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IPN-00-031

U.S. Nuclear Regulatory Commission
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Subject: **Indian Point 3 Nuclear Power Plant**
Docket No. 50-286
Supplemental Response to Request for Additional Information Regarding Response to Generic Letter 88-20, Supplement 4: Individual Plant Evaluation For External Events (TAC No. M83632)

References:

1. NYPA letter to NRC (IPN-98-104), "Response to Request for Additional Information Regarding Response to Generic Letter 88-20, Supplement 4: Individual Plant Evaluation For External Events (TAC No. M83636)," dated September 30, 1998.

2. NRC letter, George F. Wunder to James Knubel, "Request for Additional Information Regarding Response to Generic Letter 88-20, Supplement 4, 'Individual Plant Evaluation for External Events' – Indian Point Unit 3 (TAC No. M83632)," dated June 3, 1998.

3. NYPA letter to NRC (IPN-97-132), "Individual Plant Examination of External Events (IPEEE)," dated September 26, 1997.

4. B. Najafi, et al, "Guidance for Development of Response to Generic Request for Additional Information on Fire Individual Plant Examination for External Events (IPEEE)," prepared by Data Systems & Solutions for Electric Power Research Institute, Final Report, May 1999.

This letter supplements the Authority's original response (Reference 1) to the NRC's request for additional information (RAI) (Reference 2) regarding the Indian Point 3 response to Generic Letter 88-20, Supplement 4 (Reference 3). In Reference 1, the Authority deferred complete resolution of the issues concerning the heat loss factors (Question 5) and the electrical cabinet heat release rates (Question 6) until EPRI and the NRC agreed upon an appropriate response to these generic issues. EPRI has since issued a guidance document (Reference 4) which addresses the development of

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responses to these generic issues. Therefore, the Authority performed an examination of all fire zones at IP3 to evaluate any changes resulting from the revised heat loss factors and electrical cabinet heat release rates using the guidance from Reference 4. It was concluded from this reanalysis that the results of the original IPEEE analysis remain valid.

Attachment I provides a summary of the analysis performed using the EPRI guidance in Reference 4. This fulfills the Authority's commitment, made in Reference 1, to prepare and submit a report summarizing the results and any IPEEE changes resulting from the resolution of the heat loss factors and the electrical cabinet heat release rates.

This letter contains no new commitments. If you have any questions, please contact Ms. C. D. Faison.

Very truly yours,

J. Knubel
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Attachments: As stated

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ATTACHMENT I TO IPN-00-031

SUPPLEMENTAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING GENERIC LETTER 88-20, SUPPLEMENT 4: INDIVIDUAL PLANT EVALUATION FOR EXTERNAL EVENTS

NEW YORK POWER AUTHORITY
INDIAN POINT 3 NUCLEAR POWER PLANT
DOCKET NO. 50-286
DPR-64

INDIAN POINT 3 NUCLEAR POWER PLANT

RESPONSE TO FIRE IPEEE RAI QUESTION ON ELECTRICAL CABINET HEAT RELEASE RATE (HRR) AND HEAT LOSS FACTOR (HLF)

This report documents a summary of the final response to a request for additional information (RAI) on the Indian Point 3 fire Individual Plant Examination of External Events (IPEEE) (Reference 1) related to heat loss factors and electrical cabinet heat release rates – Questions #5 and #6 in Reference 4. The response is prepared using the guidance developed by EPRI and approved by the NRC (Reference 6) for preparation of response to generic RAI on fire IPEEE (Reference 2).

1.0 Identification of Fire Zones Potentially Impacted by Heat Loss Factor and/or Electrical Cabinet Heat Release Rate

The Indian Point 3 (IP3) fire IPEEE evaluated 124 fire zones. Eighteen (18) fire zones were qualitatively screened based on no safe shutdown equipment or no plant trip initiator (Reference 1, page 4-8). All but 13 fire zones fell below the screening threshold of 10^{-6}/yr during initial quantitative screening. Initial quantitative screening was done using total compartment ignition frequencies (prior to introduction of fire severity factors, manual suppression credit, and the elimination of non-damaging ignition sources) and compartment conditional core damage probability (CCDP), which assumed that all equipment and cables in the compartment were failed. Fires, in these steps of screening, were assumed to be severe and spread instantaneously throughout the fire area causing damage to all circuits in the fire area. Therefore, Heat Loss Factor (HLF) or Heat Release Rates (HRRs) were not used during these screening steps of the fire analysis at IP3.

The 13 fire zones that remained above the screening threshold after initial quantitative screening were examined for the impact of heat loss factor (HLF) and electrical cabinet heat release rate (HRR) on fire damage and risk. Two fire zones (Battery Room 32 and Primary Makeup Water Pump Room) were determined to be unaffected by the revised HRR or the HLF based on the fire sources in these rooms. The only ignition sources screened in the Primary Makeup Water Pump Room (Zone 2A) were junction boxes, on the basis that they are completely enclosed and not capable of propagating a fire. As such, the adjusted ignition source frequency for the Primary Makeup Water Pump Room, which is less than 10^{-6}/yr, is not dependent on the heat loss factor or cabinet fire heat release rate. In Battery Room 32 (Zone 13), the battery itself was the only ignition source screened in this zone, on the basis that the only cables in the battery room were those associated with the battery itself. Thus, a fire originating from the battery would not impact any other targets. As a result, the adjusted ignition source frequency for Battery Room 32, which is less than 10^{-6}/yr, is not dependent on the heat loss factor or cabinet fire heat release rate.

The remaining 11 fire zones are listed in Table 1 and were determined to have the potential to be affected by the revised HRR and/or HLF and are further examined in the following sections.

2.0 Examination of Use of 65 Btu/s for Electrical Cabinet Heat Release Rate

The IP3 fire IPEEE uses the 65 Btu/s electrical cabinet heat release rate (Reference 3) for the following type of electrical fire source groups:

1) Electrical Cabinets
   a) 6.9KV switchgears
   b) 480V switchgears
   c) 480V MCCs
   d) Indoor dry transformers
   e) Control panels and cabinets (excluding the control room panels and cabinets); e.g., relay panels, fire protection and heat tracing panels
   f) Distribution panels, e.g., 120VAC instrument bus distribution panel or 125VDC panel
   g) Inverters
   h) Battery chargers

2) Other electrical fire source
   a) Motors, fans, and pumps (with no lube oil or grease)
   b) Air conditioning units
   c) Batteries
   d) Dryers

The other electrical fire sources have significantly lower combustible load (compared to the electrical cabinets) and therefore 65 Btu/s is considered an adequate representation of electrical fires involving these other fire sources. The remaining discussion is focused on use of this value for electrical cabinets in the IP3 fire IPEEE (Reference 1).

The electrical cabinets examined in this evaluation (those located in the 11 fire zones of Table 1) are listed in Table 3 along with a summary of the results of the examination. The results are based on a walkdown that included determination of the cabinet internal combustible configuration when necessary.

Based on the guidance developed by EPRI for preparation of response to the fire IPEEE generic RAI questions (Reference 2), the 65 Btu/s HRR is appropriate for an electrical cabinet with no unqualified cables and where the fuel configuration is such that the fire will remain confined to a single bundle of qualified cables. A sample of the above ignition sources were inspected at IP3 to investigate their compliance to this criteria. The investigation is documented below.

6.9KV Switchgears – The 6.9KV switchgears at IP3 consist of several cubicles separated by sheet metal partitions. Each cubicle is further divided into three smaller compartments separated by metal partitions that are not airtight. The back compartment contains the busbar and power cables. The primary combustible is the insulation on the power cables. The control circuits are located in the upper front compartment with breaker contained in the lower front compartments. The control wiring is tightly bundled on one side of the front compartment. Because of the single bundle control wiring and separation of the control and power cables in separate compartments, a fire in the switchgear will remain confined to a single bundle. Therefore, use of a 65 Btu/s heat release rate is justified for the 6.9KV switchgears at IP3.

480V Switchgears – The configuration of the combustibles in the 480V switchgears is similar to the 6.9KV switchgear in that the power, control and breaker sections are separated by metal partitions and combustibles within each section are configured similarly. Use of a 65 Btu/s heat release rate is therefore appropriate for the 480V switchgears at IP3.

Motor Control Centers (MCCs) -- The configuration of the combustibles in the 480V motor control centers (MCCs) is similar to the 480V and 6.9KV switchgear in that the power, control and breaker sections are separated by metal partitions. The metal partitions contain the electrical components and a single wireway that runs through the right side of the MCC from top to bottom. The cables in the wireway are mostly bundled with single wires coming off and feeding individual components in the small metal enclosure. The main combustibles are confined to the tightly bundled cables in the wireway. Use of a 65 Btu/s heat release rate is therefore appropriate for the 480V motor control centers at IP3.

Distribution Panels – The 125V DC Power Panels at IP3 contain the DC input from the battery charger and the battery, and molded case circuit breakers. The front panel includes instruments that include small amount of wiring. Use of a 65 Btu/s heat release rate is appropriate for the DC distribution panels at IP3 due to low amount of combustibles in cables and wiring.

Control Panels – All control cabinets listed in Table 3 were reviewed during the walkdown to determine their size and location (i.e., proximity to cable raceways). These panels may be classified in the following categories.

a) The first category consists of small, typically 1-2' x 2-3' x 3-4', that are used for control of one or more equipment. These panels are totally enclosed and in many cases mounted on the wall. Examples are, fuse boxes, transfer or disconnect switches, small process sampling and fire protection panels. Small distribution panels with molded case breakers (similar to residential units) fall into this category. These panels are small enough and contain little combustible and are considered to meet the criteria for the 65 Btu/s heat release rate. Some of the control and distribution panels in the 11 fire zones are of this type.

b) The second category consists of floor-based single panel cabinets, typically 3-5' x 3-5' x 6-10', that may contain one or more cable bundles, instruments and relays/switches. Examples of these are diesel generator control panels and CRD control panels. This category covers most of what is in the unscreened fire zones. While most of these panels met the criteria for the 65 Btu/s heat release rate, some, however, were examined for impact of 190 Btu/s.

c) The third category consists of large walk through type cabinets. These may contain several cable bundles as well as internal raceways carrying cables throughout the panel. The only panel that fit this category (outside the main control room) was the Waste Disposal Control Panel & Extension in fire zone 17A of the Primary Auxiliary Building (PAB). This panel was re-examined using the 190 Btu/s heat release rate.

Static Inverters – The static inverters at IP3 are medium-sized cabinets, which contain low amounts of combustibles. A few large cables are routed in the cabinets. Control wiring is limited and more bundled, but they do traverse horizontally. The cabinets are vented on the top and have a small cooling fan. The cabinets also contain breakers, switches and instruments.

The configuration of an inverter is not similar to any of the tested configurations in the Sandia or Finnish tests. The configuration of this cabinet was compared with the configuration in Test 23 (Preliminary Cabinet Test #5, in picture 32.a) of Sandia's cabinet fire tests (Reference 5). This is the only cabinet test, with qualified cables, that resulted in peak heat release rate significantly higher than 65 Btu/s. The loading in this test was 1.47 MBtu of cabling unbundled and distributed throughout the cabinet. The cabinet was provided with the bottom front ventilation grill and the rear door remained open during the test. Room ventilation was set at 1 room turnover per hr.

The inverter examined at IP3 contains significantly lower combustible load than the configuration in Test 23. There is significantly more bundling and far fewer cables (a few large DC cables) traversing in the middle of the cabinet. The cabinet is open at the top and contains a fan at the top of the cabinet that helps prevent formation of hot gases as a means of propagating fire inside the cabinet. Use of a 65 Btu/s heat release rate is considered appropriate based on the combustible load, separation of the ignition source from combustibles and separation of combustibles.

Battery Chargers – Battery charger 35 in the cable spreading room was selected as typical. This charger is a 3' X 4' X 6' vented cabinet. The combustible load in the cabinet is mostly from capacitors and plastics and less from cable insulation. The larger cables in lower section are not bundled and are routed in the middle section of the cabinet. The control wiring is mostly bundled and is located in the upper section of the cabinet.

The configuration of the battery charger is not similar to any of the tested configurations in the Sandia or Finish tests. The configuration of this cabinet was compared with the configuration in Test 23 (Preliminary Cabinet Test #5, in picture 32.a) of the Sandia's cabinet fire tests (Reference 5). This is the only cabinet test, with qualified cables, that resulted in peak heat release rate significantly higher than 65 Btu/s. The loading in this test was 1.47 MBtu of cabling unbundled and distributed throughout the cabinet. The cabinet was provided with the bottom front ventilation grill and the rear door remained open during the test. Room ventilation was set at 1 room turnover per hr.

The battery charger examined contains significantly lower combustible load than the configuration in Test 23. There is more bundling in the upper control section of the charger and far fewer cables (a few large cables) traversing in the middle of the cabinet. The cabinet is open at the top that helps prevent formation of hot gases as a means of propagating fire inside the cabinet. Use of a 65 Btu/s heat release rate is considered appropriate based on the combustible load, separation of the ignition source from combustibles and separation of combustibles.

Transformers – All transformers in the 11 fire zones at IP3 are dry-type transformers. All, except the six Station Service Transformers (SSTs), 4 in the switchgear room and 2 in south Turbine Building elevation 15', are small transformers with the voltage at the high side equal or less than 480V. The SSTs are 6.9KV-to-480V transformers rated at about 2000KVA.

The amount and configuration of combustibles even in the SSTs is not enough to sustain a large fire. Therefore, a heat release rate of 65 Btu/s is considered appropriate for an electrical fire in these dry-type transformers.

3.0 Evaluation of the Effect of Heat Loss Factor and Electrical Cabinet Heat Release Rate

Ignition source screening and fire modeling in the IP3 IPEEE (Reference 1) depended on heat loss factors and cabinet fire heat release rates for those sources whose zone of influence provided the basis for screening or assessment of damage states. For this reevaluation, we examined the effect of changing these two parameters.

3.1 Evaluation of the Effect of Heat Loss Factor (HLF)

The evaluation of the effect of heat loss factor took the following into account:

1. Use of an HLF equal to 0.85 is appropriate for the analysis of cabinet fires if the virtual surface of the cabinet analyzed is greater than 0.4 times the height of the room. For those cabinets less than 0.4 times the height of the room, the hot gas layer contribution was re-calculated using a heat loss factor of 0.7.

2. A hot gas layer contribution is embedded in the calculation of the critical heights determined in preparation for screening, therefore screening could be affected by reducing the HLF.

The results of the examination of the revised HLF can be summarized as follows.

Oil-Based Fires. Severe oil fires were analyzed in the switchgear room (Zone 14) and AFW pump room (Zone 23).

- Switchgear Room (Zone 14). In the switchgear room, oil fires originate from the instrument air closed cooling water (IACCW) pumps and the instrument air (IA) compressors. For the IACCW pumps, if the heat loss factor is reduced to 0.7, the temperature rise increases from 7°F to 13°F. The IPEEE analysis for this scenario conservatively assumed that all of the cable trays in the plume above the pump (including offsite power cables) could fail within the first minute of the oil fire. The time available to suppress the fire before damage to the 480V switchgear occurs due to room heatup was based on analysis of subsequent cable tray fires, whose virtual surface was higher than 0.4 times the height of the room. Therefore, the analysis of the cable tray fire remains valid for the IACCW pumps. For the IA compressors, the IPEEE analysis postulated a severe oil fire occurring at either compressor. Analysis of the oil fire using a heat loss factor of 0.85 predicted the most severe consequences for the room, which is loss of offsite power and total loss of the 480V switchgear. Therefore, decreasing the heat loss factor for this scenario does not result in a different outcome, and the IPEEE analysis remains valid.

- AFW Pump Room (Zone 23). In the AFW pump room, oil fires originate from the motor-driven or oil-driven AFW pump bearings. For the AFW pump room, the analysis using a heat loss factor of 0.85 predicted that severe damage could occur within minutes to cables and components directly from the oil fire. However, the fuel available from oil fires alone was not sufficient to cause critical temperatures throughout the room. The IPEEE analysis predicted a hot gas layer temperature rise of 31°F. Reducing the heat loss factor to 0.7 caused the predicted hot gas layer temperature rise to increase to 64°F, still well below the critical hot gas layer temperature required to cause widespread damage throughout the room. The IPEEE analysis predicted that ignition of overhead trays was possible and could result in the formation of a critical hot gas layer and subsequent loss of all electrical equipment in the compartment. Manual suppression was not credited in the zone.

Automatic suppression was credited in preventing a critical hot gas layer temperature and would still occur prior to widespread damage if a lower heat loss factor was used. Therefore, the IPEEE analysis remains valid.

Electrical Cabinet Fires. As stated above, for cabinets taller than 0.4 times the height of the room, a heat loss factor of 0.85 was found to be acceptable. For those cabinets located below 0.4 times the room height, the hot gas layer contribution was recalculated using a heat loss factor of 0.7. The maximum temperature rise an any zone due to the cabinet fire alone using a heat loss factor of 0.7 was 34°F, well below the critical hot gas layer temperature required to cause failure of the entire room. Therefore, the IPEEE analysis remains valid.

Transient Combustible Fires. For transient combustible fires, the maximum hot gas layer temperature rise in any zone due to the transient fire alone was 46°F when the heat loss factor is reduced to 0.7. Calculations to determine area ratios for transient fires relied on critical radiant flux distances, which are independent of the selection of heat loss factor. Therefore, the IPEEE analysis remains valid.

The HLF also affects the critical height that could damage or ignite overhead cable trays. For oil fires the change in critical damage height could change by as much as 9", which could be significant. However, examination of oil fires in the 11 unscreened fire zones in Table 1 shows that all oil fires were assumed to cause ignition of the overhead cable trays regardless of the distance from the floor. For all other fire sources, including electrical cabinets and transients, the change in critical distance is less than 2" for these fire zones. This is well within the margin of error for estimates based on visual inspection. The targets just outside the zone of influence were generally assumed to be damaged by the source and thus not screened out.

3.2 Evaluation of the Effect of Electrical Cabinet Heat Release Rate (HRR)

Examination of the 11 unscreened fire zones in Table 1 identified 9 fire zones that contain electrical cabinets that potentially may not satisfy the criteria established in the EPRI guidance for 65 Btu/s and would need to be re-evaluated with the higher HRR of 190 Btu/s. Two zones (the upper and lower electrical tunnels – Zones 60A and 7A, respectively) were eliminated because they do not contain electrical cabinets. A summary of the results for each electrical cabinet is provided in Table 3. For each electrical cabinet that did not satisfy the criteria for 65 Btu/s, the impact of the higher HRR was examined and summarized in Table 2.

The Waste Disposal Panel in the Primary Auxiliary Building Corridor (PAB-2, zone 17A) was the only electrical cabinet for which the higher heat release rate of 190 Btu/s was found to have an impact on the results. Examination of the PAB corridor, fire zone 17A, for the combined impact of the revised HRR for the Waste Disposal Panel and the HLF is discussed below.

The Waste Disposal Panel is a low voltage panel with no vents except for small louvers in the door of the extension. The louvers are approximately 3 inches by 1-1/2 inches in size and are located about 12 inches below the top of the cabinet. The doors are tightly fit and closed. Cables entering and exiting the cabinets are enclosed in conduit. Therefore, the amount oxygen will limit the heat exiting the panel leading to lower heat release rate.

However, should a fully developed fire occur within this panel, the overhead cables could be damaged and ignited. The fire frequency contribution for this ignition source, crediting a fire severity factor, is 5.67×10^{-6}/yr, limiting the CDF even if all circuits in the fire zone are assumed damaged by this fire with no consideration of suppression. The fire zone is protected by the area-wide ionization detectors with hose stations (water) and CO2 extinguishers. The maximum CCDP value that was calculated for any fire scenario in the PAB 55' Elevation Corridor was 3.29×10^{-3}, based on loss of both MCCs 36B and 37. Use of this value will estimate the CDF for the Waste Disposal Panel fire scenario at 1.87×10^{-8}/yr, well below the CDF screening criteria of 10^{-6}/yr.

4.0 Evaluation of the Revised HLF on Analysis of Multi-Compartment Fire Scenarios

Analysis of the multi-compartment fires at IP3 was based on fire frequency in the exposing compartment, probability of the barrier failure, probability of the automatic suppression reliability/availability and CCDP of the combined compartment. The screening or calculation of the multi-compartment fire scenarios did not rely on the HGL temperature and therefore is not impacted by the HLF or HRR.

5.0 Summary

A detailed examination of all fire zones at IP3 was done to evaluate any changes resulting from revised electrical cabinet heat release rates and heat loss factors per guidance provided by EPRI. Each step of the screening and fire modeling was examined.

Electrical cabinets analyzed for the fire IPEEE were examined through walkdowns at IP3 with examination of the internals of representative cabinets when possible. Several electrical cabinets were identified that do not meet the criteria for the 65 Btu/s heat release rate. These panels were evaluated to identify possible impact on the fire scenario CDF values that were reported in the IP3 IPEEE (Reference 1). Only a fire in the waste disposal panel (WDP) in the primary auxiliary building (PAB), fire zone 17A, resulted in a new fire scenario that could impact the fire CDF. However, the CDF contribution from this scenario is only 1.9×10^{-8}/yr, which is well below the CDF screening threshold of 10^{-6}/yr.

The selection of heat loss factor was also reviewed for each fire zone to determine whether a lower heat loss factor of 0.7 was warranted. Although there were several instances where the heat loss factor was changed to 0.7 from 0.85, the results of the original IPEEE analysis remained valid for all cases.

6.0 References

1. IP3-RPT-UNSPEC-02182, "Indian Point 3 Nuclear Power Plant, Individual Plant Examination of External Events," September 1997.

2. B. Najafi, et al, "Guidance for Development of Response to Generic Request for Additional Information on Fire Individual Plant Examination for External Events (IPEEE)," prepared by Data Systems & Solutions for Electric Power Research Institute, Final Report, May 1999.

3. EPRI TR-105928, "Fire PRA Implementation Guide," December 1995.

4. NRC letter, George F. Wunder to James Knubel, "Request for Additional Information Regarding Response to Generic Letter 88-20, Supplement 4, "Reactor Vessel Structural Integrity" – Indian Point Unit 3 (TAC No. M83632)," June 3, 1998.

5. J. Chavez, "An Experimental Investigation of Internally Ignited Fires in Nuclear Power Plant Control Cabinets – Part II: Cabinet Effects Test," NUREG/CR-4527, Volume 2, April 1987.

6. NRC letter, Thomas L. King to Dave Modeen (NEI), "EPRI Guidance for Development of Response to NRC's Generic Request for Additional Information on the EPRI Fire PRA Implementation Guide," June 25, 1999.

Table 1: Zones Potentially Impacted by HLF and/or Electrical Cabinet HRR

Fire Area	Fire Zone	Description	Initial Screening CDF (/yr) Based on Fire Zone Frequency [Ref. 1, Table 4.4.4.1] and CCDP [Ref. 1, Table 4.4.4.2]	Fire-Induced CDF [Ref. 1, Table 4.7.5.1]
PAB-2	17A	Corridor	1.25E-02	3.17E-8
CTL-3	10	Diesel Generator 31	6.34E-06	2.13E-6
CTL-3	11	Cable Spreading Room	1.75E-02	6.83E-6
CTL-3	14	Switchgear Room	1.06E-02	3.51E-5
CTL-3	102A	Diesel Generator 33	5.19E-06	1.93E-6
AFW-6	23	Auxiliary Feedwater Pump Room	2.11E-05	2.28E-7
TBL-5	37A	South Turbine Building Elev. 15'	6.08E-04	3.78E-8
ETN-4	60A	Upper Electrical Tunnel	1.23E-03	7.14E-07 *
ETN-4	7A	Lower Electrical Tunnel	1.09E-05	2.78E-07 *
ETN-4	73A	Upper Electrical Penetration Area	1.16E-05	< 1E-6 **
ETN-4	74A	Lower Electrical Penetration Area	1.71E-06	< 1E-6 **

* The issue of heat release rate is not applicable to these zones due to the lack of electrical cabinets.

** These zones were screened in the IPEEE during the final quantitative screening process.

Table 2: Electrical Cabinets That Do Not Satisfy The Criteria for 65 BTU/s HRR

Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Electrical Cabinet HRR Examination Result	Fire Area CDF *	Notes for Re-evaluation
TBL-5/37A - South Turbine Bldg. Elev. 15'				***6.08E-4 (IS) 1.12E-4 (FS) 3.78E-8 (FM)***	
H_2 Control Panel	Control Panel	Yes	Med. Vented cabinet with cable tray 6' overhead.		The critical targets in this fire zone are the 6.9KV switchgears 31 and 32, power distribution panel PDP-TG-1. Appendix R MCC 312A, 480V switchgear 312 and 313 and their associated service transformers. These components are in the 6.9KV switchgear area between column lines 11 and 14 in zone 37A. Ignition sources considerably outside the 6.9KV area were screened in the IPEEE, on the basis that there are no mechanism by which they could damage the targets in the 6.9KV switchgear area because of the large distances and size of the room. The H_2 panel is located approximately at the intersection of column lines 59 and 12, more than 31 ft from these targets. Therefore change in the HRR of the H_2 control panel does not impact the damage and fire risk in the fire zone.

Table 2: Electrical Cabinets That Do Not Satisfy The Criteria for 65 BTU/s HRR

Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Electrical Cabinet HRR Examination Result	Fire Area CDF *	Notes for Re-evaluation
ETN-4/73A - Upper Electrical Penetration Area				***1.16E-5 (IS) 9.24E-7 (FS)***	
Alt. Source Range/RCS Temp. Cabinet	Control Panel	No	Med. Single-panel vented cabinet.		No fire modeling calculations were performed for the upper and lower electrical penetration areas in the IPEEE. All of the unscreened ignition sources, including the Alt. Source Range/RCS Temp Cabinet, were evaluated in the IPEEE based on an assumption that all equipment and cables could fail in the event of a fire. As such the outcome did not rely on heat release rates. Therefore, no further evaluation of the heat release rate was performed for the Alt. Source Range/RCS Temperature Cabinet.

Table 2: Electrical Cabinets That Do Not Satisfy The Criteria for 65 BTU/s HRR

Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Electrical Cabinet HRR Examination Result	Fire Area CDF *	Notes for Re-evaluation
CTL-3/10 – Diesel Generator Room 31				***6.34E-6 (IS) 5.80E-6 (FS) 2.13E-6 (FM)***	
31 EDG Control Panel	Control Panel	Yes	Med. Single-panel vertical cabinet with small cooling fan. Cable tray located 5-6 feet overhead.		The IP3 IPEEE determined that the only targets of interest in the DG rooms were the cables supplying power to the DG exhaust fans. A fire impacting the exhaust fan power cables in DG room 31 that could cause power to all six DG room exhaust fans to be interrupted. A fire in DG room 32 or 33 could cause power to all four exhaust fans in DG rooms 32 and 33 to be interrupted. All other fires would, at worst, result in failure of the diesel generator installed in the zone. Offsite power would be available and two diesel generators would remain operable, therefore, the CCDP for this event was considered to be negligible. The cables of interest are routed in conduit below the deck and on the south and west walls of the DG rooms. Screening of the EDG Control Panels was based qualitatively on the potential for hazards to impact these cables. The DG control panels are not close enough to the cables of interest to pose a risk of exposure. Moreover, there are no exposed cables in the DG rooms, and therefore no potential for cabinet fires to propagate to exposed combustibles. As such, the screening of these panels was independent of heat release rates. Therefore, no further evaluation of the heat release rate was performed for the Diesel Generator Control Panels.

Table 2: Electrical Cabinets That Do Not Satisfy The Criteria for 65 BTU/s HRR

Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Electrical Cabinet HRR Examination Result	Fire Area CDF *	Notes for Re-evaluation
CTL-3/102A – Diesel Generator Room 33				***5.19E-6 (IS) 4.70E-6 (FS) 1.93E-6 (FM)***	
33 EDG Control Panel	Control Panel	Yes	Med. Single-panel vertical cabinet with small cooling fan. Cable tray located 5-6 feet overhead.		See notes for 31 EDG Control Panel.

Table 2: Electrical Cabinets That Do Not Satisfy The Criteria for 65 BTU/s HRR

Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Electrical Cabinet HRR Examination Result	Fire Area CDF *	Notes for Re-evaluation
CTL-3/11 – Cable Spreading Room				***1.75E-2 (IS) 1.43E-3 (FS) 6.83E-6 (FM)***	
Westing-house Power Cabinets (X14)	Control Panel	No	Vertical vented cabinets with cable trays 6' overhead.		If the HRR is increased to 190 Btu/s the critical height increase to 5.9 ft above the top of the cabinet, an increase of 2.1 ft. At the location of the CFMS Multiplexer, there are overhead trays within the damage distance. However, these trays were assumed damaged and ignited in the IPEEE. Therefore, increasing the HRR to 190 Btu/s does not impact the results.
CFMS Multiplexer (x4)	Control Panel	No	Single-panel vented cabinet (instrument rack) with circuit cards (low energy). Two cable bundles enter the cabinet at the top. They are routed next to each other at one side of the panel.		If the HRR is increased to 190 Btu/s the critical height increase to 5.9 ft above the top of the cabinet, an increase of 2.1 ft. At the location of the CFMS Multiplexer, there are overhead trays within the damage distance. However, these trays were assumed damaged and ignited in the IPEEE. Therefore, increasing the HRR to 190 Btu/s does not impact the results.

Table 2: Electrical Cabinets That Do Not Satisfy The Criteria for 65 BTU/s HRR

Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Electrical Cabinet HRR Examination Result	Fire Area CDF *	Notes for Re-evaluation
PAB-2/17A – Corridor				***1.25E-2 (IS) 1.82E-3 (FS) 3.17E-8 (FM)***	
Waste Disposal Panel With Extension	Control Panel	No	Large walkthrough cabinet with multiple cable bundles.		This panel does not meet the criteria for 65 Btu/s. Fire scenarios associated with this control panel were re-evaluated assuming a heat release rate of 190 Btu/s.

* IS Fire area CDF at Initial Screening, i.e., with total compartment ignition frequency and failure of all circuits in the fire area.

FS Fire area CDF at Final Screening, i.e., with screening of fixed ignition source and severity factors.

FM Fire area CDF after Fire Modeling

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
CTL-3	11	Cable Spreading Room	BATTERY CHARGER31	Battery Charger	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for battery chargers.
CTL-3	11	Cable Spreading Room	BATTERY CHARGER32	Battery Charger	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for battery chargers.
CTL-3	11	Cable Spreading Room	BATTERY CHARGER34	Battery Charger	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for battery chargers.
CTL-3	11	Cable Spreading Room	BATTERY CHARGER35	Battery Charger	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for battery chargers.
CTL-3	14	Switchgear Room	BATTERY CHARGER 33	Battery Charger	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for battery chargers.
CTL-3	11	Cable Spreading Room	DC RECTIFIER	Control Panel	yes	Removed ~2.5 years ago.
TBL-5	37A	South Turbine Bldg. Elev. 15'	NEOWELD ELEC. CABINET	Control Panel	yes	Permanently removed from service (de-energized).
CTL-3	10	Diesel Generator 31	CONTROL STATION RG8	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	10	Diesel Generator 31	DIESEL ISOLATION CABINET	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	10	Diesel Generator 31	MISC. SWITCHES	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	VOLTAGE REGULATORS (X3)	Control Panel	no	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	31 INVERTER XFER SWITCH & FUSE BOX	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	31-34 BATTERY TEST TIE DISCONNECT	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	32 INVERTER XFER SWITCH & FUSE BOX	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
CTL-3	11	Cable Spreading Room	33 INVERTER XFER SWITCH & FUSE BOX	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	33 XFER SWITCH	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	34 IB XFER SWITCH	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	COMM. PANEL / RELAY BOXES (x5)	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	HJ8/HJ9 CONTROL STATIONS (x2)	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	IB FILTER 31	Control Panel	no	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	IB FILTER 32	Control Panel	no	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	IB FILTER 33	Control Panel	no	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	LIGHTING PANEL 319	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	LIGHTING PANEL 319A	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	LIGHTING PANEL 39	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	MISC. FUSE BOXES (x6)	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	MISC. SWITCHES (x2)	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	PZR HEATER GROUND RELAY PNL	Control Panel	no	65 Btu/s is acceptable because of the panel size. See note 1.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
CTL-3	11	Cable Spreading Room	RPI POWER SUPPLY XFER SWITCH	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	WRGM SYSTEM PANEL	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	14	Switchgear Room	32 LIGHTING XFER SWITCH	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	14	Switchgear Room	FIRE PROTECTION PANELS (ELECTROMATIC)	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	14	Switchgear Room	RELAY BOX	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	14	Switchgear Room	RQ0 DISCONNECT SWITCH	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	14	Switchgear Room	RR0 DISCONNECT SWITCH (IAS)	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	14	Switchgear Room	SWITCHGEAR ISOL. CABINET	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	14	Switchgear Room	SWS/FCU LOCAL CONTROL PANEL	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	14	Switchgear Room	XFER SWITCH SWS PUMP/STR	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	14	Switchgear Room	Y1W INST AIR FUSE BOXES	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	14	Switchgear Room	YA10 INST AIR FUSE BOXES	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	14	Switchgear Room	PANEL L7U (48/EXF2 transfer switch)	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	14	Switchgear Room	E.F.P. MANUAL XFER SWITCH	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
PAB-2	17A	Corridor	480V LIGHT TRANSFER SWITCH 34	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
PAB-2	17A	Corridor	BORIC ACID XFER SWITCH	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
PAB-2	17A	Corridor	CHARGING PUMPS STABILIZER HTR PANEL	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
PAB-2	17A	Corridor	CHARGING, LETDOWN, 31 PZR HTR PANEL (x2)	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
PAB-2	17A	Corridor	DRUMMING CONTROL PANEL	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
PAB-2	17A	Corridor	LIGHTING PANEL 311, 311A & 313 (x3)	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
PAB-2	17A	Corridor	LOCAL CONTROL PANEL (PL-6)	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
PAB-2	17A	Corridor	TRANS. SWITCH 36	Control Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
PAB-2	17A	Corridor	MISC. SWITCHES (x4)	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
AFW-6	23	Auxiliary Feedwater Pump Room	ELEC. PANEL (PT2)	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
TBL-5	37A	South Turbine Bldg. Elev. 15'	WEIR POWER UNIT/PANEL (retired in place)	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
TBL-5	37A	South Turbine Bldg. Elev. 15'	MISC. CABINETS (behind BUS 312/313)	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	73A	Upper Electrical Penetration Area	FUSE BOXES (NO31 & NO32)	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
ETN-4	73A	Upper Electrical Penetration Area	INSTRUMENT ISOLATION CABINET	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	73A	Upper Electrical Penetration Area	N38 AMPLIFIER CAB.	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	73A	Upper Electrical Penetration Area	N38 POWER SUPPLY SELECTOR SWITCH	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	73A	Upper Electrical Penetration Area	N39 AMPLIFIER CAB.	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	73A	Upper Electrical Penetration Area	N39 SIGNAL PROCESSOR	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	73A	Upper Electrical Penetration Area	R62 PANELS (x4)	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	73A	Upper Electrical Penetration Area	Y-96 PZR FUSE BOX	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	73A	Upper Electrical Penetration Area	Y-97 PZR FUSE BOX	Control Panel	no	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	73A	Upper Electrical Penetration Area	Y-98 PZR FUSE BOX	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	73A	Upper Electrical Penetration Area	MCC38 FUSE BOX	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	74A	Lower Electrical Penetration Area	PZR HEATER CONTROL (SCR) PANEL	Control Panel	no	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	74A	Lower Electrical Penetration Area	PZR BACKUP HEATER BKR PANEL	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	74A	Lower Electrical Penetration Area	PZR MODULATING HEATER BKR PANEL	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
CTL-3	102A	Diesel Generator 33	MISC. SWITCHES	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
PAB-2	17A	Corridor	CVCS BORIC ACID HEAT TRACE PANEL 33	Control Panel (DP/CP)	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
PAB-2	17A	Corridor	CVCS BORIC ACID HEAT TRACE PANEL 33A (x2)	Control Panel (DP/CP)	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
PAB-2	17A	Corridor	CVCS BORIC ACID HEAT TRACE PANEL 33B	Control Panel (DP/CP)	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	73A	Upper Electrical Penetration Area	N38 SIGNAL PROCESSOR CAB.	Control Panel	yes	65 Btu/s is acceptable. Switches are generally small ~3'x4'x1' units. See note 1.
ETN-4	73A	Upper Electrical Penetration Area	PA0 (120VAC POWER/CONTROL INST. PNL)	Control Panel	yes	This is a 120/240VAc standard electrical distribution panel with a 100amp main breaker and several 20 amp branch circuit breakers. The 65 Btu/s is appropriate on the bases of panel size, see note 1.
CTL-3	11	Cable Spreading Room	33 STATIC INV. BYPASS SWITCH	Control Panel	no	This panel is a medium size single-panel vented vertical cabinet is similar to an inverter. The 65 Btu/s is acceptable. See the writeup in Section 2 for distribution panels.
CTL-3	11	Cable Spreading Room	TELEMETRY CABINETS (x2)	Control Panel	yes	This is a medium size single-panel vented (at the bottom) vertical cabinet. Cable tray runs ~1' overhead. The target is close enough that they could be damaged/ignited with 65 Btu/s. Therefore use of 65 Btu/s is acceptable.
ETN-4	74A	Lower Electrical Penetration Area	H_2 RECOMBINER POWER SUPPLY (31, 32)	Control Panel	no	This is a medium size single-panel vented cabinet with low unbundled combustibles and cable tray 2' overhead. The target is close enough that they could be damaged/ignited with 65 Btu/s. Therefore use of 65 Btu/s is acceptable.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
PAB-2	17A	Corridor	COMPUTER STANDBY POWER (2 OF 2)	Control Panel	no	The Computer Standby cabinets (2) are part of the IP3 Security System and are safeguards information. One of the computer cabinets contains a UPS, distribution panel, automatic transfer switch, cables and terminal blocks. The second cabinet contains 12 - 12volt car batteries. Use of 65 Btu/s is acceptable based on amount of cabling.
PAB-2	17A	Corridor	MISC. PANEL 300	Control Panel	yes	The panel 300 is part of the IP3 Security System. This contains a multiplexer with a lot of printed circuit cards, wire and terminal blocks. Use of 65 Btu/s is acceptable based on amount of cabling.
TBL-5	37A	South Turbine Bldg. Elev. 15'	OSCILLOGRAPH SYSTEM PANEL	Control Panel	yes	Med. Vented cabinet with cable tray 6' overhead. The panel contains mostly instruments with small amount of wiring. Few wires are routed in the middle of the panel to connect to the instruments. The criterion for 65 Btu/s is satisfied.
CTL-3	11	Cable Spreading Room	MISC. ELEC. CABINET (Plant Param. Sig. Conv. Cab.)	Control Panel	no	Med. Single-panel vented vertical cabinet located between BC 35 and Static Inverter 33. The panel contains mostly instruments with small amount of wiring. Few wires are routed in the middle of the panel to connect to the instruments. The criterion for 65 Btu/s is satisfied.
ETN-4	73A	Upper Electrical Penetration Area	ALT. SOURCE RANGE/RCS TEMP. CABINET	Control Panel	no	Med. Single-panel vented cabinet. This panel was re-evaluated with a 190 Btu/s HRR.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
CTL-3	11	Cable Spreading Room	WESTINGHOUSE POWER CABINETS (X14)	Control Panel	no	Med. Vertical vented cabinets with cable trays 6' overhead. This panel was re-evaluated with a 190 Btu/s HRR.
TBL-5	37A	South Turbine Bldg. Elev. 15'	H_2 CONTROL PANEL	Control Panel	yes	Med. Vented cabinet with cable tray 6' overhead. This panel was re-evaluated with a 190 Btu/s HRR.
CTL-3	10	Diesel Generator 31	31 EDG CONTROL PANEL	Control Panel	yes	Med. Single-panel vertical cabinet with small cooling fan. Cable tray located 5-6 feet overhead. This panel was re-evaluated with a 190 Btu/s.
CTL-3	102A	Diesel Generator 33	33 EDG CONTROL PANEL	Control Panel	yes	Med. Single-panel vertical cabinet with small cooling fan. Cable tray located 5-6 feet overhead. This panel was re-evaluated with a 190 Btu/s.
CTL-3	11	Cable Spreading Room	CFMS MULTIPLEXER (x4)	Control Panel	no	Single-panel vented cabinet (instrument rack) with circuit cards (low energy). Two cable bundles enter the cabinet at the top. They are routed next to each other at one side of the panel. This panel was re-evaluated with a 190 Btu/s.
PAB-2	17A	Corridor	WASTE DISPOSAL PANEL WITH EXTENSION	Control Panel	no	Large walkthrough cabinet with multiple cable bundles. This panel was re-evaluated with a 190 Btu/s HRR.
CTL-3	11	Cable Spreading Room	STRIP HEATER PANEL 32	Distribution Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	14	Switchgear Room	STRIP HEATER PNL 31	Distribution Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
PAB-2	17A	Corridor	HEATER PANEL (H-2)	Distribution Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
PAB-2	17A	Corridor	LOCAL CONTROL PANEL (PL-2)	Distribution Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
PAB-2	17A	Corridor	STRIP HEATER PANEL 34	Distribution Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
TBL-5	37A	South Turbine Bldg. Elev. 15'	PDP-TG-1	Distribution Panel	yes	65 Btu/s is acceptable because of the panel size. See note 1.
CTL-3	11	Cable Spreading Room	125V DC POWER PANEL 31	Distribution Panel	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Distribution Panels.
CTL-3	11	Cable Spreading Room	125V DC POWER PANEL 32	Distribution Panel	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Distribution Panels.
CTL-3	14	Switchgear Room	125V DC POWER PANEL 33	Distribution Panel	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Distribution Panels.
CTL-3	11	Cable Spreading Room	125V DC POWER PANEL 34	Distribution Panel	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Distribution Panels.
CTL-3	11	Cable Spreading Room	AC DIST. PANEL DP-CCR/AC	Distribution Panel	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Distribution Panels.
PAB-2	17A	Corridor	120V AC DIST PANEL 32	Distribution Panel	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Distribution Panels.
PAB-2	17A	Corridor	DISTRIBUTION PANEL 33	Distribution Panel	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Distribution Panels.
CTL-3	11	Cable Spreading Room	DC DIST. PANEL DP-503	Distribution Panel	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Distribution Panels.
PAB-2	17A	Corridor	DISTRIBUTION PANEL DP-504	Distribution Panel	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Distribution Panels.
PAB-2	17A	Corridor	FD-2 DISTRIBUTION PANEL (x3)	Distribution Panel	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Distribution Panels.
CTL-3	14	Switchgear Room	33 BATTERY OUTPUT BKR	Distribution Panel	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Distribution Panels.
ETN-4	74A	Lower Electrical Penetration Area	DIST. PNL. DP-534	Distribution Panel	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Distribution Panels.
CTL-3	11	Cable Spreading Room	STATIC INVERTER 31	Inverter	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Static Inverters.
CTL-3	11	Cable Spreading Room	STATIC INVERTER 32	Inverter	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Static Inverters.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
CTL-3	11	Cable Spreading Room	STATIC INVERTER 33	Inverter	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Static Inverters.
CTL-3	11	Cable Spreading Room	STATIC INVERTER 34	Inverter	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Static Inverters.
CTL-3	14	Switchgear Room	33 STATIC INV DC FEED SWITCH	Inverter	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for Static Inverters.
CTL-3	11	Cable Spreading Room	MCC-39 (x27)	MCC	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for MCCs.
CTL-3	11	Cable Spreading Room	ROD DRIVE MG SET OUTPUT BRKR (x2)	MCC	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for MCCs.
CTL-3	11	Cable Spreading Room	RX TRIP BREAKER PANEL (x6)	MCC	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for MCCs.
CTL-3	14	Switchgear Room	MCC-36C	MCC	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for MCCs.
PAB-2	17A	Corridor	MCC 36A (x66)	MCC	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for MCCs.
PAB-2	17A	Corridor	MCC 36B (x64)	MCC	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for MCCs.
PAB-2	17A	Corridor	MCC 37 (x71)	MCC	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for MCCs.
TBL-5	37A	South Turbine Bldg. Elev. 15'	ALTERNATE POWER MCC-312A	MCC	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for MCCs.
CTL-3	14	Switchgear Room	BUS 2A 480V SWITCHGEAR 31	Switchgear	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for 480V switchgears.
CTL-3	14	Switchgear Room	BUS 3A 480V SWITCHGEAR 32	Switchgear	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for 480V switchgears.
CTL-3	14	Switchgear Room	BUS 5A 480V SWITCHGEAR 31	Switchgear	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for 480V switchgears.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
CTL-3	14	Switchgear Room	BUS 6A 480V SWITCHGEAR 32	Switchgear	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for 480V switchgears.
PAB-2	17A	Corridor	LIGHT SWGR 32 (x5)	Switchgear	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for 480V switchgears.
PAB-2	17A	Corridor	LIGHT SWGR 33 (x6)	Switchgear	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for 480V switchgears.
TBL-5	37A	South Turbine Bldg. Elev. 15'	6.9KV SWGR 31	Switchgear	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for 480V switchgears.
TBL-5	37A	South Turbine Bldg. Elev. 15'	6.9KV SWGR 32	Switchgear	no	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for 480V switchgears.
TBL-5	37A	South Turbine Bldg. Elev. 15'	BUS 312/313	Switchgear	yes	Use of 65 Btu/s is acceptable. See the writeup in Section 2 for 480V switchgears.
CTL-3	14	Switchgear Room	STATION SERVICE XFMR 2	Transformer	no	~2000KVA 6.9KV-to-480V transformer. Use of 65 Btu/s is considered acceptable due to amount and configuration of combustibles. See the writeup in Section 2 for transformers.
CTL-3	14	Switchgear Room	STATION SERVICE XFMR 3	Transformer	no	~2000KVA 6.9KV-to-480V transformer. Use of 65 Btu/s is considered acceptable due to amount and configuration of combustibles. See the writeup in Section 2 for transformers.
CTL-3	14	Switchgear Room	STATION SERVICE XFMR 5	Transformer	no	~2000KVA 6.9KV-to-480V transformer. Use of 65 Btu/s is considered acceptable due to amount and configuration of combustibles. See the writeup in Section 2 for transformers.
CTL-3	14	Switchgear Room	STATION SERVICE XFMR 6	Transformer	no	~2000KVA 6.9KV-to-480V transformer. Use of 65 Btu/s is considered acceptable due to amount and configuration of combustibles. See the writeup in Section 2 for transformers.
TBL-5	37A	South Turbine Bldg. Elev. 15'	SST 312	Transformer	yes	~2000KVA 6.9KV-to-480V transformer. Use of 65 Btu/s is considered acceptable due to amount and configuration of combustibles. See the writeup in Section 2 for transformers.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
TBL-5	37A	South Turbine Bldg. Elev. 15'	SST 313	Transformer	yes	~2000KVA 6.9KV-to-480V transformer. Use of 65 Btu/s is considered acceptable due to amount and configuration of combustibles. See the writeup in Section 2 for transformers.
CTL-3	11	Cable Spreading Room	1 MISC. TRANSFORMER	Transformer	no	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
CTL-3	11	Cable Spreading Room	31 AIB BU TRANSFORMER 5	Transformer	no	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
CTL-3	11	Cable Spreading Room	32 AIB BU TRANSFORMER 1-6	Transformer	no	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
CTL-3	11	Cable Spreading Room	6 MISC. TRANSFORMERS	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
CTL-3	11	Cable Spreading Room	BE1 XFMR	Transformer	no	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
CTL-3	11	Cable Spreading Room	BE2 XFMR	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
CTL-3	11	Cable Spreading Room	BM6 XFMR	Transformer	no	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
CTL-3	11	Cable Spreading Room	PZR HTR CONTROL GROUP POWER XFMRs	Transformer	no	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
CTL-3	11	Cable Spreading Room	SOLA XFMR FOR IB 32, 32A	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
CTL-3	11	Cable Spreading Room	SOLA XFMR FOR IB 34	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
CTL-3	11	Cable Spreading Room	SUPPLY XFMR	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
CTL-3	14	Switchgear Room	TRANSFORMER	Transformer	no	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
CTL-3	14	Switchgear Room	(BL0) TRANSFORMER	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
CTL-3	14	Switchgear Room	BK6 TRANSFORMER	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
CTL-3	14	Switchgear Room	BK7 TRANSFORMER	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
CTL-3	14	Switchgear Room	BK9 TRANSFORMER	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
PAB-2	17A	Corridor	480V LIGHTING TRANSFORMER 32 & 33	Transformer	no	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
PAB-2	17A	Corridor	480V TRANSFORMER	Transformer	no	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
PAB-2	17A	Corridor	480V TRANSFORMER	Transformer	no	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
PAB-2	17A	Corridor	TRANSFORMER (Sola)	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Fire Area	Fire Zone	Zone Description	Ignition Source	Electrical Cabinet Category	Screened in IPEEE	Examination Result
TBL-5	37A	South Turbine Bldg. Elev. 15'	REGULATOR POTENTIAL XFMR A	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
TBL-5	37A	South Turbine Bldg. Elev. 15'	REGULATOR POTENTIAL XFMR B	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
TBL-5	37A	South Turbine Bldg. Elev. 15'	REGULATOR POTENTIAL XFMR C	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
TBL-5	37A	South Turbine Bldg. Elev. 15'	TRANSFORMER	Transformer	yes	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
TBL-5	37A	South Turbine Bldg. Elev. 15'	TRANSFORMER GT 35	Transformer	no	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
TBL-5	37A	South Turbine Bldg. Elev. 15'	TRANSFORMER GT 36	Transformer	no	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.
ETN-4	73A	Upper Electrical Penetration Area	240V BH-8 TRANSFORMER	Transformer	no	Small (=<480V on the high side) dry-type transformers. Use of 65 Btu/s is considered acceptable because of the size. See the writeup in Section 2 for transformers.

Table 3: Results of the Examination of the Electrical Cabinets for Heat Release Rate at IP3

Note:

1. Small (~3'x4'x1'), enclosed cabinet in many cases mounted on the wall. The amount of combustibles and ignition is small enough that no vents are provided for the cabinet. They may include, lighting panels, transfer switches, small distribution panels with molded-case circuit breakers, etc.