussion.

Basis for Conclusion:

NRC Inspection Manual Chapter 0609, "Significance Determination Process," Appendix A, Attachment 1, step 2.5, "Screening for the Potential Risk Contribution Due to External Initiating Events," states that the impact of external initiators should be evaluated and that accounting for these initiators could result in increasing the risk significance attributed to an inspection finding by as much as one order of magnitude. Furthermore, step 2.5 states "This evaluation may be qualitative or quantitative in nature. Qualitative evaluations of external events should, as a minimum, provide the logic and basis for the conclusion and should reference all of the documents reviewed." The NRC has qualitatively assessed the significance of the external events contribution to the risk of this finding. Additionally, quantitative methods used by the staff indicate that the risk associated with external initiators would be at least equal to that of the risk associated with internal initiators.

The information that the licensee provided did not change the NRC's view regarding risk significance of the finding, nor did it change the basis for the risk significance determination. The external events evaluation discussed at the regulatory conference and documented by the licensee's assessment of internal events changed from 7.7×10^{-7} to 5.3×10^{-7}. However, this did not affect the final outcome of this evaluation. Some of the information provided by the licensee would affect the limited quantitative external events evaluation developed by the NRC staff in support of the preliminary significance determination. However, the qualitative evaluation by the NRC staff indicates that the external initiators portion of the total risk associated with the finding is at least equal to the estimate of internal risk provided in the preliminary assessment. Using the licensee's revised internal event estimation (5.3×10^{-7}) and increasing the internal risk by a factor of two, the total risk estimate of 1.1×10^{-6} still indicates that the finding is of low to moderate risk significance.

Weaknesses in the licensee's evaluation can be separated into the following three categories:

(1) <u>Exclusion of Certain External Initiators</u>

The licensee used design basis or IPEEE thresholds as their bases for determining that the risk associated with external events, other than internal fire, were negligible. External events are typically evaluated separately from internal events because of their ability to affect widespread areas of the plant and/or randomly affect isolated areas. The licensee's response did not take this into account for the following specific external events that were qualitatively considered by the analyst:

a. Under the heading "High Winds, Tornados, Hurricanes," the licensee stated that Seismic Category 1 structures are designed to withstand high winds. Additionally, the licensee stated that the feedwater and condensate systems are not designed to operate during a design basis tornado. Therefore, they assumed that, during any severe wind event, the systems would fail.

   The analyst agrees that, given the design of the plant, the probability of failure of safety-related mitigating systems without a loss of feedwater is small. However, the precision of this assessment is on the order of parts per 10 million. Therefore, determining that the potential hazard is small is insufficient to rule out high winds as a contributor to the external risk of this finding.

   On page 20 of their response, the licensee states that SECY-00-0162 "allows one to exclude from a PRA analysis things that screen out." However, the SECY, in page A1-13, states that an external event may be screened out if "it can be shown using an analysis that the mean value of the design-basis hazard used in the plant design is less than 10^{-5}/year, and that the conditional core-damage probability is less than 10^{-1}, given the occurrence of the design-basis hazard." The licensee did not show that the high wind hazard at River Bend Station is less than 10^{-5}/year, even though River Bend Station is located in an area in which high wind conditions are prevalent.

b. Under the heading of "Transportation Hazards," the licensee stated that the IPEEE demonstrated that the transportation of hazardous material has decreased or remained mostly constant. They, therefore, concluded that the risk of these events is expected to be negligible.

   While this type of screening analysis was sufficient to look for design vulnerabilities of the plant, the scope is insufficient to determine the total impact of these events on the subject finding.

c. Under the heading "Severe Weather Storms," the licensee stated "As stated in the IPEEE, severe weather storms generally result in either a partial or complete loss of offsite power event and are fully analyzed in the internal events PSA."

These events are analyzed in the internal events PSA only if the storm causes a loss of offsite power and no other damage. The qualitative judgment that these storms "generally" cause a loss of offsite power does not indicate that the likelihood of storms causing a plant scram, without a loss of offsite power and a loss of safety-related equipment, is less than 10^{-5}/year.

d. Under the heading of "Lightning," the licensee stated "since RBS [River Bend Station] does not have a history of frequent lightning strikes causing plant scrams, lightning is eliminated from further analysis."

River Bend Station has been operating for approximately 18 years. Therefore, even if River Bend Station had never had a scram caused by a lightning strike, one would not be able to draw the conclusion that the likelihood of a scram and additional equipment damage would be less than 10^{-5}/year.

e. Under the heading of "Spurious of Inadvertent Fire Suppression Activation," the licensee concluded "the inadvertent actuation of suppression systems alone, will not render safe shutdown of the plant inoperable."

This design basis argument does not indicate that the failures would not result in increased core damage frequency. Should internal flooding cause a reactor scram in addition to failure of risk significant equipment, it would increase the risk associated with the finding.

Any of these external events would need to be fully analyzed to obtain a plant-specific result. The precision of the IPEEE screening was insufficient to determine if the feedwater system is important to these external events. Qualitatively, the analyst concluded that these external events represented risk contributors that would increase the overall risk significance of the finding if fully analyzed.

(2) Nonbounding Assumptions Used to Evaluate 32 Fire Areas

The licensee grouped the 22 fire areas that were screened by crediting feedwater in the IPEEE and the seven unscreened areas, as well as three other areas that had specific fire area ignition frequencies for further analysis. Of these areas, the licensee determined that 8 areas had cables that could result in a direct scram. These 8 areas were then reanalyzed using the licensee's revised internal events model. The resulting assessment indicated that the finding represented a change in core damage frequency of 8×10^{-9} over the 126-day period for those 8 areas. The licensee assumed that, if a direct scram did not result, the change in risk caused by a fire in the area was negligible. The NRC staff identified the following concerns and weaknesses during the review of the licensee's response.

a. Fire Induced Scrams

On page 7 of Attachment 12 in their response, the licensee stated "no cables that would directly cause a scram were found." The licensee stated that they did not conduct a review to determine if an indirect scram could occur.

Indirect scrams do occur and are expected to be caused by certain fires. Fires affecting control room instrumentation and/or those that are large enough to concern licensed operators may result in a manual reactor scram.

The potential for indirect scrams caused by fire was not evaluated by the licensee. The analyst assumes that indirect scrams that affect the significance of this finding would occur in certain fire scenarios and that these scrams would cause an increase in the conditional core damage probability for the postulated fire. On the basis of discussions with fire protection engineers, the analysts assumed that potentially 10 percent of the fire areas could cause an indirect scram.

b. Severity Factor

In Attachment 8 of their response, the licensee calculated severity factors of between .01 and .24. Additionally, the severity factors for the fire areas that were ultimately quantified ranged from 0.014 to 0.02. These values are lower than typically used. The staff determined that factors between 0.1 and 0.3 were typical for the type of fire areas described.

If a low-range expected industry severity factor of 0.15 was used for these, instead of the licensee's values, then it would change the significance of feedwater to the first 32 fire areas from 8×10^{-9} to 7.6×10^{-8} for the 126-day period.

c. Fire Size

In Attachment 1, page 14, of their response, the licensee indicates that the River Bend Station electrical cabinet fire heat release rates were assumed to be 90 btu/second for 30 minutes. This value appears to be appropriate for low voltage (~120V) electrical cabinets but, for 480V and greater, the current SDP uses heat release rates of approximately 190 btu/s. Also, a shorter more intense fire may be more destructive than the 30-minute fire considered by the licensee. Additionally, no energetic faults were considered. However, the NRC staff determined that they should have been included.

To fully evaluate the effect on risk of these assumptions would require significant resources to reanalyze the fire areas and then quantify the risk. However, qualitatively, the risk would increase as a result of the higher heat release rates.

d. Fire Ignition Frequency

In Attachment 13 of their response, the licensee lists the fire ignition frequencies between ~1.6E-2 to ~3E-6. The smallest Mean Fire Frequency identified by RES/OERAB/S02-01 (the NRC's Office of Nuclear Regulatory Research fire frequency calculation), is for the cable spreading room and has a value of 8.4E-4 for power operation. The low end frequencies assumed by the licensee appear to be very low.

An increase in fire ignition frequency in any area would result in a direct increase in the change in core damage frequency analyzed by the licensee for this finding.

e. Fire Modeling

In Attachment 1, page 15, of their response, the licensee used the COMPBRN IIIe model with openings closed. This configuration creates an oxygen limited fire scenario which may not be worst-case as the licensee assumes. They concluded that there is no propagation within a compartment. This conclusion is affected by not assuming the compartment is closed. The licensee assumes that doors and dampers would be closed, but there would be a period before the doors and dampers close where the fire would not be oxygen limited, resulting in greater fire growth.

To evaluate fully the effect on risk of these assumptions would require significant resources to reanalyze the fire areas and then quantify the risk. However, the analyst determined that the risk would increase as a result of the increase in oxygen available to the fire.

f. Human Error Probabilities

Attachment 1, page 16, of their response, indicates that "no adjustment of error rates to account for fire environments" were made. No description of actions required in or near fire environments were provided.

Large fires usually take significant crew resources for fighting the fire. Therefore, human reliability and system recovery modeling in the internal events model would normally need adjustment to account for the additional loads on the remaining operators. Additionally, recovery of equipment in or near the fire areas is hampered.

Using the SPAR HRA method, a significant decrease in control room and plant operator resources would result in an increase by an order of magnitude in the failure rates for recovery. Given that fire scenarios usually require a significant operator response in the plant, adjusting the human factors basic events would result in a significant increase in the analyzed risk.

The analyst determined through expert judgment that the differences between the licensee's assumptions and the industry norm are enough to justify the difference between the NRC's and licensee's risk characterizations.

(3) Inferred Quantitative Assessment of Remaining Fire Areas:

Out of the 164 fire areas at River Bend Station, only 32 were actually analyzed. Of the remaining fire areas: 1 area was not assessed, but grouped with others; 53 areas were quantified by assuming similarities to the first 32; and 78 areas were quantified using generic industry data related to fire induced scrams. The following groups of fire areas were assessed:

a. Group 1, Fire Areas 1-32

The licensee grouped the 22 fire areas that were screened by crediting feedwater in the IPEEE and the 7 unscreened areas, as well as 3 other areas for further analysis. The evaluation of the licensee's analysis is discussed in Section 2 above.

The licensee then used the change in core damage frequency for these 32 areas and adjusted the number to estimate the change in core damage frequency for those areas. The nonbounding assumptions used by the licensee in evaluating Group 1 areas are discussed in detail in Section 2 of this enclosure.

b. Group 2, Fire Areas 33-62

In Areas 33-62, the licensee stated that they adjusted the core damage frequency from the first 32 areas by taking credit for manual suppression of the fire. Therefore, they reduced the core damage frequency for Group 1 areas by a factor of 10 to estimate the frequency for Group 2 areas. First, the licensee did not indicate why the fire risk in other fire area groups would be similar in risk to Areas 1-32. However, this was the licensee's assumption. In addition, fire severity factors are typically developed from fire data bases by identifying fire ignition rates and determining if the fire becomes large. This method of quantifying the severity factor inherently includes both the probability that a fire is self-extinguishing and the probability that manual suppression was effective. If a fire was extinguished early either by manual suppression or by the characteristics of the component or fire, then it would not have grown to a large fire and would have been used to reduce the severity factor. Therefore, the analyst determined that it was inappropriate to give additional credit for manual suppression as the licensee did for these fire areas.

c. Groups 3 and 4, Fire Areas 63-86

In Areas 63-86, the licensee stated that they took credit for manual suppression as well as for the failure of the fire to spread from one cabinet to another. Again, the licensee assumed that a fire in these areas would be similar in risk to Areas 1-32. The analyst, as before, determined that the additional credit for manual suppression was inappropriate.

d. Group 5, Fire Areas 87-164

In Fire Areas 87-164, the licensee quantified the risk using generic fire induced scram data. The licensee assumed that a fire in these areas would cause either a scram or damage to safe shutdown equipment, but not both. Therefore, they qualitatively assumed that a fire in these areas would cause a scram and used the conditional core damage probability for scrams with loss of feedwater to quantify these areas. This was an appropriate approach to quantifying these areas.

Only 32 of 164 fire areas were actually analyzed. The assumption that Groups 2 through 4 fire areas can be represented as similar in scram frequency, ignition frequency, and severity, appears unfounded. Additionally, the application of a manual suppression factor is inconsistent with the method used for developing the fire severity factors and with the assumption that all groups are similar to Group 1. Therefore, the analyst concluded that the licensee's assessment was incomplete and that the risk quantified by the licensee should be a factor of 10 higher for Groups 2 through 4 because of the inappropriate use of a manual suppression factor.

Summary

The analyst identified three areas of concern: the licensee excluded all external initiators with the exception of internal fires; the licensee only analyzed Group 1, representing 32 of the 164 fire areas at River Bend Station; and the licensee made the unsupported conclusion that Groups 2-4 fire areas were similar in risk to Group 1. Of these 32 areas, only seven were determined to have scram potential by direct means. There were several weaknesses in the licensee's assumptions related to the quantification of those seven. These weaknesses indicated a potential error of several orders of magnitude in the licensee's quantification. The remaining fire areas were evaluated by making the basic assumption that Groups 2-5 were similar in risk to Group 1. The licensee then inferred a risk quantification starting with the assessment of the first seven fire areas. That assumption aside, the licensee's quantification of Groups 2-4 applied quantitative factors that reduced the risk associated with those groups. One of these assumptions, that manual suppression in those fire areas was independent of the fire severity factors, was determined to be erroneous. Therefore, the analyst concluded, based on qualitative assessment of the licensee's factors, that the subject finding remained of low to moderate risk significance as determined in the preliminary risk assessment of the finding.