Florida Power & Light Company, 6501 South Ocean Drive, Jensen Beach, FL 34957

December 4, 2000

L-2000-250
10 CFR 50.90

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Re: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Proposed License Amendments
EDG Risk Informed AOT Extension
Response to Second Request for Additional Information

By letter L-99-228 dated November 17, 1999, Florida Power & Light Company (FPL) requested amendments to the Facility Operating Licenses for St. Lucie Units 1 and 2. The proposed license amendments (PLA) would increase the emergency diesel generator (EDG) allowed outage time (AOT) from the current 72-hour action statement to an action statement of 14 days for a single inoperable EDG. By letter L-2000-112 dated June 14, 2000, FPL provided a response to the NRC request for additional information dated March 1, 2000.

During a conference call on July 6, 2000, among FPL, NRC Project Management, NRC Electrical Engineering Branch, and NRC PSA Branch personnel, the PSA staff added information request 9 to the previous information request. This additional information request related to the fire risk assessments for the Unit 1 cable spreading room and control room.

FPL met with the NRC Project Management and NRC PSA Branch personnel at the NRC White Flint Offices on October 24, 2000 to discuss the fire risk assessments for Unit 1. The PSA Branch added an additional information request 10 to the previous information requests. In addition, FPL was requested to commit to additional Tier 2 restrictions prior to and during the extended AOT EDG maintenance.

A001

FPL commits to incorporate the following Unit 1 fire protection Tier 2 restrictions into the administrative procedures for implementing the configuration risk management program (CRMP) and the on-line risk monitor (OLRM).

> *During Modes 1, 2, and 3, if a Unit 1 EDG is to be removed from service for maintenance for a period scheduled to exceed 72 hours the following actions will be completed:*
> - *conduct a plant fire protection walkdown of the areas that could impact EDG availability, offsite power availability, or the ability to use the station blackout crosstie prior to entering the extended AOT;*
> - *perform a thermographic examination of high risk potential ignition sources in the cable spreading room and the control room prior to entering the extended AOT;*
> - *restrict planned hot work in the cable spreading room and control room during the extended AOT; and*
> - *establish a continuous fire watch in the cable spreading room when in the extended AOT.*

The responses to NRC supplemental RAI requests 9 and 10 are attached. The results of the Unit 2 cable spreading room and control room fire risk analysis will be provided under separate cover.

In accordance with 10 CFR 50.91 (b)(1), a copy of this regulatory response is being forwarded to the State Designee for the State of Florida.

Please contact us if there are any questions about this submittal.

Very truly yours,

Rajiv S. Kundalkar
Vice President
St. Lucie Plant

RSK/GRM

Attachment

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant
Mr. William A. Passetti, Florida Department of Health and Rehabilitative Services

STATE OF FLORIDA)
) ss.
COUNTY OF ST. LUCIE)

Rajiv S. Kundalkar being first duly sworn, deposes and says:

That he is Vice President, St. Lucie Plant, for the Nuclear Division of Florida Power & Light Company, the Licensee herein;

That he has executed the foregoing document; that the statements made in this document are true and correct to the best of his knowledge, information and belief, and that he is authorized to execute the document on behalf of said Licensee.

Rajiv S. Kundalkar

STATE OF FLORIDA

COUNTY OF ST. LUCIE

Sworn to and subscribed before me
this 4th day of December, 2000
by Rajiv S. Kundalkar, who is personally known to me.

Name of Notary Public - State of Florida

Leslie J. Whitwell
MY COMMISSION # CC646183 EXPIRES
May 12, 2001
BONDED THRU TROY FAIN INSURANCE, INC.

(Print, type or stamp Commissioned Name of Notary Public)

Request for Additional Information
Related to the Amendment of the Technical Specifications
for the Emergency Diesel Generators
St. Lucie Units 1 and 2

NRC Request 9:

Your submittal indicated that it was "judged" any potential risk impact of the proposed change due to internal fires would be "very small." Later, there was a small discussion on your off-normal operating procedures in response to fire; however, no further specific discussions were provided to justify the conclusion that the risk impact of the change would be small. Meanwhile, your IPEEE submittal estimated that the core damage frequency (CDF) due to fire was 1.9E-4/yr, which was significantly higher than the CDF due to internal initiating events. There were three rooms that were screened in for detailed evaluations, which include control rooms, cable spreading rooms, and 'B' switchgear room. Please justify your conclusion by describing your technical basis for the judgment that the risk impact due to fire would be very small in terms of risk measures, i.e., change in CDF and incremental condition core damage probability (ICCDP) for a single 14-day outage, used in Regulatory Guides (RG) 1.174 and RG 1.177.

FPL Response 9:

The St. Lucie probabilistic safety assessment (PSA) models used to calculate the estimated internal events risk impact of the proposed allowed outage time (AOT) extension do not include an assessment of the potential risk due to internal fires. The following provides a scoping estimate of the impact on the fire risk due to the proposed AOT change. Note that the fire risk is only estimated for the preventative maintenance (PM) case since PM would provide the greatest exposure to unavailability that might extend beyond the present 72-hour AOT. Figure 1 is a diagram of the St. Lucie Plant electrical distribution system showing the station blackout crosstie arrangement.

The Fire Induced Vulnerability Evaluation (FIVE) method (Revision 1, September 29, 1993) was selected by FPL to analyze the fire risk for the St. Lucie Units 1 and 2 IPEEE. Six fire compartments were not screened through application of the FIVE methodology. The compartments that were not screened based on the combined factors of fire frequency, alternate train unavailability, automatic or manual suppression and fire damage modeling include the following:

Unit 1 Compartment F - Unit 1 Control Room
Unit 2 Compartment F - Unit 2 Control Room
Unit 1 Compartment B - Unit 1 Cable Spreading Room
Unit 2 Compartment B - Unit 2 Cable Spreading Room
Unit 1 Compartment C - Unit 1 B Switchgear Room
Unit 2 Compartment C - Unit 2 B Switchgear Room

Offsite power is connected to the safety-related 4kV busses via switchgear located in the turbine building switchgear rooms. Since offsite power would be affected, the impact of a fire in one of these rooms with an emergency diesel generator (EDG) out-of-service (OOS) has also been evaluated, even though these rooms screened out in the FIVE analysis.

Unit 1 Cable Spreading Room and Main Control Room

The following summarizes the engineering information collected and assessments performed to determine the risk increment due to postulated fire events in either the Unit 1 cable spreading or main control room. This assessment found that the AOT extension would result in a CDF increase. A conservative estimate of the cumulative risk increase due to fire initiating events in the Unit 1 cable spreading room and main control room is less than 1E-07.

- Engineering Information to Support the Risk Assessment

The following information was collected to provide input to the risk assessment of the fires in the Unit 1 cable spreading room and control room.

1. Cabinet characterization in the cable spreading room and control room. For cable spreading room, the following features were identified and recorded in a videotape provided to the NRC in the meeting of October 24, 2000 at the NRC White Flint offices: cabinet with ventilation or not, open top or not, sealed top penetration or not, conduit penetration or not; main function of the equipment associated with the cabinet (system associated with it)

2. The routing of the cables associated with the essential control of offsite power, EDG A, EDG B, and blackout crosstie (See Table 13)

3. The relative locations of the trays and cabinets

RELATIVE LOCATIONS OF THE TRAYS AND CABINETS

Cabinet/Equipment ID	**Distance from cabinet top to tray bottom**	**Tray Style**
Transformer 1A3 (Pressurizer Heater Bus 1A3)	19 inches	Solid bottom with solid cover
Transformer 1B3 (Pressurizer Heater Bus 1B3)	31 inches 21 inches	Vented tray, no cover Solid bottom with solid cover
Load Test Panel 1A	30 inches	Vented tray, no cover
West CEDMs (Power Programer Cabinet)	13 inches	Vented tray, no cover
Inverter Room	14 inches 7 inches	Solid trays with covers and the roof of the inverter room is stainless steel deck
CEDS Cabinets A – D	13 inches	Vented tray, no cover Third tray up from cabinet top is solid bottom with solid cover.
Vital AC SUPS	32 inches	Solid tray with solid cover

RELATIVE LOCATIONS OF THE TRAYS AND CABINETS

Cabinet/Equipment ID	Distance from cabinet top to tray bottom	Tray Style
125VDC Bus 1AB-1	20 inches	Solid tray with solid cover
1AB Battery Charger	32 inches	Solid tray with solid cover
1AB DC Switchgear	20 inches	Solid tray with solid cover
480V Reactor Aux. Bldg. MCC 1AB	18 inches	Solid tray with solid cover
1A DC Switchgear	19 inches	Solid tray with solid cover
1A Battery Charger	32 inches	Solid tray with solid cover
1MC Instrument Inverter	32 inches	Solid tray with solid cover
1MA Instrument Inverter	32 inches	Solid tray with solid cover
1AA Battery Charger	32 inches	Solid tray with solid cover
Reactor Trip Switchgear	19 inches	Solid tray with solid cover (there was a visible gap in the tray bottom though)
East CEDMs (Power Prog. Cabinet)	20 inches	Vented tray, no cover is above and adjacent to the west and solid tray with solid cover is above and adjacent to the east
1A Maintenance Bypass Bus	65 inches	Vented tray with solid cover
1MC Instrument Bus	36 inches	Solid tray with solid cover
Metering Cabinet (PC-83)	60 inches (est.)	Vented tray with no cover
Isolimiter 1A	53 inches	Solid tray with solid cover
Transformer PP-134	12 inches	Solid tray with solid cover
Transformer PP-103	7'- 0"	Solid tray with solid cover
Generator RTD Monitor	31 inches	Vented tray with no cover
B-189C	44 inches	Solid tray with solid cover
Isolation Panel 1AB	39 inches	Solid tray with solid cover
PP-137	39 inches	Solid tray with solid cover
PP-138	39 inches	Solid tray with solid cover
B-1025A	42 inches	Solid tray with solid cover
B-1054A	36 inches	Solid tray with solid cover
B-151D	36 inches	Solid tray with solid cover
Prz. Prop. Heaters P-1	36 inches	Solid tray with solid cover
V-1404	58 inches	Solid tray with solid cover
1MA Instrument Bus	36 inches	Solid tray with solid cover
PP-101	36 inches	Solid tray with solid cover
1 MC Instrument Bus	36 inches	Solid tray with solid cover
Instrument Maintenance Bypass Transfer Switch	36 inches	Solid tray with solid cover
BPS 146-A	20 inches	Solid tray with solid cover

- Risk Assessment Details

The proposed EDG AOT extension results in an increase in time that an EDG may be unavailable to support post fire safe shutdown needs. The issue to be addressed is whether an AOT extension from 3 to 14 days causes an unacceptable fire risk increment. This assessment is focused only on the Unit 1 cable spreading and main control rooms.

The approach to the assessment relies on the redundancy that is an integral part of the plant design basis. Each of the safety-related electrical distribution buses is provided with an offsite supply and a dedicated onsite EDG. Each of these sources is available to support plant system needs following a postulated fire induced plant trip. Assuming a postulated fire event does not impact either of these three power sources, the conditional core damage probability would be dominated by random failures of the mechanical front line systems. Based on this insight, the assessment for the cable spreading room and main control room followed the general steps shown below.

1. Identify the circuits and equipment located in the two fire areas of interest associated with offsite power and the EDGs
2. Develop a 'target' footprint for the circuits and equipment noting train designations
3. Perform walkdowns of the fire areas to examine potential fire ignition sources and identify critical pinchpoints
4. Develop conservative CDF estimates to bound potential risk increases

Unit 1 Cable Spreading Room

The St. Lucie Unit 1 cable spreading room is configured such that it is better characterized as a combined auxiliary relay and cable spreading room. A review of the existing IPEEE analysis of this room concluded that the analysis was extremely conservative. Table 14 provides the cable spreading room ignition source contributions used for the IPEEE analysis. This characterization is based on the walkdown that found that the majority of the potential fire ignition sources are completely enclosed and did not present a fire propagation threat. The only fire sources of concern were the two pressurizer heater bus transformers and the regulating group power programmer cabinets.

1. Transformers – these are 4kV-460V dry type transformers. A postulated fire involving the transformer windings could generate significant heat. This is especially critical since the enclosure is not sealed. However, a transformer internal failure that would cause such a fire event is likely to also cause upstream electrical overcurrent protective devices to operate and 'terminate' the fire event. However, for conservatism, a fire requiring brigade response to suppress the fire was assumed.

2. Power Programmer Cabinets – these cabinets have a ventilation fan on the upper portion of the rear panel door. The lower portion of the rear panel door has ventilation louvers. Because of these ventilation openings, a credible fire propagation pathway is considered to exist.

   The walkdown also noted other cabinets existed with ventilation screens on their tops. However, a screening fire modeling assessment was performed and concluded that the available vertical target spacing precluded target damage. The screening assessments found the critical spacing to be between five and one-half feet and eight and three-quarter feet, depending on the estimated heat release rate. Heat rates of 65 Btu/s and 190 Btu/s were considered (see Table 15 through 18).

The heat rate that is applicable to any particular area is a function of the cabinet size and combustible loading. With the exception of the power programmer cabinets, the walkdown found that eight and three-quarter-foot spacing was satisfied for all other ventilated cabinets. Although trays may be located within the eight and three-quarter-foot spacing in some instances, the trays did not contain circuits of concern. In addition, the trays had a solid bottom with a continuous solid cover. While this lower tray was considered to be damaged, it did not represent a fire propagation mechanism. As such, the eight and three-quarter-foot required spacing was evaluated on the basis of the next higher tray.

- Transformer Fire

The evaluation of the pressurizer heater power transformers found a postulated severe fire event could result in damage to overhead cable trays.

A postulated fire involving the transformer for heater bus 1A3 could result in loss of train 'A' AC power from offsite sources and the EDG as well as other train 'A' plant system equipment. The train 'B' AC power from offsite sources and the associated EDG are not affected. In addition, circuits for other train 'B' plant system equipment are also unaffected. For this fire scenario, any incremental CDF increase would be due to the CCDP change based on the train 'B' EDG availability given the AOT extension. The ICCDP due to this fire scenario is conservatively estimated as follows. The assessment does not credit the automatic Halon system.

$$ICCDP = 7.90E-3 \; x \; \frac{1}{20} \; x \; 0.20 \; x \; \frac{14}{365} \; x \; 0.10 \; x \; 1.0E-2 \; = \; 3.03E-9$$

where:

7.90E-3 =	Plant-wide transformer fire frequency – FIVE
20 =	Assume a total of 20 transformers in the plant
0.20 =	Severity factor
14 =	Extended AOT
365 =	days per year
0.10 =	fire brigade fails to suppress fire before target damage occurs
1.0E-2 =	CCDP assuming train 'B' equipment only, offsite power available, but no EDG due to AOT

A postulated fire involving the transformer for heater bus 1B3 could result in loss of train 'B' AC power from the EDG as well as other train 'B' plant system equipment. The train 'A' AC power from offsite sources and the associated EDG are not affected. In addition, circuits for other train 'A' plant system equipment are also unaffected. For this fire scenario, any incremental CDF increase would be due to the CCDP change based on the train 'A' EDG availability. The CDF change due to this fire scenario is conservatively estimated in the same fashion as above and yields the same CDF increment.

The cumulative ICCDP due to the 14-day EDG AOT based on the postulated transformer fires is conservatively estimated to be 6.06E-9.

- Power Programmer Cabinets

The evaluation of the regulating group power programmer cabinets found a postulated severe fire event could result in damage to overhead cable trays. In addition, these cabinets are located directly beneath the main control board section containing the controls for both trains of AC power and both EDGs. This area constitutes a critical pinch point.

A postulated severe fire involving these cabinets which propagates to overhead cable trays would require operator action outside of the main control room to restore AC power. This action would involve recovery of the train 'B' power supply system in accordance with the Appendix R related station procedures. For this fire scenario, any incremental CDF increase would be due to the CCDP change based on the train 'B' EDG availability. The train 'A' EDG AOT has no impact since the fire is postulated to have damaged the circuits, and recovery from outside the area is not available. The ICCDP due to this fire scenario is conservatively estimated as follows. The assessment does not credit the automatic Halon system.

$$ICCDP = 3.20E-3 \; x \; \frac{10}{80} \; x \; 0.20 \; x \; \frac{14}{365} \; x \; 0.10 \; x \; 0.10 \; = \; 3.07E-8 .$$

Where:

3.20E-3 =	Electrical cabinet fires in cable spreading room – FIVE
10 =	Cabinets of interest assigned a weighting factor of 10
80 =	Cumulative weighting factor for total scope of cabinets in room
0.20 =	Severity factor
14 =	extended AOT
365 =	days per year
0.10 =	fire brigade fails to suppress fire before target damage occurs
0.10 =	CCDP assuming train 'B' equipment only, recovery of offsite power via operator action and no EDG

The 0.10 CCDP is based on credit for operator actions outside the main control room to restore offsite power. No other actions outside the main control room are credited in this scenario. In this scenario, the main control room remains manned. The CDF increment due to the 14-day EDG AOT based on the electrical cabinet fires is conservatively estimated to be 3.07E-8/yr.

- **Cumulative CDF Increment for Cable Spreading Room**

Based on the conservative assessment presented above, the ICCDP for the Unit 1 cable spreading room is:

$$6.06E\text{-}9 + 3.07E\text{-}8 = 3.68E\text{-}8.$$

Unit 1 Main Control Room

A review of the existing IPEEE analysis of the control room also concluded that the analysis was extremely conservative. Table 19 provides the control room ignition source contributions used for the IPEEE analysis. The revised assessment for the main control room is similar to that presented for the cable spreading room. Fire scenarios were defined for those fire events that affect offsite power and/or the EDGs. A walkdown of the main control board determined that internal barriers exist to separate it into subsections. These internal barriers extend the full height and depth of the control board and extend into the apron area. Given this configuration, a number of fire scenarios are applicable.

1. A non-severe fire in the control board sections containing AC power controls. This fire is assumed to cause localized damage to the extent defined by the internal barriers.
2. A severe fire occurs in any of the cabinets in the main control room. Failure to suppress this fire within a fixed time period is assumed to cause control room abandonment due to habitability and visibility concerns.

The main control room board containing controls associated with AC power was determined to have a linear length weighting factor of 2. The entire scope of control room boards and cabinets was determined to have a cumulative length weighting factor of 90.

The internal barriers in the electrical control section of the main control board effectively divided the section into three subsections. One subsection contained the controls for the train 'A' safety-related portion of the system. Another subsection contained the controls for the train 'B' safety-related portion of the system. Each of these subsections was assigned a weighting factor of 0.5. The third subsection contained the controls for the nonsafety-related buses and the 'common' bus which forms the connection to the opposite unit for offsite supply. This third subsection was assigned a weighting factor of 1.0.

- Non-Severe Fires

A postulated non-severe fire involving that portion of the main control board containing controls for the safety-related power system would result in complete loss of control room control for that portion. In the case of the train 'B' controls, existing Appendix R related design features provides provisions for recovery from outside the main control room.

If the fire involved the train 'B' section, post fire response would rely on the train 'A' power with the potential for operator recovery of the train 'B' power. The recovery of train 'B' power would involve operator actions outside the main control room in accordance with existing Appendix R related station procedures. If the fire involved the train 'A' section, post fire response would rely on the train 'B' power alone. Actions outside the main control room are not needed in this case. Therefore, the postulated fire involving the train 'A' section is expected to yield the greater CDF impact. This is because the fire would disable train 'A' with no available recovery. Train 'B' would rely solely on offsite power based on an assumed EDG AOT event. If the fire were assumed to be in the train 'B' section, the resultant scenario would be similar, but the CCDP would be lower since recovery of the train 'B' power from outside the main control room can be credited. The ICCDP due to this fire scenario is conservatively estimated as follows.

$$ICCDP = 9.50E-3 \; x \; \frac{1}{90} \; x \; 1.0 \; x \; \frac{14}{365} \; x \; 1.0E-2 \; = \; 4.05E-8 .$$

where:

9.50E-3 =	electrical cabinet fires in main control room – FIVE
1 =	sum of weighting factors for two subsections
90 =	cumulative weighting factor for total scope of cabinets in room
1.0 =	a severity factor of 0.80 would normally be applicable for that fraction of fires assumed to be non-severe. However, a value of 1.0 is used to account for that fraction of fires assumed to be severe, but is suppressed in time to prevent control room abandonment.
14 =	extended AOT
365 =	days per year
1.0E-2 =	CCDP assuming train B equipment only, offsite power available, but no EDG

A postulated non-severe fire involving that portion of the main control board containing the controls for the nonsafety-related buses and the 'AB' bus also needs to be considered. The 'AB' bus forms the connection to the opposite unit (blackout crosstie). In this case, the fire does not disable either safety-related train of AC power. Instead, it disables the power feed from the opposite unit. Each safety-related bus is reduced to having one offsite power supply since the fire disables the blackout crosstie. The CDF

change due to this fire scenario is conservatively estimated in the same fashion that is shown above except the CCDP is assumed to be 1.0E-3. This CCDP is based on the assumption that the only fire-induced impacts are a plant trip and loss of the blackout crosstie.

$$ICCDP = 9.50E-3 \; x \; \frac{1}{90} \; x \; 0.80 \; x \; \frac{14}{365} \; x \; 1.0E-3 \; = \; 3.24E-9.$$

The cumulative ICCDP due to the 14-day EDG AOT based on the postulated non-severe main control board fires is conservatively estimated to be:

$$4.05E-8 + 3.24E-9 \; = \; 4.37E-8.$$

- Severe Fires

A postulated severe fire involving any of the main control room control boards or cabinets presents a threat to habitability. A postulated severe control room fire that is not suppressed within a relatively short period of time will require abandonment of the main control room. This abandonment would be forced due to habitability and visibility concerns. Completion of required post fire safe shutdown actions would be performed by the plant operators using controls outside the main control room in accordance with existing Appendix R related station procedures. The probability for failure to manually suppress a severe fire is obtained from NSAC-181 and is based on available time for suppression. The manual suppression failure probability is 1.6E-2 and 3.4E-3 for 10 and 15 minutes, respectively. The ICCDP due to this fire scenario is conservatively estimated as follows.

$$ICCDP = 9.50E-3 \; x \; 0.20 \; x \; \frac{14}{365} \; x \; 7.38E-3 \; x \; 2.5E-2 \; = \; 1.34E-8.$$

Where:

9.50E-3 =	electrical cabinet fires in main control room – FIVE
0.20 =	severity factor
14 =	extended AOT
365 =	days per year
7.38E-3 =	log based average of 10 and 15 minute suppression failure
2.5E-2 =	change in CCDP assuming train B equipment only, recovery of offsite power via operator action, and no EDG. See discussion below

The calculation presented above differs from that performed for the other scenarios. In this calculation, the CCDP value is the change (increase) given the unavailability of the train 'B' EDG due to an AOT event. The baseline CCDP assuming no EDG AOT event is some value that is not developed in this evaluation. However, this value would be the sum of the human reliability event (failure probability of operator actions) given the scope of actions outside the main control room plus the random failure probability of the

safe shutdown equipment. The EDG AOT does not affect the human reliability. However, the random failure probability is expected to increase since the EDG is unavailable due to the AOT event. A conservative estimate of the increase is 5.0E-2. Assuming the baseline CCDP is half-human reliability and half-random failure events, the net increment in CCDP due to the EDG AOT event is 2.5E-2.

The analysis for the postulated severe fire event would typically also address a fire that is successfully suppressed. In this case, the resultant scenario has a CCDP that is the same as for the non-severe event. This is because successful suppression is assumed to prevent propagation of the fire to an adjacent panel compartment. However, the analysis for the non-severe fires already incorporated this scenario by using a severity factor of 1.0. Refer to the prior discussion of non-severe fires for further details.

The ICCDP due to the 14-day EDG AOT based on the postulated severe main control board fires is conservatively estimated to be 1.34E-8.

- **Cumulative CDF Increment for Main Control Room**

Based on the conservative assessment presented above, the ICCDP for the main control room is:

$$4.37E\text{-}8 + 1.34E\text{-}8 = 5.71E\text{-}8$$

Total Unit 1 Cable Spreading Room and Main Control Room CDF Increment due to AOT

Based on the conservative estimates presented in the prior sections, the cumulative Unit 1 cable spreading room and control room ICCDP due to the increase of the EDG AOT from 72 hours to 14 days is:

$$3.68E\text{-}8 + 5.71E\text{-}8 = 9.39E\text{-}8$$

Unit 1 and 2 'B' Switchgear Rooms

On both units, the 'B' switchgear compartments provide power for 'B' train components. The 'B' switchgear compartments also contain power and control cables for the 'C' (steam driven) auxiliary feedwater pump, unlike the 'A' compartments. This is the primary explanation for 'A' switchgear compartments screening while the 'B' ones do not.

The 'B' switchgear room fire-related cutsets generated in support of the IPEEE were used to estimate the risk due to the increased EDG AOT. The 'B' EDG was failed in the model before the cutsets were generated. For this analysis, the 'A' EDG test and maintenance basic event was set to true and a new conditional probability for safe shutdown equipment failure/unavailability was calculated. The ICCDP and ICLERP due to a 14-day AOT for the 'B' EDG was then estimated. Note that the cutsets used were not fully recovered, i.e., recovery actions were only added to the extent necessary to conclude that the impact of

the proposed EDG AOT extension is not risk significant. The results are, therefore, judged to be conservative.

TABLE 1
ICCDP FOR UNIT 1 'B' SWITCHGEAR ROOM FIRE

	IGNITION FREQ./YR	EQUIPMENT UNAVAILABILITY	FIRE CDF/YR
IPEEE BASE CASE	1.92E-02	2.24E-03	4.30E-05
NEW BASE CASE	1.92E-02	2.30E-03	4.42E-05
W/1A EDG OOS	1.92E-02	2.58E-03	4.95E-05
ICCDP FOR 14 DAYS			2.03E-07

TABLE 2
ICCDP FOR UNIT 2 'B' SWITCHGEAR ROOM FIRE

	IGNITION FREQ./YR	EQUIPMENT UNAVAILABILITY	FIRE CDF/YR
IPEEE BASE CASE	8.73E-03	5.13E-04	4.48E-06
NEW BASE CASE	8.73E-03	5.79E-04	5.05E-06
W/2A EDG OOS	8.73E-03	8.61E-04	7.52E-06
ICCDP FOR 14 DAYS			9.47E-08

ICLERP:

LERF = [(Total CDF – SGTR Contribution to Total CDF) x Early Containment Failure Probability] + (SGTR Contribution to Total CDF) + (ISLOCA Contribution)

ICLERP = [(Conditional LERF with the subject equipment OOS) – (baseline LERF with nominal expected equipment unavailability)] x (duration of single AOT under consideration)

For the fire analysis, a transient initiating event is assumed and thus the steam generator tube rupture (SGTR) contribution is assumed to be zero. The early containment failure probability is 0.01 and the Unit 1 ISLOCA contribution is constant.

ICLERP for Unit 1 'B' Switchgear Room Fire:

$LERF_{UNIT\ 1\ 'B'\ SWGR\ ROOM\ BASE}$ = 3.34E-06/yr

$LERF_{UNIT\ 1\ 'B'\ SWGR\ ROOM\ NEW}$ = 3.40-06/yr

$ICLERP_{UNIT\ 1\ 'B'\ SWGR\ ROOM}$ = 2.3E-09

ICLERP for Unit 2 'B' Switchgear Room Fire:

$LERF_{UNIT\ 2\ 'B'\ SWGR\ ROOM\ BASE}$ = 6.13E-06/yr

$LERF_{UNIT\ 2\ 'B'\ SWGR\ ROOM\ NEW}$ = 6.37-06/yr

$ICLERP_{UNIT\ 2\ 'B'\ SWGR\ ROOM}$ = 9.21E-09

Turbine Building Switchgear Rooms

The turbine building switchgear room fire-related cutsets generated in support of the IPEEE were used to estimate the risk due to the increased EDG AOT. The analysis was performed for the 'A' room with the 'A' EDG OOS, the 'A' room with the 'B' EDG OOS, the 'B' room with the 'A' EDG OOS, and the 'B' room with the 'B' EDG OOS. The applicable EDG's test and maintenance basic event was set to "true" and the other EDG's test and maintenance basic event was set to "false," and a new conditional probability for safe shutdown equipment failure/unavailability was calculated. EDG common cause failure probabilities were left at baseline values. The ICCDP and ICLERP assuming a 14-day EDG AOT was then estimated. Note that the cutsets used were not fully recovered, i.e., recovery actions were only added to extent necessary to conclude that the impact of the proposed EDG AOT extension is not risk significant. The results are, therefore, judged to be conservative.

Unit 1 Turbine Building Switchgear Room Results

Unit 1 Turbine Building Switchgear Room ICCDP:

The worst case ICCDPs are as follows:

- 'A' room with the 1A EDG OOS: 1.38E-08 (Table 3), and
- 'B' room with the 1B EDG OOS: 6.32E-08 (Table 4).

TABLE 3
UNIT 1 TURBINE BUILDING SWITCHGEAR ROOM 'A'
1A EDG OOS

	IGNITION FREQ./YR	EQUIPMENT UNAVAILABILITY	FIRE CDF/YR
IPEEE BASE CASE	6.88E-03	4.99E-05	3.43E-07
NEW BASE	6.88E-03	4.10E-05	2.82E-07
W/1A EDG OOS	6.88E-03	9.32E-05	6.41E-07
ICCDP FOR 14 DAYS			1.38E-08

TABLE 4
UNIT 1 TURBINE BUILDING SWITCHGEAR ROOM 'B'
1B EDG OOS

	IGNITION FREQ./YR	EQUIPMENT UNAVAILABILITY	FIRE CDF/YR
IPEEE BASE CASE	6.88E-03	8.81E-05	6.06E-07
NEW BASE	6.88E-03	1.18E-04	8.12E-07
W/1B EDG OOS	6.88E-03	3.58E-04	2.46E-06
ICCDP FOR 14 DAYS			6.32E-08

Unit 1 Turbine Bldg. Building Switchgear Room 'A' ICLERP:

$LERF_{UNIT\ 1\ 'A'\ ROOM\ BASE}$ = 2.9E-06/yr

$LERF_{UNIT\ 1\ 'A'\ ROOM\ NEW}$ = 2.91-06/yr

$ICLERP_{UNIT\ 1\ 'A'\ ROOM}$ = 3.84E-10

Unit 1 Turbine Building Switchgear Room 'B' ICLERP:

$LERF_{UNIT\ 1\ 'B'\ ROOM\ BASE}$ = 2.91E-06/yr

$LERF_{UNIT\ 1\ 'B'\ ROOM\ NEW}$= 2.92-06/yr

$ICLERP_{UNIT\ 1\ 'B'\ ROOM}$ = 3.84E-10

Unit 2 Turbine Building Switchgear Room Results

Unit 2 Turbine Building Switchgear Room ICCDP:

The worst case ICCDPs are as follows:

- 'A' room with the 2A EDG OOS: 2.08E-08 (Table 5)
- 'B' room with the 2B EDG OOS: 6.11E-08 (Table 6)

TABLE 5
UNIT 2 TURBINE BUILDING SWITCHGEAR ROOM 'A'
2A EDG OOS

	IGNITION FREQ./YR	EQUIPMENT UNAVAILABILITY	FIRE CDF/YR
IPEEE BASE CASE	6.05E-03	6.95E-05	4.20E-07
NEW BASE	6.05E-03	2.94E-05	1.78E-07
W/2A EDG OOS	6.05E-03	1.19E-04	7.20E-07
ICCDP FOR 14 DAYS			2.08E-08

TABLE 6
UNIT 2 TURBINE BUILDING SWITCHGEAR ROOM 'B'
2B EDG OOS

	IGNITION FREQ./YR	EQUIPMENT UNAVAILABILITY	FIRE CDF/YR
IPEEE BASE CASE	6.05E-03	9.18E-05	5.55E-07
NEW BASE	6.05E-03	4.93E-05	2.98E-07
W/2B EDG OOS	6.05E-03	3.13E-04	1.89E-06
ICCDP FOR 14 DAYS			6.11E-08

Unit 2 Turbine Building Switchgear Room 'A' ICLERP:

$LERF_{UNIT\ 2\ 'A'\ ROOM\ BASE}$ = 5.62E-06/yr

$LERF_{UNIT\ 2\ 'A'\ ROOM\ NEW}$= 5.63-06/yr

$ICLERP_{UNIT\ 2\ 'A'\ ROOM}$ = 3.84E-10

Unit 2 Turbine Building Switchgear Room 'B' ICLERP:

$LERF_{UNIT\ 2\ 'B'\ ROOM\ BASE}$ = 5.62E-06/yr

$LERF_{UNIT\ 2\ 'B'\ ROOM\ NEW}$= 5.64-06/yr

$ICLERP_{UNIT\ 2\ 'B'\ ROOM}$ = 7.67E-10

Change in Average Unit 1 CDF and LERF:

Tables 7 and 8 provide the results of the Unit 1 evaluation of the change in average fire related CDF and LERF based on the proposed EDG total downtime.

TABLE 7
UNIT 1 CHANGE IN AVERAGE FIRE-RELATED CDF BASED ON PROPOSED EDG UNAVAILABILITY

	IGNITION FREQ./YR	EQUIPMENT UNAVAILABILITY	FIRE CDF/YR
'B' SWITCHGEAR ROOM			
BASE CDF	1.92E-02	2.30E-03	4.42E-05
CDF W/PROPOSED T/M	1.92E-02	2.31E-03	4.44E-05
CHANGE IN CDF			2E-07
TURBINE BUILDING SWITCHGEAR ROOM 'A'			
BASE CDF	6.88E-03	4.02E-05	2.77E-07
CDF W/PROPOSED T/M	6.88E-03	4.19E-05	2.88E-07
CHANGE IN CDF			1.10E-08
TURBINE BUILDING SWITCHGEAR ROOM 'B'			
BASE CDF	6.88E-03	1.09E-04	7.50E-07
CDF W/PROPOSED T/M	6.88E-03	1.26E-04	8.67E-07
CHANGE IN CDF			1.17E-07
TOTAL CHANGE IN CDF			3.28E-07

TABLE 8
UNIT 1 CHANGE IN AVERAGE FIRE-RELATED LERF BASED ON PROPOSED EDG UNAVAILABILITY

	BASE LERF	NEW LERF	CHANGE IN LERF
'B' SWGR ROOM	3.34E-06	3.34E-06	<1E-08
TURBINE BLDG SWITCHGEAR ROOM 'A'	2.90E-06	2.90E-06	<1E-08
TURBINE BLDG SWITCHGEAR ROOM 'B'	2.91E-06	2.91E-06	<1E-08
TOTAL	9.15E-06	9.15E-06	<1E-07

Change in Average Unit 2 CDF and LERF:

Tables 9 and 10 provide the results of the Unit 2 evaluation of the change in average fire-related CDF and LERF based on the proposed EDG total downtime. The Unit 2 cable spreading room and control room results will be provided under separate cover.

TABLE 9
UNIT 2 CHANGE IN AVERAGE FIRE-RELATED CDF BASED ON PROPOSED EDG UNAVAILABILITY

	IGNITION FREQ./YR	EQUIPMENT UNAVAILABILITY	FIRE CDF/YR
'B' SWITCHGEAR ROOM			
BASE	8.73E-03	5.76E-04	5.03E-06
W/PROPOSED T/M	8.73E-03	5.81E-04	5.07E-06
CHANGE IN CDF			4E-08
TURBINE BUILDING SWITCHGEAR ROOM 'A'			
BASE	6.05E-03	2.83E-05	1.71E-07
W/PROPOSED T/M	6.05E-03	3.04E-05	1.84E-07
CHANGE IN CDF			1.30E-08
TURBINE BUILDING SWITCHGEAR ROOM 'B'			
BASE	6.05E-03	4.61E-05	2.79E-07
W/PROPOSED T/M	6.05E-03	5.25E-05	3.18E-07
CHANGE IN CDF			3.90E-08
TOTAL CHANGE IN CDF			9.20E-08

TABLE 10
UNIT 2 CHANGE IN AVERAGE FIRE-RELATED LERF BASED ON PROPOSED EDG UNAVAILABILITY

	BASE LERF	NEW LERF	CHANGE IN LERF
'B' SWGR ROOM	5.67E-06	5.67E-06	<1E-08
TURBINE BLDG SWITCHGEAR ROOM 'A'	5.62E-06	5.62E-06	<1E-08
TURBINE BLDG SWITCHGEAR ROOM 'B'	5.62E-06	5.62E-06	<1E-08
TOTAL	1.69E-05	1.69E-05	<1E-07

TABLE 11
SUMMARY OF UNIT 1 FIRE-RELATED RESULTS

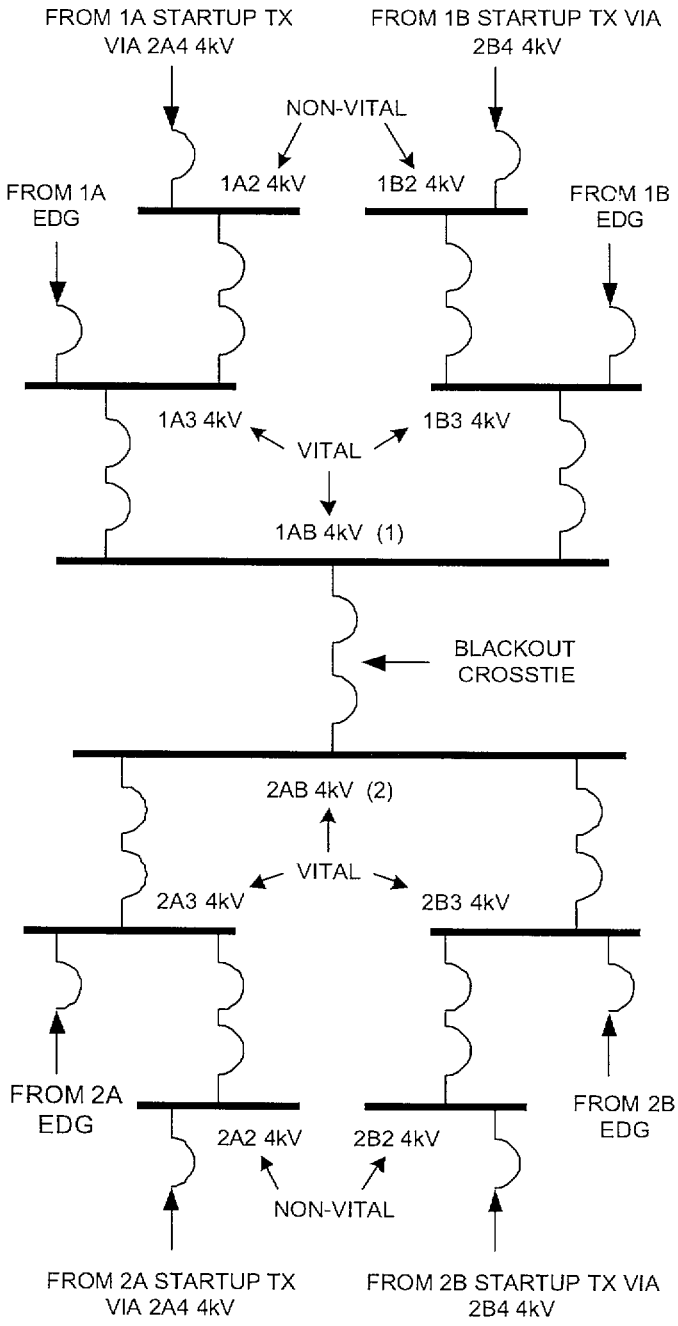
	ICCDP	ICLERP	CHANGE IN CDF	CHANGE IN LERF
UNIT 1 CABLE SPREADING ROOM	3.68E-08			
UNIT 1 CONTROL ROOM	5.71E-08			
UNIT 1 'B' SWITCHGEAR ROOM (Note 1)	2.03E-07	2.30E-09	2E-07	<1E-08
UNIT 1 'A' TURBINE BUILDING SWITCHGEAR ROOM (Note 1)	1.38E-08	3.80E-10	1.10E-08	<1E-08
UNIT 1 'B' TURBINE BUILDING SWITCHGEAR ROOM (Note 1)	6.32E-08	3.84E-10	1.17E-07	<1E-08
TOTAL (Note 1)	3.74E-07	3.06E-09	3.28E-07	<1E-07
Note 1	The cutsets used were not fully recovered, i.e., recovery actions were only added to the extent necessary to conclude that the impact of the proposed EDG AOT extension is not risk significant. The results are, therefore, judged to be conservative.			

TABLE 12
SUMMARY OF UNIT 2 FIRE-RELATED RESULTS

	ICCDP	ICLERP	CHANGE IN CDF	CHANGE IN LERF
UNIT 2 CABLE SPREADING ROOM	Later			
UNIT 2 CONTROL ROOM	Later			
UNIT 2 'B' SWITCHGEAR ROOM (Note 1)	9.47E-08	9.21E-09	4E-08	<1E-08
UNIT 2 'A' TURBINE BUILDING SWITCHGEAR ROOM (Note 1)	2.08E-08	3.84E-10	1.30E-08	<1E-08
UNIT 2 'B' TURBINE BUILDING SWITCHGEAR ROOM (Note 1)	6.11E-08	7.67E-10	3.90E-08	<1E-08
TOTAL (Note 1)	1.77E-07	1.04E-08	9.20E-08	<1E-07
Note 1	The cutsets used were not fully recovered, i.e., recovery actions were only added to the extent necessary to conclude that the impact of the proposed EDG AOT extension is not risk significant. The results are, therefore, judged to be conservative.			

The total ICCDP, including the conservatively estimated fire risk contribution, is less than 5E-07 and the ICLERP is less than 5E-08. The results are thus below the regulatory guide (RG) 1.177 specified values and are considered small.

FIGURE 1
Blackout Crosstie Bus Arrangement



(1) 1AB is connected to either 1A3 or 1B3, but not both simultaneously
(2) 2AB is connected to either 2A3 or 2B3, but not both simultaneously

TABLE 13
CABLE ROUTING ASSOCIATED WITH THE ESSENTIAL CONTROL OF OFFSITE POWER, EDG A, EDG B, AND BLACKOUT CROSSTIE

SSC	Item #	Cable #	Sys	From	To	Comment	Cable Tray #	Cable Tray Elev
1A SU TX BKR	1	10906A	-	1A2 4KV SWGR	RTGB-101	CONTROL	C10, C15 & C14	EL 55'-0
1B SU TX BKR	2	10907A	-	1B2 4KV SWGR	RTGB-101	CONTROL	C37 & C33	EL 54'-5
1B EDG RELAYING/METERING	3	10964B	DG	1B3 4KV SWGR	RTGB 101	METERING	C38	EL 53'-7
"	4	10964E	DG	DG 1B CNTL PNL	RTGB 101	METERING	C30	EL 55'-3
"	5	10964F	DG	DG 1B CNTL PNL	RTGB 101	METERING	C30	EL 55'-3
"	6	10931A	ELEC	1A DC BUS	1A3 4KV SWGR	DC PWR	C10, C15 & C14	EL 55'-0
BKR - 1A2 4KV SWGR FROM 1A3 4KV SWGR	7	10934C	-	1A2 4KV SWGR	RTGB-101	CONTROL	C10, C15 & C14	EL 55'-0
BKR - 1B2 4KV SWGR FROM 1B3 4KV SWGR	8	10935C	-	1B2 4KV SWGR	RTGB-101	CONTROL	C30	EL 55'-3
BKR - 1A3 4KV SWGR FROM 1A2 4KV SWGR	9	10936B	ELEC	1A3 4KV SWGR	RTGB-101	CONTROL	C17	EL 56'-8
BKR - 1B3 4KV SWGR FROM 1B2 4KV SWGR	10	10937B	ELEC	1B3 4KV SWGR	RTGB-101	CONTROL	C32	EL 55'-3
"	11	10953C	DG	1A3 4KV SWGR	RTGB-101	BKR CONTROL	C14	EL 55'-0
"	12	10954B	DG	1A3 4KV SWGR	RTGB-101	METERING	C14	EL 55'-0
"	13	10954E	DG	1A EDG	RTGB-101	METERING	C17	EL 56'-8
"	14	10954F	DG	1A EDG	RTGB-101	METERING	C17	EL 56'-8
"	15	10957B	DG	1A EDG	CR (ESC-SA)	CONTROL	C17	EL 56'-8

TABLE 13
CABLE ROUTING ASSOCIATED WITH THE ESSENTIAL CONTROL OF OFFSITE POWER, EDG A, EDG B, AND BLACKOUT CROSSTIE

"	16	10957C	DG	1A EDG	CR (ESC-SA)	CONTROL	C17	EL 56'-8
"	17	10957D	-	1A EDG	RTGB-101	CONTROL	C17	EL 56'-8
"	18	10957F	DG	1A EDG	RTGB-101	ANN	C17	EL 56'-8
"	19	10958A	DG	1A EDG	RTGB-101	CONTROL	C17	EL 56'-8
"	20	10958B	DG	1A EDG	RTGB-101	CONTROL	C17	EL 56'-8
"	21	10958C	-	1A EDG	RTGB-101	ANN	C17	EL 56'-8
"	22	10958G	DG	1A DC BUS	1A EDG	PWR	C10, C15 & C14	EL 55'-0
"	23	10956F	DG	CR (ESC-SA)	1A EDG	LOCKOUT	C17	EL 56'-8
1B EDG BKR	24	10963C	DG	1B3 4KV SWGR	RTGB 101	CONTROL	C38	EL 53'-7
1EDG LOCKOUT RELAY	25	10966F	DG	DG 1B CNTL PNL	ESC PNL SB	ISOLATION	C30 & C38	EL 53'-7
1B SU TX	26	10908B	-	1B SU TX	RTGB-101	ANN	C33 & C37	EL 54'-5
"	27	10950E	-	B-1767	1B3 4KV SWGR	CONTROL/LOAD SHED	C38	EL 53'-7
"	28	11006M	-	B-1289	B-1767	120VAC "MB" TO LOAD SHED	C48 & C38	EL 53'-7
"	29	11006D	-	120VAC BUS"MB"	B-1289	120VAC "MB" TO LOAD SHED	C48 & C38	EL 53'-7
1B2 4KV SWGR	30	10917A	-	1B2 4KV SWGR	RTGB-101	METERING	C33 & C37	EL 54'-5
"	31	10933A	ELEC	1AB DC BUS	1AB 4KV SWGR	DC PWR	C61	EL 54'-5
1B2 4KV SWGR	32	10951A	ELEC	B-1767	1AB 4KV SWGR	CONTROL/LOAD SHED	C61	EL 54'-5
"	33	10951B	ELEC	B-1766	1AB 4KV SWGR	CONTROL/LOAD SHED	C61	EL 54'-5
"	34	10951D	ELEC	B-1767	1B3 4KV SWGR	CONTROL/LOAD SHED	C38	EL 53'-7
"	35	10951E	ELEC	B-1766	1A3 4KV SWGR	CONTROL/LOAD SHED	C14	EL 55'-0
BKR - 1AB 4KV SWGR FROM 1B3 4KV SWGR	36	10941B	ELEC	1AB 4KV SWGR	RTGB-101	CONTROL	C61	EL 54'-5

TABLE 13
CABLE ROUTING ASSOCIATED WITH THE ESSENTIAL CONTROL OF OFFSITE POWER, EDG A, EDG B, AND BLACKOUT CROSSTIE

BKR - 1B3 4KV SWGR TO 1AB 4KV SWGR	37	10939B	ELEC	1B3 4KV SWGR	RTGB-101	CONTROL	C32	EL 55'-3
"	38	11297A	-	1AB 4KV SWGR	RTGB-101	CONTROL	C61	EL 54'-5
"	39	11297E	-	1AB 4KV SWGR	B-1766 & B-196E	CONTROL	C61	EL 54'-5
"	40	11297J	-	1A3 4KV SWGR	B-1766 & B-196E	CONTROL	C14	EL 55'-0
"	41	11297F	-	1AB 4KV SWGR	B-1767 & B-197E	CONTROL	C61	EL 54'-5
"	42	11297K	-	1B3 4KV SWGR	B-1767 & B-197E	CONTROL	C38	EL 53'-7

TABLE 14
UNIT 1 CABLE SPREADING ROOM
IGNITION SOURCES ASSUMED FOR IPEEE ANALYSIS

		COMPARTMENT (FA-B) DESCRIPTION				
FIRE COMPARTMENT BOUNDARIES: FZ-57						
INSIDE FIRE AREA: FA-B, CABLE SPREADING ROOM						
		COMPARTMENT (FA-B) FIRE IGNITION FREQUENCY				
STEP 1.1	SELECTED PLANT LOCATION (REF. TABLE 1.1)	CABLE SPREADING ROOM			PLANT-WIDE	
STEP 1.2	LOCATION WEIGHTING FACTOR (WFL) (REF. TABLE 1.1)	1.00E+00			2.00E+00	
STEP 1.3	IGNITION SOURCE FREQUENCY (FIF)	(Fif = Ff * WFLS * WFL				
	COMPARTMENT IGNITION SOURCES	(A)	(B)	WFLS = A/B	Ff (Table 1.2)	Fif
1.	ELECTRICAL CABINETS			1	3.20E-03	3.20E-03
2.						
	PLANT WIDE IGNITION SOURCES	(A)	(C)	WFLS = A/C	Ff (Table 1.2)	
1. TRANSIENTS		6	63	9.52E-02	1.3E-03	2.48E-04
2. WELDING>ORDINARY COMBUSTIBLES (1/# COMPTS)		1	63	1.59E-02	3.10E-02	9.84E-04
3. WELDING>CABLE FIRES (1/# COMPTS)		1	63	1.59E-02	5.10E-03	1.62E-04
4. TRANSFORMERS		10	145	6.90E-02	7.9E-03	1.09E-03
5. VENTILATION SYSTEMS		3	168	1.79E-02	9.5E-03	3.39E-04
6. CABLE RUNS		7.66E+08	1.26E+10	6.07E-02	6.3E-03	7.65E-04
7. JUNCTION BOXES NON-QUALIFIED						**
8. FIRE PROTECTION PANELS		2	55	3.64E-02	2.4E-03	1.75E-04
9. MISCELLANEOUS HYDROGEN FIRES *			63		3.2E-03	
10						
* NO HYDROGEN LINES						
STEP 1.4	COMPARTMENT (FA-B) FIRE FREQUENCY (F1) - equals the sum of the Fif values					6.96E-03

** Note: Typical FPL practice is to use junction boxes as cable pull boxes, not for splices, and all junction boxes are sealed and entered only by conduits. Therefore, these would not propagate if they did ignite and are not considered to be ignition sources.

TABLE 15
FIXED COMBUSTIBLE / TARGET IN PLUME
190 Btu

1	TARGET DAMAGE THRESHOLD TEMPERATURE (USE TABLE 1E FOR GUIDANCE)	425	F
2	HEIGHT OF TARGET ABOVE FIRE SOURCE (BASED ON SCENARIO GEOMETRY)	8.75	ft
3	HEIGHT FROM FIRE SOURCE TO CEILING (BASED ON SCENARIO GEOMETRY)	20	ft
3a	FLOOR DIMENSIONS - LENGTH - WIDTH	80 40	ft ft
3b	FLOOR AREA (LENGTH) X (WIDTH)	3200	ft2
3c	ESTIMATED DURATION OF FIRE	15	min
4	PEAK FIRE INTENSITY USE TABLE 2E & FIGURES 4-5 FOR GUIDANCE)	190	Btu/s
5	FIRE LOCATION FACTOR (4 FOR CORNER, 2 FOR WALL, 1 FOR CENTER)	1	--
6	EFFECTIVE HEAT RELEASE RATE ([BOX 4] X [BOX 5])	190	Btu/s
7	PLUME TEMPERATURE RISE AT TARGET (LOOK UP VALUE FROM TABLE 5E)	302.44	F
8a	MAXIMUM AMBIENT TEMPERATURE	75	F
8b	CRITICAL TEMPERATURE RISE AT TARGET ([BOX 1] - MAXIMUM AMBIENT TEMPERATURE)	350	F
9	CRITICAL - PLUME TEMPERATURE RISE ([BOX 8] - [BOX 7])	47.56	F
	IF THE ENTRY IN BOX 9 IS LESS THAN OR EQUAL TO 0, STOP. OTHERWISE CONTINUE TO CALCULATE THE CRITICAL COMBUSTIBLE LOAD NEEDED TO RAISE THE AVERAGE TEMPERATURE BY THIS AMOUNT		
10	Qnet/V TO ACHIEVE TEMP RISE IN BOX 9 (LOOK UP VALUE FROM TABLE 7E)	0.81	Btu/ft3
11	CALCULATED ENCLOSURE VOLUME, V ([BOX 3] X FLOOR AREA OF SPACE)	64000	ft3
12	CALCULATED CRITICAL Qnet ([BOX 10] X [BOX11])	52,033	Btu
13	ESTIMATED HEAT LOSS FRACTION (REPRESENTATIVE VALUE : 0.7)	0.7	--
14	ESTIMATE OF CRITICAL Qtot ([BOX 12]/(1 - [BOX13]))	173,443	Btu
15	ESTIMATE OF ACTUAL Qtot ([HRR] X [TIME]) = [BOX 4] X [TIME]	171,000	Btu

Note: If the entry in box 15 is less than the value in box 14, critical conditions are not indicated for the scenario being evaluated. Otherwise, if the scenario does not pass this screening procedure, further analysis required.

TABLE 16
FIXED COMBUSTIBLE / TARGET IN PLUME
65 Btu

1	TARGET DAMAGE THRESHOLD TEMPERATURE	425	F
	(USE TABLE 1E FOR GUIDANCE)		
2	HEIGHT OF TARGET ABOVE FIRE SOURCE	5.4	ft
	(BASED ON SCENARIO GEOMETRY)		
3	HEIGHT FROM FIRE SOURCE TO CEILING	20	ft
	(BASED ON SCENARIO GEOMETRY)		
3a	FLOOR DIMENSIONS - LENGTH	80	ft
	- WIDTH	40	ft
3b	FLOOR AREA (LENGTH) X (WIDTH)	3200	ft2
3c	ESTIMATED DURATION OF FIRE	15	min
4	PEAK FIRE INTENSITY	65	Btu/s
	USE TABLE 2E & FIGURES 4-5 FOR GUIDANCE)		
5	FIRE LOCATION FACTOR	1	--
	(4 FOR CORNER, 2 FOR WALL, 1 FOR CENTER)		
6	EFFECTIVE HEAT RELEASE RATE	65	Btu/s
	([BOX 4] X [BOX 5])		
7	PLUME TEMPERATURE RISE AT TARGET	330.70	F
	(LOOK UP VALUE FROM TABLE 5E)		
8a	MAXIMUM AMBIENT TEMPERATURE	75	F
8b	CRITICAL TEMPERATURE RISE AT TARGET	350	F
	([BOX 1] - MAXIMUM AMBIENT TEMPERATURE)		
9	CRITICAL - PLUME TEMPERATURE RISE	19.30	F
	([BOX 8] - [BOX 7])		
	IF THE ENTRY IN BOX 9 IS LESS THAN OR EQUAL TO 0, STOP. OTHERWISE CONTINUE TO CALCULATE THE CRITICAL COMBUSTIBLE LOAD NEEDED TO RAISE THE AVERAGE TEMPERATURE BY THIS AMOUNT		
10	Qnet/V TO ACHIEVE TEMP RISE IN BOX 9	0.34	Btu/ft3
	(LOOK UP VALUE FROM TABLE 7E)		
11	CALCULATED ENCLOSURE VOLUME, V	64000	ft3
	([BOX 3] X FLOOR AREA OF SPACE)		
12	CALCULATED CRITICAL Qnet	21,653	Btu
	([BOX 10] X [BOX11])		
13	ESTIMATED HEAT LOSS FRACTION	0.7	--
	(REPRESENTATIVE VALUE : 0.7)		
14	ESTIMATE OF CRITICAL Qtot	72,177	Btu
	([BOX 12]/(1 - [BOX13]))		
15	ESTIMATE OF ACTUAL Qtot	58,500	Btu
	([HRR] X [TIME]) = [BOX 4] X [TIME]		
Note: If the entry in box 15 is less than the value in box 14, critical conditions are not indicated for the scenario being evaluated. Otherwise, if the scenario does not pass this screening procedure, further analysis required.			

TABLE 17
FIXED COMBUSTIBLE / TARGET OUTSIDE PLUME
190 Btu

1	TARGET DAMAGE THRESHOLD TEMPERATURE	425	F
	(LOOK UP VALUE FROM TABLE 1E)		
2	HEIGHT OF TARGET ABOVE FIRE SOURCE	17	ft
	(BASED ON SCENARIO GEOMETRY)		
3	HEIGHT FROM FIRE SOURCE TO CEILING	20	ft
	(BASED ON SCENARIO GEOMETRY)		
3a	FLOOR DIMENSIONS - LENGTH	80	ft
	- WIDTH	40	ft
3b	FLOOR AREA [LENGTH] X [WIDTH]	3200	ft2
3c	ESTIMATED DURATION OF FIRE	15	min
4	RATIO OF TARGET HEIGHT/CEILING HEIGHT	0.85	--
	([BOX2]/[BOX3])		
	IF THE VALUE IN BOX 4 IS > 0.85, COMPLETE BOXES 5-11; OTHERWISE, ENTER A VALUE OF 0 IN BOX 14 AND CONTINUE WITH BOX 15.		
5	LONGITUDINAL DISTANCE FROM FIRE SOURCE TO TARGET, L	0.5	ft
	(BASED ON SCENARIO GEOMETRY)		
6	LONGITUDINAL DISTANCE TO HEIGHT RATIO, L/H	0.03	--
	([BOX 5]/[BOX 3])		
7	ENCLOSURE WIDTH, W	40	ft
	(BASED ON SCENARIO GEOMETRY)		
8	HEIGHT TO WIDTH RATIO, H/W	0.50	--
	([BOX 3]/[BOX 7])		
9	PEAK FIRE INTENSITY	190	Btu/s
	(USE TABLE 2E FOR GUIDANCE)		
10	FIRE LOCATION FACTOR	1	--
	(4 FOR CORNER, 2 FOR WALL, 1 FOR CENTER)		
11	EFFECTIVE HEAT RATE RELEASE	190	Btu/s
	([BOX 9] X [BOX 10])		
12	PLUME TEMPERATURE RISE AT CEILING	76.25	F
	(LOOK UP VALUE FROM TABLE 5E)		
13	CEILING JET TEMPERATURE RISE FACTOR AT TARGET		--
	(IF [BOX 4] < 0.85, ENTER 0, ELSE	3.509	
	LOOK UP VALUE FROM TABLE 6A OR 6B)		
14	CEILING JET TEMPERATURE RISE AT TARGET	267.56	F
	([BOX 12] X [BOX 13])		
15a	MAXIMUM AMBIENT TEMPERATURE	75	F
15b	CRITICAL TEMPERATURE RISE AT TARGET	350	F
	([BOX 1] - MAXIMUM AMBIENT TEMPERATURE)		

TABLE 17
FIXED COMBUSTIBLE / TARGET OUTSIDE PLUME
190 Btu

16	CRITICAL - CEILING JET TEMP. RISE AT TARGET	82.44	F
	([BOX 15] - [BOX 14])		
	IF THE ENTRY IN BOX 16 IS <= 0, STOP. OTHERWISE CONTINUE TO CALCULATE THE CRITICAL COMBUSTIBLE LOAD NEEDED TO RAISE THE AVERAGE TEMPERATURE BY THE AMOUNT INDICATED IN BOX 16.		
17	Qnet/V TO ACHIEVE TEMP RISE IN BOX 16	1.37	Btu/ft3
	(LOOK UP VALUE FROM TABLE 7E)		
18	CALCULATED ENCLOSURE VOLUME, V	64,000	ft3
	([BOX 3B] X [BOX 3])		
19	CALCULATED CRITICAL Qnet	87,550	Btu
	([BOX 17] X [BOX18])		
20	ESTIMATED HEAT LOSS FRACTION (RANGE: 0-1)	0.7	--
	(REPRESENTATIVE VALUE : 0.7)		
21	ESTIMATE OF CRITICAL Qtot	291,833	Btu
	([BOX 19]/(1 - [BOX20]))		
22	ESTIMATE OF ACTUAL Qtot	171,000	Btu
	(BASED ON ENERGY CONTENT OF FIRE SOURCE)		
Note: If the entry in box 22 is less than the value in box 21, critical conditions are not indicated for the scenario being evaluated. Otherwise, if the scenario does not pass this screening procedure, further analysis required.			

TABLE 18
FIXED COMBUSTIBLE / RADIANT EXPOSURE
190 Btu

1	CRITICAL RADIANT FLUX TO TARGET (REPRESENTATIVE CONSERVATIVE VALUE = 1) (LOOK UP VALUE FROM TABLE 1E)	1	Btu/s/ft2
2	PEAK FIRE INTENSITY (USE TABLE 2E FOR GUIDANCE)	190	Btu/s
3	RADIANT FRACTION OF HEAT RELEASE (REPRESENTATIVE VALUE = 0.4)	0.4	--
4	RADIANT HEAT RELEASE RATE ([BOX2]X[BOX3])	76	Btu/s
5	CRITICAL RADIANT FLUX DISTANCE (LOOK UP VALUE FROM TABLE 10E)	2.46	ft
6	ACTUAL DISTANCE BETWEEN SOURCE/TARGET (FROM FIRE COMPARTMENT CCDS)	0	ft
Note: If the exposure fire is located within this distance (indicated in box 5) of the target, critical conditions can occur outside this range. Critical conditions are not indicated for the scenario under consideration.			

TABLE 19
UNIT 1 CONTROL ROOM
IGNITION SOURCES ASSUMED FOR IPEEE ANALYSIS

		COMPARTMENT (FA-F + FZ-72) DESCRIPTION				
FIRE COMPARTMENT BOUNDARIES: FZ 71, 73, 82						
INSIDE FIRE AREA: FA-F W/O FZ-70, CONTROL ROOM						
		COMPARTMENT (FA-F + 72) FIRE IGNITION FREQUENCY				
STEP 1.1	SELECTED PLANT LOCATION (REF. TABLE 1.1)	RAB			PLANT-WIDE	
STEP 1.2	LOCATION WEIGHTING FACTOR (WFL) (REF. TABLE 1.1)	1.00E+00			2.00E+00	
STEP 1.3	IGNITION SOURCE FREQUENCY (FIF)	(Fif = Ff * WFLS * WFL				
	COMPARTMENT IGNITION SOURCES	(A)	(B)	WFLS = A/B	Ff (Table 1.2)	Fif
1.	ELECTRICAL CABINETS	30	225	1.33E-01	1.90E-02	2.53E-03
2.	PUMPS		142		1.90E-02	
3.						
4.						
5.						
	PLANT WIDE IGNITION SOURCES	(A)	(C)	WFLS = A/C	Ff (Table 1.2)	
1. TRANSIENTS		6	62	9.68E-02	1.3E-03	2.52E-04
2. WELDING>ORDINARY COMBUSTIBLES (1/# COMPTS)		0.6	62	9.68E-03	3.1E-02	6.00E-04
3. WELDING>CABLE FIRES (1/# COMPTS)		0.6	62	9.68E-03	5.1E-03	9.87E-05
4. TRANSFORMERS		2	145	1.38E-02	7.9E-03	2.18E-04
5. VENTILATION SYSTEMS		13	170	7.65E-02	9.5E-03	1.45E-03
6. CABLE RUNS		2.61E+08	1.26E+10	2.07E-02	6.3E-03	2.61E-04
7. JUNCTION BOXES NON-QUALIFIED		2.61E+08	1.26E+10	2.07E-02	1.6E-03	6.62E-05
8. FIRE PROTECTION PANELS			55		2.4E-03	
9. MISCELLANEOUS HYDROGEN FIRES *			62		3.2E-03	
10						
	* NO HYDROGEN LINES					
	SUB-TOTAL FIF (FIRE IGNITION FREQUENCY)					5.48E-03
	FZ-70 CONTROL ROOM FIF (FIRE IGNITION FREQUENCY)					1.07E-02
	FZ-72 RAB ROOF (A/C AREA) CONTROL ROOM FIF (FIRE IGNITION FREQUENCY)					1.37E-03
STEP 1.4	COMPARTMENT (ALL FA-F + FZ-72) FIRE FREQUENCY (F1) - EQUALS THE SUM OF THE FIF VALUES					1.62E-02

NRC Request 10:

During the meeting on October 24, 2000, FPL was requested to provide the following information with regard to the fire protection capabilities.

a) Confirm that there is sufficient hose length in the Unit 1 cable spreading room (CSR) to cover all areas of the room with a hose stream

b) How many other hose stations external to the CSR have sufficient hose length to cover all the areas in the room with a hose stream?

c) What is the length of the watch for the continuous fire watch stationed in the CSR?

d) How many hot work permits were issued for hot work in the CSR from 1996 to the present?

e) Identify how many condition reports (CR) have been written on transient combustible program problems since the CR program was put in place?

f) Identify the tier 2 restrictions we will propose to include in the CRMP as mitigating factors to lower the risk of fire in the CSR during the extended AOT period including, as a minimum, the following restrictions:

- *significant restrictions on hot work in cable spreading room during extended AOT*
- *continuous firewatch when in extended AOT*
- *plant fire protection walkdown prior to entering extended AOT*
- *thermographic examination of high risk potential ignition sources in cable spreading room and control room*

FPL Response 10:

a) One hundred feet of hose is installed on all of the hose stations in and adjacent to the cable spreading room. One hose station (HS-15-32) is located in the cable spreading room that will protect 100 percent of the cable spreading room.

b) There is one hose station (HS-15-31) located in an adjacent area ('B' switchgear room) that will protect 100 percent of the cable spreading room. There are also two hose stations (HS-15- 37 & HS-15-8) in adjacent areas (fan room hallway and turbine generator building mezzanine) that will protect over 50 percent of the room. The brigade has a fire hose readily available to add an additional hose length (50 to 100 feet) to get total coverage of this area, if required.

c) Continuous fire watch personnel are normally rotated on a 3-hour interval, or sooner if requested by the individual, in the cable spreading room.

d) A detailed review determined minimal hot work has been performed in the cable spreading room. During 1999 and early 2000, a small amount of hot work was performed to support the thermo-lag and fire barrier upgrade project. All of the major project work has been completed in this area and hot work is not required as a part of routine work. A continuous fire watch with back up fire extinguisher equipment is always required for hot work in this area. Also, any combustible material must be removed from the area or protected prior to starting the work.

e) Two condition reports have been written on transient combustible program problems since the CR program was put in place. One CR was initiated in 1997 and the second was in 1998.

f) FPL commits to incorporate the following Unit 1 fire protection Tier 2 restrictions into the administrative procedures for implementing the configuration risk management program (CRMP) and the on-line risk monitor (OLRM).

During Modes 1, 2, and 3, if a Unit 1 EDG is to be removed from service for maintenance for a period scheduled to exceed 72 hours the following actions will be completed:

- *conduct a plant fire protection walkdown of the areas that could impact EDG availability, offsite power availability, or the ability to use the station blackout crosstie prior to entering the extended AOT;*
- *perform a thermographic examination of high risk potential ignition sources in the cable spreading room and the control room prior to entering the extended AOT;*
- *restrict planned hot work in the cable spreading room and control room during the extended AOT; and*
- *establish a continuous fire watch in the cable spreading room when in the extended AOT.*