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SUBJECT: Requests for exemption from certain requirements of 10CFR50 App R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to 790101."

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FPL

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L-96-318
10 CFR §50.12
10 CFR §50.48
10 CFR Part 50 Appendix R

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Subject: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Request for Exemption -
Fire Rating of Raceway Fire Barriers in the
Outdoor Fire Area Excluding the Turbine Building

The purpose of this letter is to request, in accordance with the provisions of Title 10 Code of Federal Regulations section 50.12 (10 CFR §50.12), an exemption from certain requirements of 10 CFR Part 50 Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," for Turkey Point Units 3 and 4. The exemption request is provided as an attachment to this letter.

Specifically, Florida Power & Light Company (FPL) requests an exemption from the requirements of 10 CFR Part 50 Appendix R subsection III.G.2.a for raceway fire barriers in outdoor fire zones at Turkey Point, excluding the Open Turbine Building. This exemption and supporting justification, if granted, replaces existing exemptions in outdoor fire zones outside of the Open Turbine Building at Turkey Point Units 3 and 4.

To our knowledge, other than at Turkey Point Plant, there has been little or no use of Thermo-Lag 330-1 outdoor fire barrier configurations within the industry. These outdoor areas are not subject to fire damage from stratified gases or ceiling jet layers such as can occur from a fire in an indoor area. Turkey Point Plant has approximately 17,000 feet of Thermo-Lag protected raceways in outdoor areas. This exemption request addresses an estimated 70% of this total.

Due to the configuration of the Open Turbine Building, FPL is presently evaluating various options to address the remaining Thermo-Lag protected raceways in the Open Turbine Building from north-south column lines 22 to 36 and from east-west column lines A to Jc. As such, the Open Turbine Building will be addressed by separate correspondence.

The requested exemption satisfies the requirements of 10 CFR §50.12 in that it is authorized by law, will not present an undue risk to the public health and safety, is consistent with the common defense and security, and involves special circumstances.

an FPL Group company

cc: NRC/DE
NRC/DSSA
Region

A006

FPL plans to perform, at its own risk, the engineering to achieve implementation of this exemption beginning early 1997 in parallel with NRC review and approval. Accordingly, FPL requests that this proposed exemption be given priority review by NRC staff and that the exemption be approved by June 30, 1997.

FPL will submit an implementation plan for the outdoor areas outside the Open Turbine Building within 120 days of NRC approval of this exemption request.

Very truly yours,

T. F. Plunkett
President
Nuclear Division

OIH

Attachment

cc: S. D. Ebneter, Regional Administrator, Region II, USNRC
T. P. Johnson, Senior Resident Inspector, USNRC, Turkey Point

TURKEY POINT UNITS 3 AND 4
REQUEST FOR EXEMPTION
FIRE RATING OF RACEWAY FIRE BARRIERS IN THE OUTDOOR FIRE AREA EXCLUDING THE TURBINE BUILDING

Table of Contents

I. Introduction

The purpose of this submittal is to request, in accordance with the provisions of Title 10 Code of Federal Regulations section 50.12 (10 CFR §50.12), "Specific exemptions", an exemption for Outdoor Fire Zones excluding the Open Turbine Building at Turkey Point Units 3 and 4 from provisions of subsection III.G.2.a of Appendix R to 10 CFR Part 50. Appendix R sets forth certain fire protection features pertinent to satisfying Criterion 3 of Appendix A to Part 50. The subsection of Appendix R referenced above addresses specific requirements for the protection of safe shutdown capability against fire.

Under 10 CFR §50.12 the NRC may, "...upon application by any interested person . . . grant exemptions from the requirements of . . . regulations . . . ." As applied to the Commission's fire protection regulations by the U.S. Court of Appeals for the D.C. Circuit in Connecticut Light & Power v. NRC, 673 F.2d 525 (D.C. Cir.), cert. denied, 459 U.S. 835 (1982), section 50.12 provides, in effect, an alternative means of complying with certain provisions of Appendix R, including subsection III.G.2.a.

This exemption request supersedes and deletes previously granted exemptions for outdoor fire zones, excluding the Open Turbine Building, at Turkey Point Units 3 and 4, as delineated herein.

II. Discussion

A. Background

Pursuant to 10 CFR §50.48(a), each operating nuclear power plant must have a plan to satisfy Criterion 3, "Fire protection," of Appendix A to 10 CFR Part 50. Under the terms of 10 CFR §50.48(b), "Appendix R . . . establishes fire protection features required to satisfy Criterion 3 of Appendix A . . . with respect to certain generic issues . . . ." In particular, subsections III.G.2.a, b and c of Appendix R address fire protection features for assuring safe shutdown capability. Specifically, subsection III.G.2.a allows the separation of cables and equipment and associated non-safety circuits of redundant trains of certain shutdown systems by a three-hour fire barrier as an acceptable means of protection; subsection III.G.2.b allows for the separation of cables and equipment and associated non-safety circuits of redundant trains of certain shutdown systems by 20 feet of separation, with fire detection, fire suppression and no intervening combustibles; and subsection III.G.2.c allows the enclosure of cable and equipment and associated non-safety circuits in a one-hour fire barrier, with fire detectors and an automatic fire suppression system, as an acceptable alternative.

The standards applied by the NRC in decreasing importance to grant an exemption from regulatory requirements are set forth in 10 CFR §50.12. The standards are that:

(a) The Commission may, upon application by an interested person or upon its own initiative, grant exemptions from the requirements of the regulations of this part, which are -

(1) Authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security.

(2) The Commission will not consider granting an exemption unless special circumstances are present. . . .

Application of this exemption procedure within the context of the Commission's fire protection regulations was considered by the Court of Appeals for the D.C. Circuit in the Connecticut Light case. So applied, the court found that 10 CFR §50.12 provides, in effect, an alternative means of complying with certain fire protection requirements, including the options specified in subsections III.G.2.a and c for the protection of safe shutdown capability. Connecticut Light, 673 F.2d at 528-34. In the words of the court, "if the company can prove that another method works as well as one of the three stipulated by the NRC [in subsections III.G.2.a, b, and c], in light of the identified fire hazards at its plant, it may continue to employ that method." Connecticut Light, 673 F.2d at 534. As detailed below, Florida Power & Light Company (FPL) requests an exemption from the application of certain requirements of subsection III.G.2.a for the reasons stated in the specified bases.

B. Requested Exemption

Subsection III.G.2.a of Appendix R to 10 CFR Part 50 requires that cable and equipment and associated non-safety circuits of a redundant train of certain shutdown apparatus in the same fire area be separated by a fire barrier having a 3-hour rating. FPL requests an exemption for Outdoor Fire Zones permitting the use of the following in lieu of subsection III.G.2.a requirements:

1) Separation of cables and equipment and associated non-safety circuits of redundant trains west of the Open Turbine Building Structure column line A by a 1-hour rated fire barrier until a horizontal distance of 20 feet is attained. Water suppression systems are provided for the major combustible sources, however no suppression or detection is provided for the raceways.

2) Separation of cables and equipment and associated non-safety circuits of redundant trains by a 25-minute rated fire barrier until a horizontal distance of 20 feet is attained. No suppression or detection is provided.

3) Separation of cables and equipment and associated non-safety circuits of redundant trains by a 25-minute rated fire barrier until a horizontal distance of 10 feet is attained in Roof Top locations. No suppression or detection is provided.

4) Separation of cables and equipment and associated non-safety circuits of redundant trains by a radiant energy shield having an equivalent 30-minute fire rating until a horizontal distance of 20 feet is attained. A radiant energy shield is a line of sight barrier between redundant equipment and/or components. The radiant energy shield may be combustible. No suppression or detection is provided.

5) The existing separation of approximately 12 feet on center for the Component Cooling Water (CCW) Pumps combined with fire detection and a dual-header partial-coverage suppression system for the pumps.

6) The existing separation of approximately 14 feet on center for the Intake Cooling Water (ICW) Pumps and associated conduits, with fire detection for the pumps. No suppression is provided.

7) The use of a partial height (10 feet high) fire barrier between the Unit 3 Emergency Diesel Generator(EDG) "A" and "B" radiator rooms. No suppression or detection is provided.

C. Fire Zones Associated with the Exemption

The fire zones within the scope of the exemption request are listed below with respect to the exemption sections to which they apply (refer also to the attached drawings for fire zone boundary descriptions):

1) Fire Zones 81; and 86 West of the A-line.

2) Fire Zones 47 and 54; 86 North of column line 22 and East of the A-line; 79, 84, 88 and 89 East of the Jc-line; and 106R, 113, 114, 115, 116, 118, 119, 120, 131 and 143.

3) Fire Zones 106R, 114, 115, 118 and 143.

4) Fire Zones 47 and 54; 86 North of column line 22 and East of the A-line; 79, 84, 88 and 89 East of the Jc-line; and 106R, 113, 114, 115, 116, 118, 119, 120, 131 and 143.

5) Fire Zones 47 and 54.

6) Fire Zones 119 and 120.

7) Fire Zone 131.

D. Exemption Fire Zone Descriptions

Fire Zone	Description
47	Unit 4 CCW Pump & Heat Exchanger Area
54	Unit 3 CCW Pump & Heat Exchanger Area
79 (partial)	Area West of Unit 4 Containment
81	Unit 4 Main & Startup Transformer, Unit 3 Turbine Lube Oil (TLO) Reservoir
84 (partial)	Unit 3 & 4 Auxiliary Feedwater (AFW) Pump Area
86	Unit 3 Main and Startup Transformers
88 (partial)	Unit 3 Switchgear/EDG Vestibule
89 (partial)	Unit 3 Condensate Storage Tank Area
106R	Control Building Roof (Control Room Air Conditioning Units)
113	Unit 4 Feedwater (FW) Platform
114	Unit 4 Main Steam Platform
115	Unit 3 Main Steam Platform
116	Unit 3 Feedwater Platform
118	Auxiliary Building (& partial Control Building) Roof
119	Unit 4 Circulating Water Intake Structure
120	Unit 3 Circulating Water Intake Structure
131	Unit 3 EDG Radiator Room
143	Unit 3 EDG Building Roof

A detailed description of the combustible loading, installed essential equipment and fire detection and suppression features for the fire zones which are included in the exemption request is provided in Section IV.

E. Bases for Requested Exemption

The requested exemption is consistent with the requirements of 10 CFR 50.12 and should be granted. First, in accordance with subsection 50.12(a)(1), it is clear from the discussion herein that the exemption sought by FPL for Turkey Point is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security.

(1) Authorized by Law. As discussed above, exemptions from Appendix R are expressly authorized by law. This authority is confirmed by past Commission practice since the promulgation of Appendix R, under which the Commission has granted numerous exemptions from Appendix R requirements. In its Staff Requirements Memorandum dated June 27, 1994, "Options for Resolving the Thermo-Lag Fire Barrier Issues," the Commission reaffirmed this practice as specifically applied to exemptions involving the use of Thermo-Lag as a fire barrier. In that letter, the Staff stated that the Commission would consider specific exemptions from certain technical requirements of Appendix R, "provided the licensee submits a technical basis that demonstrates the in-plant condition provides an adequate level of fire safety." Therefore, by law, the Commission is authorized to grant exemptions from Appendix R.

(2) No Undue Risk. The proposed exemptions from Appendix R requirements pose no undue risk to the public health and safety because an adequate level of fire protection is maintained. As demonstrated in the discussion below, the existing fire barriers at Turkey Point, together with fire protection measures, administrative controls, and the unique outdoor nature of the areas in question, satisfy the underlying intent of the rule, which is to assure that plant shutdown can be accomplished in the event of a fire. As such, adequate protection of the public health and safety is provided.

(3) Consistent with the Common Defense and Security. Common defense and security issues are not implicated by the proposed exemption because no safeguards issues or equipment are affected by the request.

Second, consistent with the requirements of subsection 50.12(a)(2), special circumstances are present. In particular, as discussed below, special circumstances exist within the terms of subsections 50.12(a)(2)(ii) and (iii).

Subsection 50.12(a)(2)(ii) -- Application of the regulation in the particular circumstances either would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule;

The purpose of the NRC's fire protection regulations is to help assure that a fire in a nuclear power plant will not disable the capability to safely shut down the plant. The particular aspects of the regulations pertinent here concern the protection of components associated with achieving and maintaining safe shutdown conditions. As discussed above in this request, the granting of the exemption is consistent with preserving safe shutdown capability by assuring, through appropriate use of fire barrier material, that shutdown capability will, in fact, be maintained. Therefore, the underlying intent of the rules will be met. Thus, application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule.

Subsection 50.12(a)(2)(iii) -- Compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated;

The costs of regulatory compliance contemplated when Appendix R was adopted were limited to those related to the installation of fire barrier material to meet specific Appendix R requirements. At that time, the Commission did not contemplate additional expenses that reactor licensees might incur to replace degraded barrier material that was once reasonably relied upon by the NRC and its licensees as qualified. FPL has spent more than ten million dollars on outdoor fire barriers at Turkey Point in order to satisfy the originally contemplated Appendix R barrier material requirements in the Outdoor Areas. FPL estimates that an additional expenditure of approximately ten million dollars would be necessary to upgrade Thermo-Lag barriers to meet the literal requirements of Appendix R. Thus, strict compliance by FPL with the Commission's fire protection regulations would result in costs significantly in excess of those originally contemplated.

III. Engineering Assessment

The scope and technical justification for the exemption request for outdoor fire zones, except the Open Turbine Building, is presented in this section. A more detailed description of the fire zones and associated essential equipment, combustible loads and fire protection features is presented in Section IV. Section V reflects responses to previous NRC requests for additional information, edited for consistency with this exemption request.

Technical justification for granting the exemption request is based on characteristics of outdoor areas, types and quantities of in-situ combustible materials, control of transient combustible materials, fire protection features and providing adequate protection to ensure that, in the event of a fire, at least one train of safe shutdown equipment and components is available. If the rating of the fire barrier assembly is less than the applicable 1-hour or 25-minutes, then the barrier does not meet the requirements of the exemption request and modifications must be performed.

Special Characteristics of Outdoor Areas

The outdoor areas addressed in this exemption request possess special features which reduce the effect of fires. Stratified hot gases or ceiling jet layers are not a concern in outdoor areas. The fire energy is not localized by physical boundaries and dissipates quickly with the large heat sink. Major in-situ combustibles in outdoor areas such as transformers and turbine lube oil reservoirs are contained and have automatic suppression systems. Also, maintaining a 50-foot separation from major combustibles provides additional assurance that a fire from one of these sources would not challenge a 25-minute fire barrier.

Combustible Loading

A description of the in-situ combustible load, fire control and fire protection features for each outdoor fire zone is provided in Sections V.D and IV herein. Major combustibles are in wide open areas. Areas such as roofs and the intake structure, in addition to being wide open, also have very low combustible loads. The more congested zones transitioning between the containments and turbine building are also open and combustible loads consist mainly of pumps, valves and raceways.

The cable trays are sparsely populated (most of which are located 13 to 20 feet above grade) and located in horizontal, vertical and askew runs, at grade elevation, up walls, in free space and over roof tops. The cable in trays was either coated with Flammastic 71A or 77 (and certain of these cable coatings are maintained, as provided in the Updated Final Safety Analysis Report (UFSAR) Appendix 9.6A, paragraph 2.4.D.3.f) or is qualified to Institute of Electrical and Electronic Engineers (IEEE)-383, 1974 standards. The fuel load is so low and spread out that the fuel contribution from the cable and Thermo-Lag are considered negligible.

The small quantity of lubricating oil in pumps is considered to be insignificant as an in-situ combustible hazard because the oil is contained in reservoirs encased within the pumps. The relatively massive steel casings would mitigate the propagation of flame from a credible exposure fire to the oil in the reservoirs.

Transient Combustible Control Program for Outdoor Areas

The Turkey Point Combustible Control Program does not allow storage of combustibles in outdoor areas that contain safety related equipment or cables. Procedures require that flammable liquids be attended at all times and a special permit is required for quantities greater than 5 gallons. Hence, transient combustible controls assure that a worst case transient fire caused by a spill would be far below a hazard level that could challenge protected raceways and components. There are very few transient combustibles in the plant at any one time, and those few have sufficient controls. Therefore, the potential accumulation of combustibles would not challenge the fire-resistive capability of fire barriers. Additionally, the fire brigade response time for outdoor fires is less than 15 minutes, which is well below fire barrier fire endurance capabilities. (See also Sections V.E and V.G)

IV. Fire Zone Evaluations

This section provides an overview of the outdoor fire zone configurations, excluding the Open Turbine Building, combustible loading, installed essential equipment and fire detection and fire suppression features. This information is provided in Appendix 9.6A of the UFSAR, along with more recent updated information is also presented in the following table to facilitate NRC review.

SUMMARY OF OUTDOOR FIRE ZONE FACILITIES

FIRE ZONE	COMBUSTIBLE. LOAD (BTU)	SOURCE OF COMBUSTIBLE	AVAILABLE FIRE PROTECTION FEATURES	ESSENTIAL EQUIPMENT	SEPARATION
47	Negligible	Cable <1 gal. Lube Oil in each of 3 CCW Pumps	Fire Detection Dual-header auto deluge sprinkler sys. Extinguishers & Standpipe Hose Station	CCW Pumps Valves Heat Exchangers	~12' on ℄ (1)
54	Negligible	Cable <1 gal. Lube Oil in each of 3 CCW Pumps	Fire Detection Dual-header auto deluge sprinkler sys. Extinguishers & Standpipe Hose Station	CCW Pumps Valves Heat Exchangers	~12' on ℄ (1)
79	Negligible	Cable, Guard House and Access Control Enclosures Trays located 18' to 20' above grade	Extinguishers & Hose Stations	Blowdown & Instrument Air (IA) Valves AFW Valves	(1)
81	7.08×10^9	47,040 gal. oil from Unit 4 Main and Startup Transformers & Unit 3 TLO Reservoir Negligible Cable	Wet Pipe & Fixed Water Spray Suppression with Thermal Detection Extinguisher, Hose Station & Hydrants	Intake Cooling Water (ICW) To Turbine Plant Cooling Water (TPCW) Valves	Spurious ONLY Concern
84	Negligible	<24.5 gal. Lube Oil and Grease in each of 3 AFW pumps	Extinguishers & Hose Station	Turbine-Driven AFW Pumps Blowdown & IA Valves	>50' to Standby Steam Generator (SG) Feed Pumps (1)
86	5.0×10^9	33,165 gal. from Unit 3 Main and Startup Transformers Negligible Cable	Fixed Water Spray Suppression with Thermal Detection, Extinguishers, Hose Stations & Hydrants	None	(1)
88	Negligible	Cable	Extinguishers & Hose Station	None	(1)
89	Negligible	Cable	Extinguishers & Hose Station	Blowdown & IA Valves	(1)
106R	Negligible	Control Room (CR) A/C Units	Extinguishers & Hose Stations	CR A/C Units	A & C > 20'

FIRE ZONE	COMBUSTIBLE. LOAD (BTU)	SOURCE OF COMBUSTIBLE	AVAILABLE FIRE PROTECTION FEATURES	ESSENTIAL EQUIPMENT	SEPARATION
113	Negligible	Cable	Flame Detection w/ CR alarm Extinguishers & Hose Stations	AFW Feedwater Control Valves (FCVs) FW bypass Valves	FW Platform (1)
114	Negligible	Cable	Extinguishers & Hose Stations	Main Steam Isolation Valves (MSIVs) Bypass Valves Atm Dump Valves Instrumentation	MSIVs ~28' on ℄ (1)
115	Negligible	Cable	Extinguisher & Hose Station	MSIVs Bypass Valves Atm Dump Valves SG Instrumentation	MSIVs ~28' on ℄ (1)
116	Negligible	Cable	Flame Detection w/ CR alarm Extinguishers & Hose Station	AFW FCVs FW bypass Valves	FW Platform (1)
118	Negligible	Cable	Extinguishers & Hose Stations	Auxiliary Building (AB) Supply Fans & Control Building Heating, Ventilation and AC	AB Exhaust Fans Indoors
119	Negligible	Cable 17 gal. Lube Oil in each of 4 Circulating Water Pumps	Flame Detection w/ CR alarm Extinguishers & Hydrants	ICW Pumps	~14' on ℄ (1)
120	Negligible	Cable 17 gal. Lube Oil in each of 4 Circualting Water Pumps	Flame Detection w/ CR alarm Extinguishers & Hydrants	ICW Pumps	~14' on ℄ (1)
131	Negligible	Cable	Extinguishers, Hose Station & Hydrant	Unit 3 EDG Coolers	10' High Partial Height Wall
143	Negligible	Cable	Extinguishers, Hose Station & Hydrant	None	(1)

(1) For cable, separation is in accordance with the requested exemption.

A. Locations West of the Turbine Building

The area adjacent to and west of the Open Turbine Building includes all or portions of the following fire zones:

76 Unit 4 TLO Reservoir Area
81 Unit 4 Main & Startup Transformer, Unit 3 TLO Reservoir Area
86 Unit 3 Main and Startup Transformers

Essential redundant safe shutdown cables routed through Fire Zones 81 and 86 are protected by a 1-hour fire barrier until at least 20' of horizontal separation is achieved. Fire Zone 76 contains no protected raceway and is not included in this exemption request.

These fire zones are located at grade on pavement and are included in the "Transient Combustible Control Area" for the plant. The most significant of the major combustibles near the power block (main, startup transformers and TLO reservoirs) are located in Fire Zones 76, 81 and 86. The in-situ cable load is negligible. The transformers are mounted over gravel-filled pits. The components are physically contained such that any oil leakage is also contained in the area.

Each of the major combustible sources is served by a fixed spray suppression system and thermal detection with provisions for alarms in the CR. Secondary fire protection features include hydrants and hose stations. These fire zones are in open areas; remote to the control, EDG and auxiliary buildings, so smoke migration, drift and ventilation is not a concern.

B. Locations North of the Turbine Building

Only a section of Fire Zone 86 is adjacent to and north of the Open Turbine Building. This zone includes the normal footpath between the turbine building and the Water Treatment Plant, Intake Structure and Unit 4 EDG Building. The space is paved and unconfined, and contains negligible combustibles.

C. Locations South of the Turbine Building

Fire Zone 77 is adjacent to and south of the Open Turbine Building. Fire Zone 77 is paved and is a normal footpath for secondary plant access. Fuel for the air compressor diesels is the main combustible in this zone. The combustible load from cable is negligible.

Instrument air compressors are the only essential equipment in the area. The Unit 3 and the Unit 4 compressors are redundant and separated by greater than 50 feet. Fire Zone 999 is south of Fire Zone 77 and contains the Standby SG FW Pumps, which are redundant to the AFW Pumps in Fire Zone 84. These fire zones are in open areas; remote to the control, EDG and auxiliary buildings, so smoke migration, drift and ventilation is not a concern.

D. Locations East of the Turbine Building

The following fire zones are located adjacent to or near the east side of the Open Turbine Building:

79 Area West of Unit 4 Containment Area
84 Units 3 & 4 AFW Pump Area
88 Unit 3 Switchgear/EDG Vestibule
89 Unit 3 Condensate Storage Tank Area
113 Unit 4 FW Platform
116 Unit 3 FW Platform
131 Unit 3 EDG Radiator Room

The adjacent fire zones accommodate the transition among the Open Turbine Building, the Unit 3 EDG Building, the Control Building, the Auxiliary Building and the containments. Fire Zone 131 is near, but not connected to the Turbine Building. These fire zones are included in the "Transient Combustible Control Area" of the plant.

The fire zones at grade are either paved or gravel. The feedwater platforms are constructed of concrete, steel and steel plate, and are located about 20' above grade. These platforms contain feedwater valves, piping and conduits for instrumentation and valve operation. These are key card access areas (above and below the platform), and consequently are not high traffic areas.

The combustible loading in each of these zones is negligible and is mainly associated with cable, valves, pumps and Thermo-Lag. Cables in trays are coated with a fire retardant or are qualified to the requirements of IEEE-383, 1974. The height above the grade level (typically 18' to 20' above grade), the fire retardant characteristics of the cables and coatings, the open nature of the zone combined with the administrative controls of being a "Transient Combustible Control Area", effectively renders these cables as insignificant contributors to the fire load for these zones.

The spaces are open to the weather and breezes such that, if a fire could develop, hot gases would not stratify and would dissipate quickly.

E. Locations Remote from the Turbine Building

The following fire zones are remote from the Turbine Building:

47 Unit 4 CCW Pump & Heat Exchanger Area
54 Unit 3 CCW Pump & Heat Exchanger Area
119 Unit 4 Circulating Water Intake Structure
120 Unit 3 Circulating Water Intake Structure

Fire Zones 47 and 54 are on concrete mats, with walls on four sides (except open access from the east) and open grating above. The intake structures in Fire Zones 119 and 120 are on concrete slabs with wood, metal and fiberglass (AFC Duragrid T3300) over the screen wash areas.

The in-situ combustibles are associated with pumps, valves, cable and Thermo-Lag. These fire zones are included in the "Transient Combustible Control Area" for the plant. If a fire were allowed to develop, the smoke and hot gases would rise and dissipate virtually unrestricted so that no stratification layers would be formed or contained.

F. Roofs

Fire zones located above grade and under open sky are categorized as roofs. The following fire zones are included in this section:

106R Control Building Roof
114 Unit 4 Main Steam Platform
115 Unit 3 Main Steam Platform
118 Auxiliary Building (& partial Control Building) Roof
143 Unit 3 EDG Building Roof

These fire zones are part of the "Transient Combustible Control Area" for the site and are not major traffic routes for plant personnel.

The Auxiliary Building Roof is of concrete construction. Large roof drains direct the rain water to storm drains. This roof is inside the Radiation Control Area of the facility. As such, the admission of materials is limited to what is expected to be consumed. Any excess material has the potential to become a low level radioactive waste product. This further reduces the amount of transient combustibles in the area. This roof contains conduits, piping, ventilation fans, and Air Conditioning Units. There are no ignition sources in this area. A 1-inch low-pressure (≈100 psig) hydrogen line runs east and west along the north edge of the roof; connecting the gas house on the east side of the plant to the Main Generators in the Open Turbine Building.

The Inverter/DC Equipment Room Roof is of concrete construction. Large roof drains direct the rain water to storm drains. This roof is partially inside the Radiation Control Area of the facility. For the portion of this area within the Radiation Control Area, the admission of anything which could become a low level radioactive waste product is limited to what is expected to be consumed, further reducing the amount of transient combustibles. This roof contains conduits, piping and Air Conditioning Units. There are no ignition sources in this area.

The Control Building Roof is of concrete construction, and covered with a composite built-up roofing for water tightness. Large roof drains direct the rain water to storm drains. This roof contains conduits, piping, and Air Conditioning Units. There are no ignition sources in this area.

The Unit 3 EDG Building Roof is of concrete construction. Large roof drains direct the rain water to storm drains. This roof is not accessible (no stairs or ladder to the roof), and consequently is not a normal traffic path. The roof contains the EDG exhaust pipe (not directed at raceways) and muffler as well as conduits.

The Main Steam Platforms are dual-elevation (54' and 42') locations, and are located within an open-grating security barrier. These are key card access locations on both elevations, and consequently are not high traffic areas. These platform locations are constructed of concrete. The facilities immediately beneath the platforms are accessed via a steel plate platform.

Negligible combustibles in this zone assure a very low potential for the occurrence of a significant fire. The open nature of this zone prevents the buildup and stratification of hot gases, smoke or other products of combustion from affecting redundant equipment should a fire occur. The large physical separation between redundant trains of components and cables provides assurance that a single credible fire will not impact more than one train of safe shutdown components.

Conclusion

This information demonstrates that separation by one of the means described in the exemption request in Section II.B provides a level of fire protection consistent with the fire hazards, both in-situ and transient, identified for these fire zones and that these features provide a high level of assurance that at least one train of safe shutdown equipment and cables will remain free of fire damage. Additional protective features would not significantly enhance the safety of the plant.

V. Supplemental Evaluations

The purpose of this section is to reflect responses to previous NRC requests for additional information, and to provide added details to topics addressed within the context of this exemption request.

A. Fire Test Applicability for Outdoor Configurations

The purpose of this subsection is to show a comparison between Turkey Point outdoor configuration-specific fire endurance testing (Nuclear Energy Institute (NEI) Fire Test 2-2, center assembly) and generic industry fire endurance testing (NEI Fire Test 2-1), and to demonstrate that all of the industry generic testing is applicable to the Turkey Point outdoor configurations.

Referring to NEI Fire Test 2-2, the two center conduits are representative of the Turkey Point outdoor installations by:

(1) using 3M caulk in the joints,

(2) using a weather-resistant topcoating, and

(3) having weep holes installed in the enclosure for potential water drainage.

If the results of Test 2-2 are similar to the Test 2-1 results of the standard installations, then the results of the standard testing is applicable to these specific features in these configurations. This test included a hose stream test following completion of the 1-hour test interval.

Tested Configurations

The purpose of the test configurations in NEI Test 2-2 was to evaluate the effectiveness of three specific Turkey Point configuration features, namely the 3M joint compound, weep holes and topcoat.

The testing of two specific configurations is sufficient to justify these features. The first feature (the joints) is a critical design feature in that failure of a joint would constitute failure of the assembly. The smaller the conduit, the lower the fire rating of the assembly (all other parameters remaining the same), because smaller conduits provide a lesser heat sink inside the fire barrier. The specifications for the joint gap prior to installing a joint compound are the same for small and large conduits. Therefore, testing the smaller conduit would test the worst case joint for any conduit size.

In NEI Fire Test 2-2, a 3/4-inch (small) conduit and a 2-inch (medium) conduit were tested with the 3M Fire Dam 150 Caulk. These results are compared to results for equivalent NEI Fire Test 2-1 testing with trowel grade material as the joint compound. The results are found to be consistent such that the 3M Fire Dam 150 Caulk functions in a similar manner as the trowel grade material when used as a joint compound.

The second feature (drainage holes) is a unique characteristic of the Turkey Point outdoor installations. If the small (1/4-inch) hole failed to seal itself up or depleted the material at a faster rate than a continuous barrier, it would reduce the fire resistance of the assembly. A failure at this location would not depend on the conduit size or orientation, only on the effect of the hole to seal itself. Thus, a single test is sufficient to determine the effect of this feature. The results of NEI Fire Test 2-2 demonstrate that small drainage holes do not reduce the fire rating of the assembly, as compared to similar testing without drainage holes.

The third feature is the topcoat (paint) used for weather (water) resistance in the outdoor locations. This coating is external to the barrier, and does not affect any of the installed parameters of the barrier. The only potential adverse effect could be additional fire loading on the surface of the assembly, which may somehow affect the rating, or a chemical reaction with the Thermo-Lag which may degrade the performance of the fire barrier material. Again, a single test is sufficient to determine if there is any significant effect of this feature. The results of NEI Fire Test 2-2 support the conclusion that the topcoat does not reduce the fire rating of the assembly, as compared to similar testing without the topcoating.

Acceptance Criteria

The thermal acceptance criteria, as stated in American Society for Testing Materials (ASTM) E-119 and National Fire Protection Association NFPA)-251; and reiterated in Generic Letter 86-10 Supplement #1, are:

- The average unexposed side temperature of the fire barrier system, as measured on the exterior surface of the raceway or component, does not exceed 250°F above its initial temperature; and

- Any single thermocouple does not exceed 30 percent of the maximum allowable temperature rise (i.e. 325°F above its initial temperature).

Test Results

Applying this criteria to the 2-inch aluminum conduit in NEI Fire Test 2-2, the allowable average temperature was exceeded at 40 minutes and the allowable maximum temperature was exceeded at 35 minutes. Also, the maximum temperature was exceeded on the radial bend at 35 minutes. Even so, this assembly passed the hose stream test and still had virgin material remaining after testing was completed.

For the 3/4-inch aluminum conduit, the allowable average temperature was exceeded at 27 minutes and the allowable maximum temperature was exceeded at 26 minutes. Also, the allowable maximum temperature was exceeded on the radial bend at 31 minutes. For most of the conduit, no uncharred material was evident following the 1-hour fire and hose stream testing.

Testing of conduits with Thermo-Lag 330-1 protection has indicated that, with all other factors the same; the smaller the conduit, the lower the fire rating. Additionally, testing has indicated that conduits do not have a structural failure mode as do cable tray 1-hour configurations. For these reasons, two small conduit sizes (worst case) were selected for testing using the installation techniques unique to Turkey Point outdoor installations. The differences in the Turkey Point installations versus the standard baseline installations were not expected to have any appreciable effect on the fire rating of the barriers. The differences and the reason for assuming consistency in fire rating is as follows:

1) Fire Dam 150 (3M) Caulk is used as a joint filler for Turkey Point, where Thermo-Lag 330-1 Trowel Grade material is used for the standard baseline installations. The Fire Dam 150 Caulk is used in other fire rated assemblies, and has a similar fire rating to the trowel grade, which it is replacing, for the thickness tested.

2) Drainage holes of 1/4-inch diameter are provided at low points on raceways to permit any moisture trapped in the enclosure to escape. Due to the growing nature of the Thermo-Lag material in fire conditions, these holes are expected to seal up rapidly and provide a fire barrier equivalent to the remainder of the assembly.

3) A topcoating system (paint) is applied over the completed assembly for waterproofing. Although topcoating systems are generally flammable out of the can, when they cure (dry) the flammability is greatly diminished. Also, the flammability of a thin layer of topcoat would be overwhelmed by the furnace heat flux, and no effect on the fire rating was expected.

The following is a comparison of conduit tests of similar configuration, so that the other tested configurations would be applicable for the analysis of Turkey Point outdoor configurations. A comparison is made to NEI Test 2-1, where baseline construction techniques were employed.

	NEI Test 2-1		NEI Test 2-2	
	3/4" Conduit	2" Conduit	3/4" Conduit	2" Conduit
Minutes to Max. Single Temperature	27	41	26	35
Minutes to Max. Avg. Temperature	27	39	27	40

The time to the average maximum temperature is essentially the same for these two tests. The data demonstrates that no new failure modes were generated with the use of the three new aforementioned construction techniques, and testing performed to baseline construction methods are valid for Turkey Point outdoor conduit configurations to determine fire rating.

Fire endurance and hose stream testing was performed per ASTM E-119 and NFPA-251, as reiterated in Generic Letter 86-10 Supplement #1. The specific outdoor applications were hose stream tested in NEI Test 2-2.

The NEI testing assessed (among other things) the performance of two 1 hour outdoor configuration baseline fire barriers constructed using preshaped Thermo-Lag conduit sections on 3/4- and 2-inch diameter conduits (center assemblies). The testing was conducted for 60 minutes. No barrier openings occurred for the 2-inch diameter conduit, even though it received an additional fire exposure of 25 minutes beyond the point where temperature criteria were exceeded. The 3/4-inch conduit barrier had observable openings after having been subjected to 34 minutes of fire exposure beyond when it initially exceeded temperature criteria (at 26 minutes into the test).

Although it is difficult to determine exactly when the openings occurred, it is reasonable to assume, based on the 2-inch conduit performance, that openings did not occur at 26 minutes and may have occurred well after that point. Based on temperature profile data recorded during the test, no joint openings (or any structural failure) occurred for the 3/4-inch conduit barrier during fire exposure. Instead, the openings were characterized as "burn-through" where the Thermo-Lag material had been consumed to the underlying stress skin. Therefore, it is reasonable to conclude that this burn-through occurred well after exceeding the temperature criteria, and that the openings more likely occurred as a result of hose stream testing.

Based on the preceding, the 2-inch conduit barrier passed the hose stream test requirements at one hour, and there is a very high confidence level that the 3/4-inch conduit barrier had sufficient fire and firefighting endurance capability to have met the hose stream requirements for the fire endurance rating (26 minutes) provided.

When using the applicable guidance documents to rate a particular fire barrier, if the rating is less than the applicable 1-hour or 25-minutes, then the barrier does not meet the requirements of the exemption request and modifications must be performed.

Extent of Test Applicability

The drainage holes and the topcoat are features independent of the overall configuration (conduit, tray, box, etc.) of a raceway fire barrier assembly. However, the extent of the applicability for the use of the FD-150 as a joint compound is limited to conduits. When structural integrity of an assembly is the failure mode or when a joint would be stressed due to the effects of a fire, then the applicability of the FD-150 as a qualified joint compound is questionable. In these cases, additional testing would need to be performed or the assemblies would require upgrade to meet a tested configuration. Turkey Point will not take credit for the use of Fire Dam 150 joint compound in these types of assemblies.

Significant industry testing has been performed for the upgrade of boxes, trays and banked conduit configurations. The baseline for these tests are typically dry or post-buttered joints. Turkey Point will upgrade all cable tray, junction box, pull box and banked conduit configurations in outdoor areas excluding the Turbine Building based on tested configurations for the fire rating required to address the use of a qualified joint configuration or compound.

B. Installed Barrier Parameters

The design parameters and construction attributes used to install the fire barriers at Turkey Point were verified to be the same as or bounded by those used to construct the test specimens by comparing NEI test specimen features with Turkey Point installation requirements and as-built conditions. This was accomplished by reviewing the NEI Application Guide, NEI Test 2-2, and FPL Construction Specification MN-3.21 (Revision 3), and by disassembling and inspecting (destructive testing) various fire barrier installations. The following is a listing of destructive tests performed on various types of barriers:

- One (1) Pull Box
- Four (4) Support Boxes
- One (1) 1-1/2" Conduit
- Three (3) 2" Conduits
- Three (3) 3" Conduits

The quantities (111 linear feet of conduit) and sizes of Thermo-Lag fire barrier assemblies provide a sufficient sampling because (a) destructive tests were performed on sections found to be damaged or degraded during routine inspection, and are therefore randomly obtained, and (b) the methods and techniques used to construct each barrier are the same regardless of the protected barrier size. A comparison of parameters and attributes is provided in the table below. The results of the destructive tests confirm that the Turkey Point installations are consistent with plant-specific installation instructions and guidelines and the NEI Application Guide. The following table compares the attributes of a representative outdoor 2" conduit installed at Turkey

Point Plant with corresponding construction specification requirements and NEI Application Guide Test 2-2 parameters.

REPRESENTATIVE 2" CONDUIT, 1 HOUR FIRE BARRIER, in OUTDOOR AREA *			
	NEI Test 2-2	AS SPECIFIED	AS INSTALLED
COMMODITY PARAMETERS			
Size	2"	2"	2"
Material	aluminum	steel	steel
Contents/Total Enclosed Mass (lbs./linear ft.)	Empty/ 1.16	not stated	3.32
Orientation	H & V	not stated	Skew & V
BARRIER PARAMETERS			
Material Type	pre-shaped	pre-formed	pre-shaped
Material Thickness	½" nom.	½" min.	½"+1/4"-0"
Stress Skin Location	inside	inside	inside
Joint Type	butt	butt	butt
Joint Gap	1/4" max.; 3M caulk	1/4" max; 3M caulk	<<1/4"; 3M caulk or Trowel Grade
Fastener Size/Material	½" wide bands	18 g SS wire or ½" band	18 g Steel
Fastener Spacing	12"	12" max.	8" to 10"
Fastener Distance from Joints	2"	2" min.	< 2"
Joint Reinforcement Mechanisms	none	none reqd	none
Structural Support & Intervening Steel Protection	none	9"	9"

In summary, NEI used minimum thickness Thermo-Lag material and aluminum conduit with 0% fill. The installed configuration used up to 50% thicker Thermo-Lag material (more thermal protection), steel conduit (higher thermal mass) and an actual cable fill (more thermal mass to resist heat rise). Other as-built parameters were the same as or more conservative than the test specimens. Therefore, the configurations installed at Turkey Point provide a higher fire rating than the NEI tested configurations. On this basis, the NEI test results are bounding for Turkey Point.

C. Major Combustibles

The major combustible sources include station transformers, lube oil and fuel oil storage tanks, hydrogen seal oil units and fossil unit facilities.

The methodology for fire hazard analyses of Turkey Point nuclear facilities is provided in UFSAR Appendix 9.6A, Section 4.0. Existing analyses are provided in the UFSAR 4.OD-series subsections and describe zone features, combustible loading sources and fire control facilities. The following fire hazard evaluations are provided.

1. Nuclear Station Transformers

The main and startup transformers are located in the open area along the west side of the turbine building. The C-bus transformer is located on the banks of the discharge canal, west of the west plant access road and over 100 feet from the turbine building. The auxiliary transformers are located just inside the open turbine structure.

The primary combustible loading source in the respective fire zones is the volume of cooling oil contained within the transformers. The transformer oil volume is the most significant component of the loading described in the UFSAR subsections.

Each transformer is provided with facilities to either contain oil leakage and/or to channel it to a safe drainage area. Additionally, thermal detection is provided which activates the fixed water spray system and alarms in the CR. The transformers are primarily served by fixed water spray fire suppression systems. Secondary protection is also provided by local fire extinguishers, and supplemented by nearby standpipe hose stations and hydrants.

2. Main and Startup Transformer Pit Design

The main and startup transformer pits (Unit 3 and Unit 4) have 3' thick reinforced concrete base mat with approximately 4' 10-1/2" high reinforced concrete walls around the perimeter of the base mats, and the pits are filled with layers of stacked and staggered Concrete Masonry Units (CMU) blocks, covered with wire mesh and 6" to 8" layers of crushed stone. Each of the pits with the CMU blocks and stone filled material are designed with sufficient void volume to allow for the retention of the full volume of oil in its respective transformer, as well as an appropriate amount of concurrent rainwater retention within the pit. The areas adjacent to the main and startup transformer pits are paved. As such, the potential for any significant amount of dirt to be deposited in the pits is considered unlikely. In addition, small quantities of dirt (compared to the large volume of the pits and the void spacing in the gravel fill) would not compromise the retention volume or percolation capability of the pits and the CMU block/wire mesh/crushed stone material therein.

3. Auxiliary Transformers

The Auxiliary Transformers are located along the west side of the Open Turbine Building. The auxiliary transformers are mounted in reinforced concrete dikes to contain oil leakage and are provided with thermal detection which activates the fixed water spray systems and alarms in the CR. The reservoirs are primarily served by fixed water spray fire suppression systems. Secondary protection is also provided by local fire extinguishers, supplemented by nearby standpipe hose stations and hydrants.

4. Lube Oil Reservoir

The TLO reservoirs (Tanks) are located above ground, outdoors west of the turbine building. Each reservoir has a capacity of about 14,000 gallons of lube oil, but contains only a fraction of that volume during power operation.

The Unit 3 TLO reservoir is curbed to collect leakage and to direct oil spills to the Unit 4 Start-Up Transformer oil collection pit. The Unit 4 TLO reservoir is mounted in a reinforced concrete dike to contain oil spills and leakage. The tanks are provided with thermal detectors which alarm in the CR. Additionally, thermal detection is provided which activates the fixed water spray system and alarms in the CR. The reservoirs are primarily served by fixed water spray fire suppression systems. Secondary protection is also provided by local fire extinguishers, supplemented by nearby standpipe hose stations and hydrants.

5. Hydrogen Supply Lines

Hydrogen supply headers are routed to the turbine building to serve the main generator manifolds. One header is routed over the auxiliary building roof to enter the turbine building from the east. The hydrogen supply header is 1-inch, Schedule 40 piping, with welded fittings. Due to the open nature of the surroundings, any hydrogen leak that might occur would be quickly diluted and dissipated. Also, there are no ignition sources in the vicinity of the pipe. As such the hydrogen line is not considered a credible fire threat.

Another hydrogen supply line is provided from the Fossil Units and approaches the turbine building from the north. Due to the open nature of the surroundings, any hydrogen leak that might occur would be quickly diluted and dissipated. As such, this hydrogen line is not considered a credible fire threat.

6. Fossil Unit Facilities

With regard to the fossil units, the facilities are so far from the nuclear plant that they are not considered to be within the vicinity of protected circuits. The main structures alone are more than 85 feet away from the nuclear facilities. Even so, the following are separation distances (approximated using a site plan) from major fossil unit oil facilities to the nuclear facilities:

Bulk Fuel Oil Storage Tank to U4 EDG Bldg	750 feet
South Monitor Tank to U4 EDG Bldg	193 feet
South Monitor Tank to U3 EDG Fuel Oil Tank	237 feet
South Monitor Tank to nearest Thermo-Lag	250 feet

These distances far exceed the separation guidelines to nuclear facility components and structures. Therefore, the fossil plant facilities are not considered a combustible threat to the protected circuits.

D. Combustible Loading

A detailed description of the combustible load, fire control and fire protection features for each outdoor fire zone is provided in Appendix 9.6A, Section 4.0 of the UFSAR and for the applicable fire zones in Section IV herein. Due to the extensive volume of information contained in the UFSAR, it will not be duplicated here. However, the highlights of this information are summarized in Section IV.

The small quantity of lubricating oil in pumps is considered insignificant as an in-situ combustible hazard because the oil is contained in reservoirs encased within the pumps. The relatively massive steel casings would mitigate the propagation of flame from a credible exposure fire to the oil in the reservoirs.

The only in-situ fire loads east of the Open Turbine Building structure are sparsely populated cable trays (most of which are located 13 to 20 feet above grade), and Thermo-Lag. The cable in trays was either coated with Flammastic 71A or 77 (and certain of these cable coatings are maintained, as provided in UFSAR Appendix 9.6A, paragraph 2.4.D.3.f) or qualified to IEEE-383, 1974 standards, and the enclosures are generally constructed with fire-resistant materials. The fuel load is so low and spread out that fuel contribution from cable and Thermo-Lag is considered negligible.

E. Transient Combustible Control Program

The Turkey Point Combustible Control Program does not allow storage of combustibles in outdoor areas that contain safety related equipment or cables. Procedures require that flammable liquids be attended at all times and a special permit is required for quantities greater than 5 gallons. Hence, transient combustible controls provide added assurance that a worst case transient fire caused by a spill would be far below a hazard level that could challenge a 25-minute fire barrier. Additionally, the fire brigade response time for outdoor fires is documented (via fire drills) to be less than 15 minutes which is well below a 25-minute fire barrier fire endurance rating.

There are several levels of fire prevention involving control of transient flammable and combustible materials at Turkey Point. Overall, transient combustible and flammable substances located or used anywhere in the plant area are controlled by housekeeping. In addition, they are further restricted in certain areas to prevent the possibility of a fire from interfering with proper operation of systems required for safe shutdown. These restrictions address storage and handling of transient combustible and flammable substances, and become even more definitive and restrictive for increasingly sensitive areas.

The restrictions are specifically implemented under FPL Administrative Procedure 0-ADM-016.1, "Transient Combustible and Flammable Substances Program". This procedure generally defines the term "transient combustible" as "any combustible or flammable material that is not permanently installed...or stored in a designated storage area." The procedure also defines the restricted areas by illustration. These areas include safe shutdown component areas as well as safety related component areas, plus the Radwaste Building and Fire Pump/Raw Water Storage Tank area.

A Transient Combustible Permit (TCP) is required under specifically defined conditions, including where Class A materials exceed 100 pounds (10 pounds for sensitive areas), where Class B liquids exceed 5 gallons (1 gallon for sensitive areas), or where more than five flammable or combustible aerosol containers are to be used. TCPs are issued and tracked by the Fire Protection Representative who also determines the need for additional fire prevention measures at the work site. No transient combustible or flammable liquids are allowed to be unattended unless specifically exempted by procedure or by the Fire Protection Representative.

With regard to the accumulation of transient combustibles in a specific location due to multiple work activities, there is no need for procedural restrictions for the following reasons:

- Maintenance activities performed during plant power generation are restricted from an operations standpoint, and usually do not require transient combustibles.

- Transient combustible liquids are attended to by those performing the task in the area.

- By nature of the work, most maintenance activities cannot be performed in close proximity with one another, so that work space often limits exposure to more than the transient combustibles required for the task.

- Plant work controls require that a TCP be prepared for any work which involves transient combustible material as applicable, and that flammable and combustible liquids be removed and properly stored by the end of every work shift.

- Restrictions imposed by the TCP are very conservative with respect to the exposure hazard required to challenge fire protection features in work areas.

In light of the preceding, there are very few transient combustibles in the plant at any one time, and those that are have sufficient controls. Therefore, the potential accumulation of combustibles would not challenge the fire-resistive capability of fire barriers.

F. ASTM E-1529 Applicability

The ASTM E-1529 test methods are intended to simulate a sudden and total continuous engulfment in flames in the hottest areas of large hydrocarbon fuel pool fires. By contrast, the ASTM E-119 test methods simulate the more gradual exposure to fires typically associated with solid fuels combustion.

It is recognized that materials can perform quite differently in response to ASTM E-1529 test methods than with ASTM E-119 test methods. The main reason is that the test specimens heat up faster during ASTM E-1529 testing and are subjected to strong thermal shock. The ASTM E-1529 test methods are used to evaluate fire barrier performance of materials used in the hydrocarbon processing industry (such as refineries and petrochemical plants) for structures that could be exposed to large (hundreds or thousands of gallons spread over several hundred to several thousand square foot areas), free-burning, unmitigated, fluid-hydrocarbon fueled pool fires. Such fire scenarios are not credible in the vicinity of Turkey Point for the following reasons:

1. Areas in the vicinity of the turbine building containing major combustible inventories, such as transformers and turbine lube oil reservoirs, are protected by water spray-type deluge systems.

2. Major equipment maintenance is usually performed during plant power outages. Lube oil replacement may be performed locally. In all cases, the handling of combustible fluids is strictly controlled.

3. There is an inherent lack of ignition sources in areas near safe shutdown circuits. The hot steam and feedwater lines in this zone are located on the feedwater and steam platforms.

4. Transient combustible fluids near safe shutdown circuits are likely to be a few gallons of paint or lube oil passing through.

5. A significant pool of combustible fluid could only be created through catastrophic failure of a transformer, turbine lube oil storage tank or fuel tank. These facilities are either designed to contain collected spills (dikes) and are equipped with fire suppression systems or are remote from the power block. In-situ fire suppression would begin to mitigate such a fire almost immediately, and would be promptly supported by the fire brigade.

Based on the preceding, the potential for exposure to a hydrocarbon-fueled fire that could challenge safe shutdown circuit fire wrap is extremely unlikely. The potential for creating such a fire is very small. Also, there are substantial provisions to contain combustible fluids and fire mitigation, and the protected safe shutdown circuits are far from the potential fire sources. Therefore, a fire barrier rating based on ASTM E-119 is appropriate for Turkey Point Units 3 and 4.

G. Fire Detection/Fire Brigade Response

Fire detection outdoors is typically provided directly by the detection systems associated with the Fixed Water Spray Suppression systems protecting the major combustibles (e.g., transformers). Indirect fire detection is provided from flow alarms which would sound in the event that a wet pipe sprinkler system was activated.

Ignition of transient combustible materials is the most likely of any cause for a fire, and these materials are strictly controlled. In many cases, plant personnel are required to accompany a transient combustible, and thus provide the primary means of detection and reporting a fire, even in areas where detection is installed.

Based on the preceding, a fire which could challenge an outdoor fire barrier system is extremely unlikely. Even so, the Turkey Point fire brigade staffing and training meets or exceeds the requirements as provided in 10 CFR 50, Appendix R, Sections III.H and III.I. All fire brigade members are trained at an accredited fire training facility once a year. This facility exercises the fire fighting skills of the fire brigade members through training with live fires.

In addition, fire brigade response/control times for actual fires at Turkey Point have been recorded. "Response Time" is defined as the time it takes for the last assigned fire brigade member to arrive at the scene. "Control Time" is defined as the time required to extinguish the fire. The fire brigade response/control time data for fires during the period 1989-1996 is as follows:

1989 There were two fires requiring fire brigade response from oil soaked lagging (caused by turbine oil seal leak during safeguards testing) in the Unit 3 turbine area. The first fire occurred on 2/6/89; the fire brigade (5 members) response/control times were 5/7 minutes. The second fire occurred on 2/7/89; the fire brigade (5 members) response/control times were 5/15 minutes.

1990 There was one fire requiring fire brigade response located behind the Technical Support Center from a discarded cigarette igniting a piece of tarp on the ground. The fire occurred on 2/10/90; the fire brigade (5 members) response/control times were 10/4 minutes.

1991 There were two fires requiring fire brigade response. The first fire occurred on 5/21/91 outside the Nuclear Administration Building from trash in roll-off dumpster box ignited by a discarded cigarette; the fire brigade (10 members) response/control times were 5/6 minutes. The second fire occurred on 11/1/91 in the Health Physics computer room from a computer transformer burning due to an electrical short; the fire brigade (13 members) response/control times were 1/5 minutes.

1992 No fires occurred requiring fire brigade response.

1993 There was one fire requiring fire brigade response located in the Radwaste Building from a smoldering mop head (caused by welding slag dropped onto the mop). The fire occurred on 12/6/93; the fire brigade (11 members) response/control times were 7/8 minutes.

1994 There were two fires requiring fire brigade response. The first fire occurred on 3/21/94 in the Laundry Room from protective clothing in dryer #10 (caused by an overheated dryer element); the fire brigade (5 members) response/control times were 2/0.5 minutes. The second fire occurred on 12/6/94 at the new cafeteria site from an engine fire on a diesel powered back hoe (caused by an oil line on the engine failing; the fire brigade (9 members) response/control times were 2/5 minutes.

1995 There was one fire requiring fire brigade response located in the Laundry Room where protective clothing ignited in a dryer as a result of an exhaust fan malfunction.. The fire occurred on 9/27/95; the fire brigade (10 members) response/control times were 3/10 minutes.

1996 As of this submittal, there have been no fires requiring fire brigade response.

It should be noted that some of the fires described above were extinguished before the full fire brigade complement arrived. Based on the preceding, the fire detection features are sufficient for fire fighting support.

H. Environmental Conditions

Environmental effects (specifically water damage) on the Thermo-Lag material were noted during initial installations at Turkey Point in outdoor locations. Rain water entered the Thermo-Lag enclosures. When weeping out through the enclosure walls, the water would also take part of the binding material. The effects are detected visually by material swelling, cracking, pealing, delamination and discoloration.

This leaching process occurs only when liquid flows through Thermo-Lag material. It was observed that if wetted material were allowed to air-dry, there was no evidence of leaching. This led to the installation of weep holes in locations where water intrusion was most likely, and the use of a substantial topcoating system to prevent water intrusion.

The Thermo-Lag installations are monitored by fire protection personnel by periodic inspections, which are performed under the fire barrier inspection program and cover 100% of the Thermo-Lag over each 18-month period. If the material does not pass inspection criteria (i.e. cracks, gaps, hardness), it is declared inoperable and a Fire Protection Impairment (FPI) is initiated for repair.

Thermo-Lag replacement has been performed somewhere in the plant each year since installation of the material began (circa 1984). Although some of the repairs have been due to physical damage from construction or maintenance activities, most of the cases in outdoor installations appear to be the effects of weather. With the exception of post-Hurricane Andrew repairs, the more recent trend shows the number of weather-related cases as decreasing.

As long as the physical configuration, consistency and surface hardness (sponginess) of the material is maintained (that is, no visible swelling, cracking, pealing or delamination), then there is reasonable assurance that the fire-resistance performance capability of the installation is maintained. In this regard, the current inspection program is sufficient to provide this assurance.

I. Thermo-Lag as an Intervening Combustible

Appendix R contains three requirements that preclude the presence of intervening combustible materials. First, Section III.G.2.b requires (as one alternative) 20 feet of separation between redundant trains with no intervening combustibles. Second, Section III.G.2.d requires (as an alternative) 20 feet of separation between redundant trains in containment, with no intervening combustibles. Third, Section III.G.2.f requires that a radiant energy shield in containment shall be non-combustible.

There is no evidence that the authors of Appendix R conceived of safe shutdown raceways and equipment in outdoor locations. Since the fires in relatively unconfined outdoor locations are well vented and unlikely to form trapped layers of hot gases, it is appropriate to apply the requirements of Sections III.G.2.d, e or f.

The term "combustible" covers a large range of products. On one end of the spectrum are the volatile petroleum products. On the other end is Fire Retardant Wood & Thermo-Lag.

The purpose of the 20-foot combustible free zone and the noncombustible radiant energy shield is to prevent a postulated fire from spreading to redundant safe shutdown components. FPL has applied this objective to the use of Thermo-Lag in open areas such as outdoors or containment. The radiant energy shields and intervening combustibles at Turkey Point take the form of raceway protection, rather than barrier walls.

Thermo-Lag requires a relatively high temperature (>1000°F) and/or a high radiant flux (>25 kW/m^2, 2.2 $BTU/s\text{-}ft^2$) to ignite. It will also absorb large amounts of energy before ignition. Thermo-Lag on its own, will not spread a flame horizontally. Considering the wide range of combustible products, and the objective of preventing a fire from propagating to 20 feet and redundant components, it is appropriate to determine if Thermo-Lag will or will not support fire propagation to a horizontal distance of 20 feet.

First, as stated above, Thermo-Lag will not self-propagate horizontally. Second, it is necessary to determine the distance from a fire where the radiant flux will drop to less than 25 kW/m^2 (2.2 $BTU/s\text{-}ft^2$). Looking at "Fire Induced Vulnerability Evaluation Methodology (FIVE) Plant Screen Guide, Table 10E "Critical Radiant Flux Distances"; it is evident that even at the end of the chart, the critical radial distance for 2.2 $BTU/s\text{-}ft^2$ is about 8 feet. This indicates that with a very large fire, redundant safe shutdown components at 20 feet will not be jeopardized by intervening Thermo-Lag. In addition, only the surface area of a small number of conduits will potentially add to the combustible load outside the fire plume. Based on this analysis, it is evident that Thermo-Lag does not qualify as an intervening combustible.

J. Top Coatings as Intervening Combustibles

Top Coatings are simply paint products used to keep adverse environmental conditions from affecting the Thermo-Lag. The contribution to fuel load from paint is very small. Paint is only flammable as a liquid, once cured/dried the combustible load is minimal.

In "Fire Tests of Building Interior Covering Systems", by David Waksman and John Ferguson (Interior Finish and Fire Spread, NFPA Pub. SSP-47), the authors provided experimental results of fire properties (flame spread, smoke generation and combustion products) of several surface coverings on combustible and relatively non-combustible substrates. The two painted substrates used were asbestos cement board (ACB) and 3/4" thick interior plywood. The flame spreads (per ASTM E-84) for these materials prior to applying surface coatings were essentially zero and about 300 respectively. The results were that the substrate has a significant effect on the results of the flame spread of the applied surface coating. A number of the coatings tested were paint products of various thicknesses. One example is a two component epoxy paint which had a flame spread of 281 on the plywood and a flame spread of 1 on the ACB. The worst case in the testing was a Nylon-Formulated Two-Component Paint w/Flexible Primer which had a flame spread of 341 on the plywood and a flame spread of 2 on the ACB. The nylon-formulated paints were the only paints tested which had a flame spread greater than 300 on the plywood substrate. Paint on relatively non-combustible materials (ACB) has a very low flame spread (1 to 7). In most cases the paint on a combustible substrate (plywood) had a flame spread of less than the substrate material.

Thermo-Lag 330-1 has a flame spread of about 25, based on Information Notice 95-32. Therefore, it is concluded that the application of a topcoat material (paint) will not increase the flame spread of the material. As such, the flame spread of the topcoat on Thermo-Lag 330-1 material would be in the range of 25. According to Information Notice 95-32 this correlates to about 8 feet in the ASTM E-84 Test Tunnel.

The conclusion is that the topcoating will not substantially increase the flame spread of the Thermo-Lag material and is acceptable for use at Turkey Point Units 3 and 4.

K. Control Building Roof Coating

There are four basic attributes of roof coverings which need to be evaluated. The first is the potential spread of a fire on the interior of a building to the roof. The second is the potential for the spread of a fire on the roof to the interior of the building. Since the basic construction of this roof is one foot of reinforced concrete, the first two possibilities are not feasible. The third is the potential to propagate a roof fire when exposed to an external fire, and the fourth is localized damage to the roof covering without spreading the fire. Most roof coverings are combustible to some degree. It is important to have a roof covering which will not originate, propagate or intensify a fire originating on the roof.

The roof on the main control building consists of:

1) a Koroseal vapor barrier,
2) Flintkote roof insulation,
3) Lexsuco adhesive,
4) four layers of Ruberoid asphalt felt conforming to ASTM D226-60
5) four layers of Ruberoid asphalt conforming to ASTM D312 Type 1, and
6) clean dry opaque 1/4" to 5/8" gravel.

This roof covering is original plant construction and confirmation of the roofing system Class requirements cannot be found. However, the current Ruberoid Mop Systems specification (from GAF Inc.) indicates a Class "A" rating (NFPA 256).

NFPA 203, Section 2-1 on composite built-up roof coverings states, "The finished surface could be a smooth flood coat of bitumen, or it could have gravel or slag imbedded in it. The gravel or slag surfacing acts to reflect heat, to prevent flow and cracking of the bitumen, and to improve the fire performance of the coverings." Section 5-2 on built-up coverings states, "Gravel or slag could be needed on the roofing surface for its fire resistance qualities."

Based on the above, it is concluded that a roof covering which uses the gravel topping (as installed on the Control Building) is of high resistance to a severe fire, and that propagation of a roof top fire due to this roof covering is unlikely.

L. Cable as a Heat Sink

The NEI Application Guide is used to determine the fire endurance rating of the Thermo-Lag 330-1 installations. One-hour rated Thermo-Lag 330-1 does not have a structural failure mode for conduits. In evaluating the thermal failure mode of the conduit configurations, the percent cable fill (enclosed thermal mass) for any conduit size has a significant effect on the ultimate fire endurance rating. Testing has been performed to document the effect of varying the enclosed thermal mass while keeping all other parameters the same. FPL has developed correlations from this data for applicable installation methods to better determine the fire rating of the conduit assemblies and will use this correlation to establish the fire barrier rating of conduits installed at Turkey Point Units 3 and 4.

VI. Summary and Conclusion

Subsections III.G.2.a of Appendix R to 10 CFR Part 50 address fire protection features for assuring safe shutdown capability. Exemptions are provided under the provisions of 10 CFR §50.12 and, in effect, have been made a part of the fire protection regulations through the Court of Appeals decision in Connecticut Light. The exemption requested in Section II.B above, is consistent with Section 50.12 of the Commission's regulations in that it is authorized by law, will not present an undue risk to the public health and safety, is consistent with the common defense and security, and presents special circumstances. Accordingly, the requested exemption should be granted.

GROUND FLOOR PLAN EL. 18'-0"

LEGEND
EXCLUSION AREA
SUPPRESSION FOR MAJOR COMBUSTIBLE COMPONENT

9612190431-01

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		ISSUED FOR USE.				

FPL

TURKEY POINT NUCLEAR UNITS 3 & 4

GENERAL ARRANGEMENT

APPENDIX "R"
MAJOR COMBUSTIBLES
50 FOOT EXCLUSION AREAS

FLORIDA POWER & LIGHT

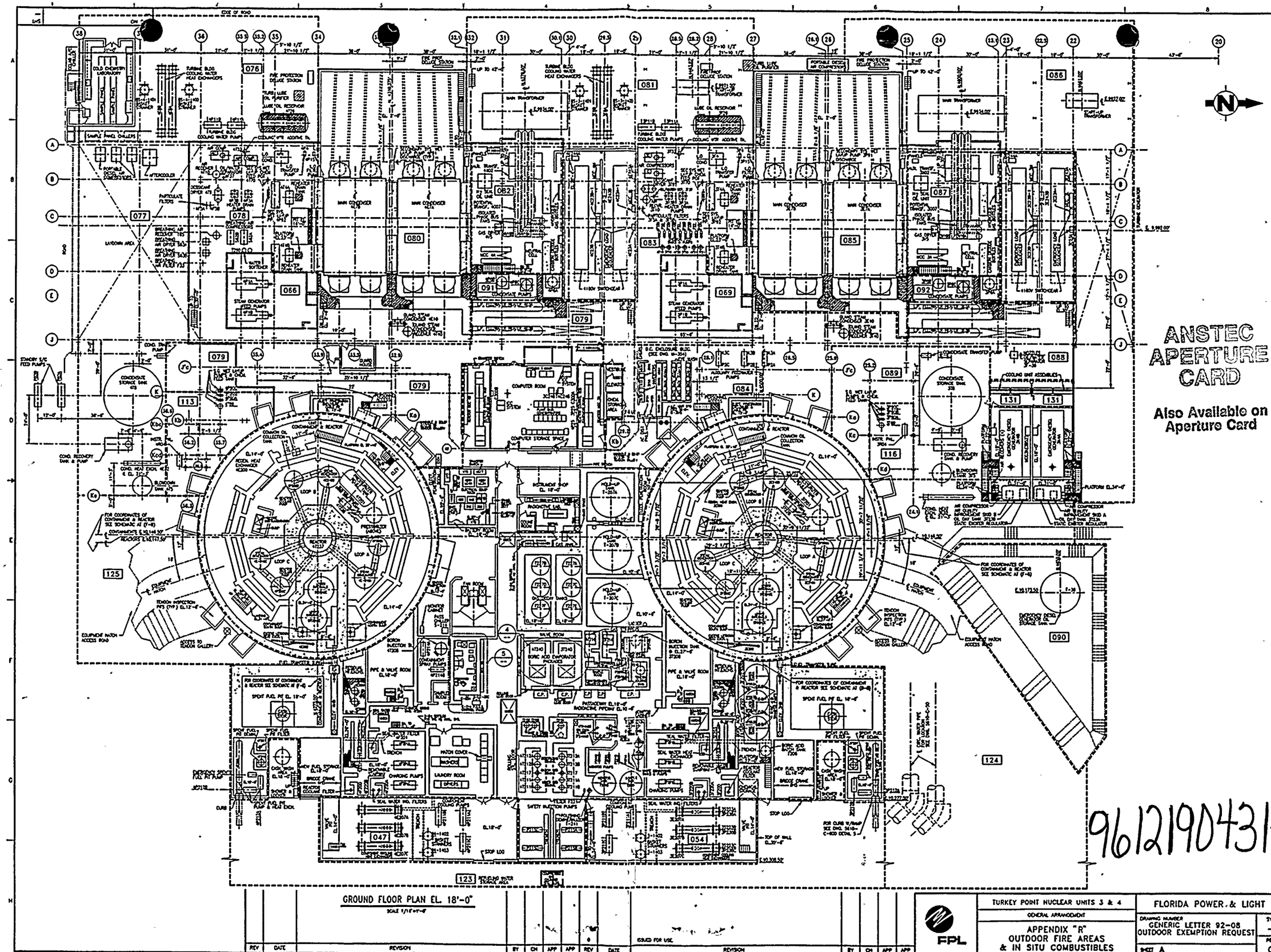
DRAWING NUMBER
GENERIC LETTER 92-08
OUTDOOR EXEMPTION REQUEST

SYS —

REV —

SHEET 8

WRG 38 DWG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9612190431-02
GROUND FLOOR PLAN EL. 18'-0"
TURKEY POINT NUCLEAR UNITS 3 & 4
GENERAL ARRANGEMENT
APPENDIX "R"
OUTDOOR FIRE AREAS
& IN SITU COMBUSTIBLES
FLORIDA POWER & LIGHT
DRAWING NUMBER
GENERIC LETTER 92-08
OUTDOOR EXEMPTION REQUEST
SHEET A
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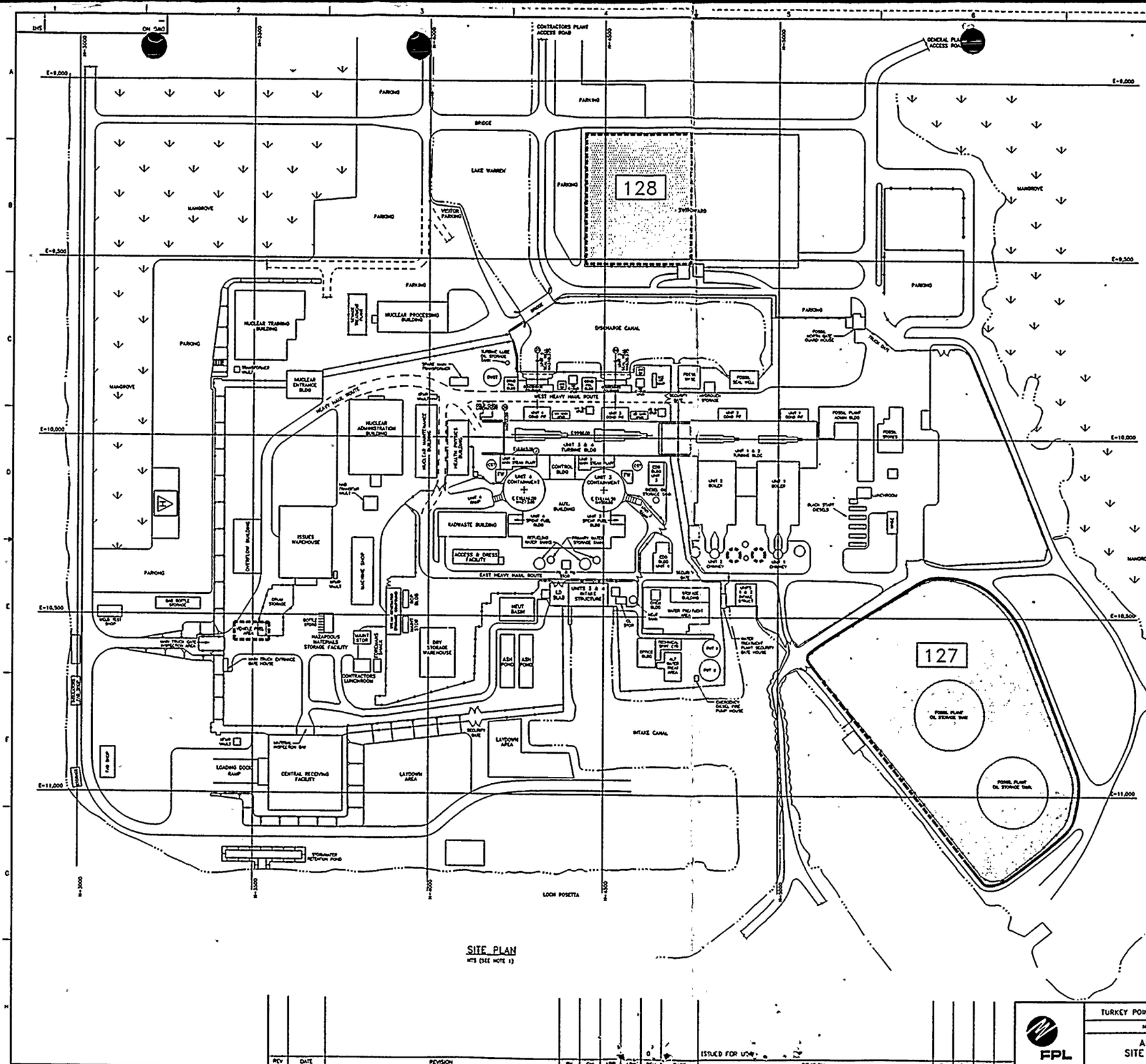

SITE PLAN
NTS (SEE NOTE 1)

NOTES:

1. SITE PLAN DEPICTS GENERAL SITE LAYOUT. LOCATIONS AND SIZES OF DEPICTED FACILITIES ARE NOT SCALEABLE FOR DESIGN PURPOSES.
2. SEE DRAWINGS 5610-C-8 AND 5610-C-13 FOR ENLARGEMENT OF MAIN PLANT AREA.

LEGEND:

- NUCLEAR PERIMETER FENCE
- NUISANCE FENCE/CHAIN
- RADIATION CONTROL AREA
- FOSSIL/OTHER FENCES
- GUARD RAIL
- SLOPE/EMBANKMENT
- EDGE OF WATER

REFERENCE DRAWINGS:

FSK-C-726	PTN MASTER SITE PLAN UNITS 3 & 4
5610-C-8	PAVING, GRADING & FENCING MAIN SERVICE AREA
4675-C-8	GRADING, PAVING & FENCING AREA 2
C-46382-4	TURKEY POINT PLANT AND SOUTH DADE PROPERTIES - PROPERTY PLAT

9612190431-03

NOTE: THIS DWG IS MADE FROM
(M/DCP) DWG. NO. ____ REV. ____
(W) DWG. NO. ____ REV. ____
FPL DWG NO. ____ DRN. C-10601 PAGE 2 (PC/N 94-067) REV. ____

REV	DATE	REVISION	BY	CH	APP	APP
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FPL	TURKEY POINT NUCLEAR UNITS 3 & 4 NOT NUCLEAR SAFETY APPENDIX "R" SITE FIRE HAZARDS	FLORIDA POWER AND LIGHT DRAWING NUMBER GENERIC LETTER 92-08 OUTDOOR EXEMPTION REQUEST SHEET C
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