FPL.

L-2013-021
10 CFR 52.3

January 18, 2013

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Re: Florida Power & Light Company
Proposed Turkey Point Units 6 and 7
Docket Nos. 52-040 and 52-041
Revised Response to NRC Request for Additional Information
Letter No. 026 (eRAI 5653) Standard Review Plan
Section 02.02.03 – Evaluation of Potential Accidents

Reference:

1. NRC Letter to FPL dated July 5, 2011, Request for Additional Information Letter No.026 Related to SRP Section 02.02.03 – Evaluation of Potential Accidents for the Turkey Point Nuclear Plant Units 6 and 7 Combined License Application
2. FPL Letter to NRC dated August 24, 2011, Response to NRC Request for Additional Information Letter No. 026 (eRAI 5653) Standard Review Plan Section 02.02.03 – Evaluation of Potential Accidents
3. FPL Letter to NRC dated December 14, 2011, Response to NRC Request for Additional Information Letter No. 026 (eRAI 5653) Standard Review Plan Section 02.02.03 – Evaluation of Potential Accidents

Florida Power & Light Company (FPL) provides, as an attachment to this letter, its revised responses to the Nuclear Regulatory Commission's (NRC) requests for additional information (RAI) 02.02.03-1. Revision bars are provided to indicate the changes.

In response to NRC request for additional information (RAI) 02.02.03 Evaluation of Potential Accidents (Reference 1), Florida Power & Light Company (FPL) provided a response in letter L-2011-331, dated August 24, 2011 (Reference 2). FPL subsequently provided a revised response in letter L-2011-523, dated December 14, 2011 (Reference 3).

This revision replaces the storage of hydrogen as a series of gaseous hydrogen storage banks, used at Turkey Point Units 1-5, with a liquid hydrogen storage tank and vaporizers specified in the AP1000 DCD.

If you have any questions, or need additional information, please contact me at 561-691-7490.

D097
NRD

I declare under penalty of perjury that the foregoing is true and correct.

Executed on January 18, 2013

Sincerely,

William Maher
Senior Licensing Director – New Nuclear Projects

WDM/RFB

Attachment: FPL Revised Response to NRC RAI No. 02.02.03-1 (eRAI 5653)

cc:
PTN 6 & 7 Project Manager, AP1000 Projects Branch 1, USNRC DNRL/NRO
Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant 3 & 4

NRC RAI Letter No. PTN-RAI-LTR-026

SRP Section: EIS 02.02.03 – Evaluation of Potential Accidents

Question from Siting and Accident Conseq Branch

NRC RAI Number: 02.02.03-1 (eRAI 5653)

Pursuant to 10 CFR sections 52.79(a)(1)(iv) and 52.79(a)(1)(vi), a COL application must contain a final safety analysis report (FSAR) that shall include, among other things, the location and description of any nearby industrial, military, or transportation facilities and routes, and a description and safety assessment of the site on which the facility is to be located, including site characteristics that comply with site criteria in 10 CFR 100.

With respect to onsite or offsite storage of hazardous chemicals, guidance on these regulations is provided in RG 1.206, Section C.I.2.2.3, "Evaluation of Potential Accidents," which states that applicants should determine, on the basis of information provided in FSAR Sections 2.2.1 and 2.2.2, the potential accidents to be considered as design basis accidents and identify the potential effects of those accidents on the nuclear plant in terms of design parameters or physical phenomena.

For COL applicants referencing the AP1000 DCD, COL information item 2.2-1 states, among other things, that COL applicants referencing the AP1000 certified design will provide site-specific information related to the identification of potential hazards within the site vicinity. Safe distances for material in onsite storage facilities that are part of the standard design are included in AP1000 DCD Table 2.2-1, and COL applicants are expected to verify that the locations and size of the storage facilities are consistent with the safe distances defined by the AP1000 certified design.

The staff requests the following additional information regarding PTN COL FSAR Section 2.2.3.

a. Revise the COL FSAR to include an explanation of how safe separation distances for standard chemicals listed in AP1000 DCD Table 2.2-1 are met at the PTN site.

b. COL FSAR Table 2.2-202 lists a hydrogen gas inventory of one 40,000 standard cubic feet tube trailer located in the PGS area for Units 6 & 7. Footnote (a) of COL FSAR Table 2.2 -213, "Design Basis Events – Explosions" states that simultaneous detonation of all the tubes in the tube trailer "is not a likely scenario." The applicant explains that it assumed that one-third of the tubes could rupture, which yields a safe distance of 544 feet, as compared to a distance of 560 feet to the nearest safety related structure, which leaves a margin of 16 feet. As stated in the AP1000 DCD, Section 2.2, "The determination of the probability of occurrence of potential accidents which could have severe consequences will be based on analyses of available statistical data on the occurrence of the accident together with analyses of the effects of the accident on the plant's safety-related structures and components." Justify why there is an acceptably low probability of occurrence of an accident ($< 10^{-6}$ probability of occurrence per year) which involves simultaneous rupture of more than one-third of the tubes, detonation other hydrogen gas, and a radiological dose in excess of the limits in 10 CFR 50.34(a)(1). Revise the COL FSAR, as appropriate.

FPL RESPONSE:

This revision reflects FPL's decision to remove the COL Departure, PTN DEP 9.3-1. COL Departure, PTN DEP 9.3-1 specified the storage of hydrogen as a series of gaseous hydrogen storage banks, identical to the hydrogen banks used at Turkey Point Units 1-5, in lieu of the liquid hydrogen storage tank and vaporizers specified in the AP1000 DCD. The revision is discussed in the following paragraphs.

a. The calculated safe distances for onsite site-specific materials along with the distances to the nearest safety related structure for explosions and flammable vapor cloud explosions are found in FSAR Tables 2.2-213 and 2.2-214, respectively. The calculated safe distances for standard chemicals stored onsite at Turkey Point Units 6 & 7 for explosions and flammable vapor cloud explosions are listed in DCD Table 2.2-1. Table 1, below, provides an excerpt from Table 2.2-1 of the AP1000 DCD, including the Explosion Minimum Safe Distances and Flammable Vapor Cloud Safe Distance columns.

Table 1

Material	Explosion Minimum Safe Distance[1] (feet)	Flammable Vapor Cloud Safe Distance[1] (feet)
Liquid Hydrogen, H_2	577	175
Pressurized Gaseous Hydrogen, H_2	6	Not Applicable
Hydrazine, N_2H_4	45	Not Applicable
Morpholine, $O(CH_2CH_2)_2NH$	66	Not Applicable
3-Methoxy propylamine (MOPA), $C_4H_{11}NO$	87	Not Applicable
No. 2 Diesel Fuel Oil	280	Not Applicable
Waste Oil	102	Not Applicable

Note:

1. Safe distance is to nearest point of nuclear island SSC (Structures, Systems, or Components).

Each standard chemical stored at Turkey Point Units 6 & 7 will be stored at a distance greater than the indicated minimum safe distances for explosion and vapor cloud explosions indicated in Table 2.2-1 of the AP1000 DCD and Table 1 above.

b. The deletion of COL Departure, PTN DEP 9.3-1, which specified the storage of hydrogen as a series of gaseous hydrogen storage banks in lieu of the liquid hydrogen storage tank specified in the AP1000 DCD, removes the evaluation of the hydrogen gas inventory of one 40,000 standard cubic feet tube trailer located in the Plant Gas Storage (PGS) area for Units 6 & 7.

   Revisions will be made to FSAR 1.8, 2.2, 6.4, and 9.3 along with Part 7 to reflect the removal of COL Departure, PTN DEP 9.3-1. (See Associated COLA Revisions Section).

This response is PLANT SPECIFIC.

References:

None

ASSOCIATED COLA REVISIONS:

The following changes will be made in a future COLA revision.

FSAR Table 1.8-201 (Sheet 2 of 2), Summary of FSAR Departures from the DCD, will be revised as follows:

Departure Number	Departure Description Summary	FSAR Section or Subsection
PTN DEP 8.3-1	The Class 1E voltage regulating transformers do not have active components to limit current.	8.3.2.2
PTN DEP 9.3-1	**DELETED** ~~DCD Subsection 9.3.2.2.1 describes the low pressure hydrogen gas portion of the plant gas system as a packaged system consisting of a liquid hydrogen storage tank and vaporizers. Units 6 & 7 will use a series of hydrogen storage banks that store hydrogen gas in banks of storage tubes instead of the liquid hydrogen storage tank and vaporizers. The hydrogen gas storage banks will be located at the hydrogen storage tank area.~~	**N/A** ~~9.3.2.2 9.3.2.5~~

FSAR Section 2.2 will be revised as follows:

STD DEP 1.1-1
~~**PTN DEP 9.3-1**~~

Subsection 2.2.1 of the DCD is renumbered as Subsection 2.2.4 and moved to the end of Section 2.2. This is being done to accommodate the incorporation of RG 1.206 numbering conventions for Section 2.2. ~~Section 2.2 includes the evaluation of hazards due to changes in the Plant Gas System specifically hydrogen gas storage.~~

FSAR Subsection 2.2.2.2.1 (Paragraph 2) will be revised as follows:

Units 6 & 7 are located southwest of Units 1 through 5 as delineated on the site area maps (Figures 2.1-203 and 2.1-205). The center point of the Unit 6 reactor building is approximately 215 feet west and 3625 feet south of the center point of the Unit 4 containment. The Units 6 & 7 onsite chemicals identified for possible analysis and their

storage location are presented in Table 2.2-202, including the AP1000 standard chemicals described in DCD Table 6.4-1. The disposition of hazards associated with these chemicals is summarized in Tables 2.2-207 and 2.2-208. The subsequent hazards associated with the AP1000 standard chemicals are addressed in DCD Table 2.2-1 and Table 6.4-201. DCD Table 2.2-1 provides specific information concerning onsite explosion and flammable vapor cloud safe distances associated with the AP1000 standard chemicals. Table 6.4-201 provides specific information concerning the toxicity analysis associated with the standard AP1000 chemicals for Units 6 & 7. A site specific analysis is included for those chemicals stored at Units 6 & 7 which were ~~either~~ not included in the standard AP1000 chemical analyses (DCD Table 2.2-1 and Table 6.4-201) ~~or where the standard AP1000 chemical analyses was not bounding for the identified chemical~~. The subsequent analysis of the site-specific chemicals identified for further analysis is addressed in Subsection 2.2.3.

FSAR Subsection 2.2.3.1 (Paragraph 1, second bullet) will be revised as follows:

RG 1.206 states that design basis events, internal and external to the nuclear plant, are defined as those accidents that have a probability of occurrence on the order of magnitude of 1E-07 per year or greater with potential consequences serious enough to exceed the guidelines in 10 CFR Part 100 affecting the safety of the plant. The following accident categories are considered in selecting design basis events: explosions, flammable vapor clouds (delayed ignition), toxic chemicals, fires, collisions with the intake structure, and liquid spills. On the basis of the identification of industrial, transportation, and military facilities presented in Subsections 2.2.1 and 2.2.2, the postulated accidents within these categories are analyzed at the following locations:

- Onsite chemical storage (Units 1 through 5)
- PTN DEP 9.3-1 Site-specific onsite chemical storage (Units 6 & 7) ~~including hydrogen gas storage located at the Plant Gas Storage area~~
- Nearby chemical and fuel storage facilities (Homestead Air Reserve Base)
- Nearby transportation routes (Florida Gas Transmission Company (Turkey Point Lateral-natural gas transmission pipeline), and an onsite transportation route)

FSAR Subsection 2.2.3.1.1.4 will be revised as follows:

The site-specific chemical~~s~~ associated with Units 6 & 7 that ~~were~~ **is** identified for further analysis with regard to explosion potential ~~were~~ **is** methanol ~~and the hydrogen storage banks~~. A conservative analysis using the TNT equivalency methods described in Subsection 2.2.3.1.1.1 was used to determine **the** safe distance~~s for the identified hazardous materials~~. The result~~s~~ indicate**s** that the safe distance~~s are~~**for methanol is 344 feet, which is** less than the minimum separation distance from the nearest safety-related structure—the ~~Unit 6 or~~ Unit 7 auxiliary building~~—to each storage location. The safe distance for methanol is 344 feet; and for hydrogen, 269 feet~~ (Table 2.2-213). Methanol is stored at the FPL reclaimed water treatment facility approximately 5581 feet from the nearest safety-related structure for Units 6 & 7—the Unit 7 auxiliary building. ~~Hydrogen is stored approximately 560 feet from the nearest safety-related structure for Turkey Point Units 6 & 7—the Unit 6 or Unit 7 auxiliary building~~. Additionally, each

standard AP1000 chemical stored at Turkey Point Units 6 & 7 is stored at a distance greater than the minimum safe distance for explosion indicated in DCD Table 2.2-1. Therefore, an explosion from any of the onsite hazardous materials evaluated will not adversely affect the safe operation or shutdown of Units 6 & 7.

FSAR Subsection 2.2.3.1.2.1 (Paragraph 3, first bullet) will be revised as follows:

Other assumptions for the ALOHA model include:

- "Open Country" was selected for the ground roughness with the exception of those chemicals stored north of Units 1 through 4 (ammonium hydroxide) ~~and those chemicals stored at the PGS bulk gas storage area (hydrogen)~~ where "Urban or Forest" was selected. The degree of atmospheric turbulence influences how quickly a pollutant cloud moving downwind will mix with the air around it and will be diluted. Friction between the ground and air passing over it is one cause of atmospheric turbulence. The rougher the ground surface, the greater the ground roughness and the greater the turbulence that develops. A chemical cloud generally travels farther across open country than over an urban area or forest. The selection of "Open Country" is conservative because the Turkey Point site meets the criteria for "Urban or Forest"—an area with many friction-generating roughness elements, such as trees or small buildings (e.g., industrial areas). The site layout and location of the chemicals stored north of Units 1 through 4 and those stored at the PGS in relation to Units 6 & 7 would entail a vapor cloud travel through or around plant structures, thus "Urban or Forest" was selected for the determined worst-case meteorological conditions.

FSAR Subsection 2.2.3.1.2.4 will be revised as follows:

The site-specific chemical~~s~~ stored on site that ~~were~~**is** identified for further analysis with regard to forming a flammable vapor cloud capable of delayed ignition following an accidental release of the hazardous material ~~are~~**is** methanol ~~and hydrogen~~. As described in Subsection 2.2.3.1.2.1, the ALOHA dispersion model was used to determine the distance a vapor cloud could travel to reach the LFL boundary once a vapor cloud has formed from an accidental release of the identified chemical. ~~For the hydrogen storage banks, the analyzed quantity was released over a 10-minute period as a continuous direct source.~~

The result~~s indicate~~ **indicates** that any plausible vapor cloud that could form and mix sufficiently under stable atmospheric conditions would be below the LFL before reaching the nearest safety-related structure—the Unit ~~6~~ **7** auxiliary building. The distance to the LFL boundary for methanol is 333 feet~~; and for hydrogen, 507 feet~~. Methanol is stored at the FPL reclaimed water treatment facility approximately 5581 feet~~, and hydrogen is stored approximately 560 feet~~ from the nearest safety-related structure~~—either the Unit 6 or Unit 7 auxiliary building~~ (Table 2.2-214).

Further, as described in Subsection 2.2.3.1.2.1, the associated heat flux for ~~each~~**the** flammable vapor cloud was determined from the point at which the vapor cloud reaches the LFL to the nearest safety-related structure. The maximum incident heat flux for methanol is 0.592 kW/m^2~~; and for hydrogen is 2.344 kW/m^2~~. ~~These~~ **This** result~~s are~~ **is** less than 5 kW/m^2 level of concern defined by the EPA.

~~With the exception of hydrogen, a~~ **A** vapor cloud explosion analysis was also completed as detailed in Subsection 2.2.3.1.2.2 to obtain **the** safe distance~~s~~. ~~The methodology for the hydrogen analysis accounted for the buoyancy associated with a release of gaseous hydrogen.~~ The result~~s~~ concluded that the safe distance, the minimum distance required for an explosion to have less than a 1 psi peak incident pressure, is less than the shortest distance to the nearest safety-related structure for Units 6 & 7, the Unit ~~6~~ **7** auxiliary building, and the storage location of ~~these chemicals~~**methanol**. The safe distance for the methanol is 804 feet~~; and for hydrogen, 514 feet~~ from the point of ignition. ~~Each of these~~ **This** chemical~~s~~ is stored at a greater distance from the nearest safety-related structure than the calculated safe distance. Additionally, each standard AP1000 chemical stored at Turkey Point Units 6 & 7 is stored at a distance greater than the minimum safe distance for vapor cloud explosion indicated in DCD Table 2.2-1. Therefore, a flammable vapor cloud with the possibility of ignition or explosion formed from the storage of the onsite chemical storage for Units 6 & 7 analyzed will not adversely affect the safe operation or shutdown of Units 6 & 7 (Table 2.2-214).

FSAR Subsection 2.2.3.1.3 (Paragraph 7, first bullet) will be revised as follows:

Other atmospheric inputs/assumptions for the ALOHA model include:

- "Open Country" was selected for the ground roughness with the exception of those chemicals stored north of Units 1 through 4 (ammonium hydroxide and sodium hypochlorite); ~~the hydrogen stored at the PGS bulk gas storage area~~ and the sodium hypochlorite stored at the Cooling Towers; where "Urban or Forest" was selected. The degree of atmospheric turbulence influences how quickly a pollutant cloud moving downwind will mix with the air around it and will be diluted. Friction between the ground and air passing over it is one cause of atmospheric turbulence. The rougher the ground surface, the greater the ground roughness and the greater the turbulence that develops. A chemical cloud generally travels farther across open country than over an urban area or forest. The selection of "Open Country" is conservative because the Turkey Point site meets the criteria for "Urban or Forest"—an area with many friction-generating roughness elements, such as trees or small buildings (e.g., industrial areas). The site layout and location of the chemicals stored north of Units 1 through 4 and those stored at the PGS and the Cooling Tower Area in relation to Units 6 & 7 would entail a vapor cloud travel through or around plant structures, thus "Urban or Forest" was selected for the determined worst-case meteorological conditions.

FSAR Section 2.2.3.1.3.2 will be revised as follows:

The site-specific chemicals stored on site that were identified for further analysis with regard to the potential of the formation of toxic vapor clouds formed following an accidental release are methanol~~,~~ **and** sodium hypochlorite (storage at FPL reclaimed water treatment facility and cooling tower)~~, and hydrogen (asphyxiant)~~. As described in Subsection 2.2.3.1.3, the identified hazardous materials were analyzed using the ALOHA dispersion model to determine whether the formed vapor cloud would reach the control room intake and what the concentration of the toxic chemical may reach in the control room following an accidental release~~. Hydrogen concentrations were determined at the control room following a 10-minute release from the volume of the interconnected storage vessels. For remaining chemicals stored in the liquid phase, the~~ **The** worst-case release scenario included the total loss of the largest vessel, resulting in an unconfined 1-centimeter-thick puddle~~. In the case of the asphyxiant analyzed, hydrogen, the concentration under the determined worst-case meteorological conditions at the control room, 1890 ppm, would not displace enough oxygen for the control room to become oxygen-deficient, nor would it otherwise be toxic at this concentration.~~ The ~~remaining~~ chemical analyses indicate that the control room would remain habitable for the determined worst-case release scenario—128 ppm methanol, 2.68 ppm sodium hypochlorite (FPL reclaimed water treatment facility), and 5.59 ppm sodium hypochlorite (cooling tower) (Table 2.2-215). Additionally, Table 6.4-201 provides specific information concerning the toxicity analysis associated with the standard AP1000 chemicals for Units 6 & 7. Each standard AP1000 chemical stored at Turkey Point Units 6 & 7 is stored at distances greater than the evaluated minimum distance to the main control room intake indicated in Table 6.4-201. Therefore, the formation of a toxic vapor cloud following an accidental release of the analyzed hazardous materials stored on site would not adversely affect the safe operation or shutdown of Units 6 & 7.

FSAR Table 2.2-202 will be revised as follows:

Table 2.2-202 (Sheet 4 of 4)
Onsite Chemical Storage Units 1 through 7

Material	Toxicity Limit IDLH [a]	Maximum Quantity in Largest Container	Primary Storage Location
Proprietary Reverse Osmosis Cleaning Chemical[d] (EDTA Salt, Percarbonate Salt, Phosphonic Acid, Tetrasodium Salt)	None Established	Fiber Drums	Turbine Building
Proprietary Reverse Osmosis Cleaning Chemical[d] (Hydroxyalkanoic acid, Inorganic phosphate, EDTA Salt)	None Established	Fiber Drums	Turbine Building
Hydrazine (35% solution)[e]	50 ppm	800 gallons	Turbine Building
Carbohydrazide	None Established	800 gallons	Turbine Building
Morpholine[e]	1,400 ppm	800 gallons	Turbine Building
No. 2 Diesel Fuel Oil[e]	None Established	60,000 gallons	Diesel Generator Day Tanks/Diesel Generator Building/Annex Building
Liquid Nitrogen[e]	Asphyxiant	1,500 gallons	Plant Gas Storage Area
Liquid Hydrogen[e] ~~Gas~~	Asphyxiant	~~40,000 standard cubic feet (Tube Trailer)~~ **1,500 gallons**	Plant Gas Storage Area
Liquid Carbon Dioxide[e]	40,000 ppm	6 tons	Plant Gas Storage Area
Sodium Molybdate[e]	5 mg/m^3 (as Mo-TLV)	45 gallons	Turbine Building
Ethylene Glycol	None Established	45 gallons	Turbine Building

~~PTN DEP 9.3-1~~

FSAR Table 2.2-206 will be revised as follows:

Table 2.2-208 (Sheet 3 of 4)
Unit 6 & 7 Onsite Chemical Storage—Disposition

Material	Toxicity Limit (IDLH)	Flammability	Explosion Hazard	Vapor Pressure	Disposition
Reverse Osmosis (RO) Cleaning Chemicals (cont.)					
Proprietary Reverse Osmosis Cleaning Chemical (Hydroxyalkanoic acid, Inorganic phosphate, EDTA Salt)	None established	Not Flammable	None Listed	Solid—in a solution	No further analysis required.
Steam Generator Blowdown System					
Hydrazine-oxygen scavenger (35% solution)	50 ppm	4.7–100 percent	Vapor may explode	14 mmHg @ 77°F	Table 6.4-201 (AP1000 Standard Chemical)
Carbohydrazide—oxygen scavenger (Shut Down)	None established	Not flammable-unless water is boiled away and chemical is heated	None Listed	12 mm Hg @ 20°C	No further analysis required.
Morpholine	1,400 ppm(i)	1.4–11.2 percent	Vapor may explode	6 mmHg @ 68°F	Table 6.4-201 (AP1000 Standard Chemical)
Standby Diesel Fuel Oil System					
No. 2 Diesel Fuel Oil-Diesel Generator Day Tank	None Established	1.3–6.0 percent	None Listed	0.100 psi @ 100°F	Table 6.4-201 (AP1000 Standard Chemical)
No. 2 Diesel Fuel Oil-Ancillary Diesel Generator	None Established	1.3–6.0 percent	None Listed	0.100 psi @ 100°F	Table 6.4-201 (AP1000 Standard Chemical)
No. 2 Diesel Fuel Oil-Diesel Fire Pump Day Tank	None Established	1.3–6.0 percent	None Listed	0.100 psi @ 100°F	Table 6.4-201 (AP1000 Standard Chemical)
Fire Protection System					
No. 2 Diesel Fuel Oil	None Established	1.3–6.0 percent	None Listed	0.100 psi @ 100°F	Table 6.4-201 (AP1000 Standard Chemical)
Plant Gas System					
Nitrogen-Liquid	Asphyxiant	Negligible	None Listed	1.931 psi @ -344°F	Table 6.4-201 (AP1000 Standard Chemical)
Nitrogen Gas	Asphyxiant	Not Flammable	None Listed	1.931 psi @ -344F°	Table 6.4-201 (AP1000 Standard Chemical)
PTN DEP 9.3-1 Hydrogen-**Liquid** ~~Gas~~	Asphyxiant	4.0–75 percent	Vapor may explode	1.231 psi @ -434°F	~~Toxicity Analysis—consider as asphyxiant.~~ **Table 6.4-201 (AP1000 Standard Chemical)** ~~Flammability Analysis~~ ~~Explosion Analysis~~

FSAR Table 2.2-213 will be revised as follows:

Table 2.2-213
Design Basis Events – Explosions

Source	Chemical Evaluated	Quantity	Heat of Combustion (Btu/lb)	Distance to Nearest Safety-Related Structure	Safe Distance for Explosion to have less than 1 psi of Peak Incident Pressure	Thermal Radiation Heat Flux Resulting from a BLEVE
Road: Onsite Transport	Gasoline	50,000 pounds	18,720 Btu/lb	2,054 feet	266 feet	N/A
Pipeline: Turkey Point Lateral	Natural Gas	30,302 pounds (ba)	21,517 Btu/lb	4,535 feet	3,097 feet	N/A
Onsite (Includes Units 1 through 5)	Acetylene	3,000 pounds	20,747 Btu/lb	4,300 feet	1,416 feet	N/A
	Ammonium Hydroxide	40,000 gallons	7,992 Btu/lb	5,079 feet	296 feet	N/A
	Hydrazine	1,100 gallons	8,345 Btu/lb	2,727 feet	170 feet	N/A
	Hydrogen	1,615 standard cubic feet (cb)	50,080 Btu/lb	3,966 feet	269 feet	N/A
	Propane	500 gallons	19,782 Btu/lb	4,168 feet	1,299 feet	0.0878 kW/m^2
Site-specific Onsite (Includes Units 6 & 7)	Methanol	25,000 gallons	8,419 Btu/lb	5,581 feet	344 feet	N/A
	~~Hydrogen~~ (a)	~~1,615 standard cubic feet~~	~~50,080 Btu/lb~~	~~560 feet~~	~~269 feet~~	~~N/A~~
Offsite (Homestead Air Reserve Base)	Gasoline	137,104 pounds	18,720 Btu/lb	25,133 feet	372 feet	N/A
	Jet Fuel	23,251,606 pounds	18,540 Btu/lb		2,232 feet	N/A
	Propane	185,865 pounds	19,782 Btu/lb		5,513 feet	N/A

PTN-DEP-9.3-1

~~(a) A simultaneous detonation of all the tubes contained in a 40,000 scf hydrogen tube bank is not a plausible scenario. Therefore, an explosion involving a single hydrogen tube, 1,615 scf, was evaluated.~~

~~(b)~~ (a) Quantity of natural gas released over 5 seconds after a postulated pipeline rupture.

~~(c)~~ (b) The simultaneous detonation of all the tubes contained in a 58,000 scf trailer stored at Units 1–5 is not a plausible scenario; therefore, an explosion involving the largest single tube, 1615 scf, was evaluated.

FSAR Table 2.2-214 will be revised as follows:

Table 2.2-214,
Design Basis Events Flammable Vapor Clouds (Delayed Ignition) and Vapor Cloud Explosions

Source	Chemical Evaluated & Quantity	Distance to Nearest Safety-Related Structure	Distance to LFL	Safe Distance for Vapor Cloud Explosions	Thermal Radiation Heat Flux at Nearest Safety-Related Structure
Road: Onsite Transport	Gasoline (50,000 pounds)	2,054 feet	402 feet[(e)]	1,014 feet[(e)]	2.776 kW/m^2
Pipeline: Turkey Point Lateral	Natural Gas	{4,535 feet}	750 feet[(a)]	3,033 feet[(a)]	0.261 kW/m$^{2(b)}$
Onsite (Includes Units 1 through 5)	Acetylene (3,000 pounds)	4,300 feet	1,308 feet[(e)]	1,764 feet[(e)]	0.162 kW/m^2
	Ammonium Hydroxide (40,000 gal)	5,079 feet	354 feet[(c)(a)(~~h~~g)]	963 feet [(c)(a)(~~h~~g)]	0.900 kW/m^2
	Hydrazine (1,100 gal)	2,727 feet	42 feet[(a)]	No Detonation[(d)]	0.271 kW/m^2
	Hydrogen (58,000 scf)	3,966 feet	1,179 feet[(e)]	1,347 feet[(e)]	0.054 kW/m^2
	Propane (500 gal)	4,168 feet	738 feet[(f)]	1,416 feet[(a)]	0.090 kW/m^2
Site-specific Onsite (Includes Units 6 & 7)	~~Hydrogen Tube Bank (40,000 scf)~~	~~560 feet~~	~~507 feet[(c)(e)]~~	~~514 feet[(c)(e)(g)]~~	~~2.344 kW/m^2~~
	Methanol (25,000 gal)	5,581 feet	333 feet[(e)]	804 feet[(e)]	0.592 kW/m^2
Offsite (Homestead Air Force Base)	Gasoline (137,104 lb)	25,133 feet	678 feet[(e)]	1,623 feet[(e)]	0.051 kW/m^2
	Propane (185,865 lb)		2,190 feet[(a)]	4,866 feet[(e)]	0.078 kW/m^2

(a) Worst-case scenario meteorological condition was F stability class at two meters per second
(b) Thermal radiation heat flux resulting from a jet fire at the pipeline break.
(c) Urban or Forest ground roughness selected
(d) "No detonation" is listed when ALOHA reports that there is no detonation of the formed vapor cloud-that is no part of the cloud is above the LEL at any time.
(e) Worst-case scenario meteorological condition was F stability class at one meters per second
(f) Worst-case scenario meteorological condition was F stability class at one meters per second at 78°F
~~(g) The vapor cloud explosion analysis, in the case of hydrogen storage at Units 6 & 7, accounts for the buoyancy of a postulated release of gaseous hydrogen when traveling as the formed vapor cloud. Additionally, a TNT equivalency calculation (for spherical aerial vapor clouds) was used to determine the distance to 1 psi in this case.~~
(~~h~~g) 40,000 gallons of ammonium hydroxide were released within an area of 44,415 ft^2. This is conservative because the analyzed puddle expands greater than the dike area surrounding the ammonium hydroxide tanks. The analyzed puddle expands to nearby drains.

FSAR Table 2.2-215 will be revised as follows:

Table 2.2-215 (Sheet 2 of 2)
Design Basis Events, Toxic Vapor Clouds

Source	Chemical	Quantity	IDLH[a]	Distance to Nearest Control Room (feet)	Distance to IDLH	Maximum Control Room Concentration (ppm)
Site-specific Onsite (Includes Units 6 & 7)	~~Hydrogen Tube Bank~~	~~40,000 standard cubic feet~~	~~Asphyxiant~~	~~561 feet~~	~~N/A~~	~~1,890 ppm[c][g]~~
	Methanol	25,000 gallons	6,000 ppm	5,660 feet	1,131 feet	128 ppm[d]
	Sodium Hypochlorite (Reclaimed Water Treatment Facility)	20,000 gallons	10 ppm as Chlorine	5,660 feet	6,864 feet	2.68 ppm[d]
	Sodium Hypochlorite (Cooling Tower)	12,000 gallons	10 ppm as Chlorine	807 feet	2,622 feet	5.59 ppm[d]
Offsite (Homestead Air Reserve Base)	Halon 1301	5,440 pounds	40,000 ppm	25,133 feet	99 feet	0.273 ppm[e]
	Gasoline	137,104 pounds	300 ppm[b]		2,199 feet	1.91 ppm[f]
	Oxygen	36,561 pounds	May displace air and cause an oxygen enriched environment		N/A	9.39 ppm[e]
	Propane	185,865 pounds	2,100 ppm		6,864 feet	19.6 ppm[e]

FSAR Table 6.4-201(Sheet 1 of 2), Main Control Room Habitability Evaluation of Onsite Toxic Chemicals[a] Standard Onsite Toxic Chemicals, will be revised as follows:

	Evaluated Material	Evaluated State	Evaluated Maximum Quantity	Evaluated Minimum Distance to MCR Intake	Evaluated Location	MCR Habitability Impact Evaluation
	Hydrogen	Gas	500 scf	126.3 ft	Yard at turbine building	MCR
~~PTN-DEP-9.3-1~~	Hydrogen	Liquid	1500 gal	577 ft	Gas storage	MCR
	Nitrogen	Liquid	3000 gal	577 ft	Gas Storage	MCR
	Carbon Dioxide (CO2)	Liquid	6 tons	577 ft	Gas storage	MCR
	Oxygen Scavenger [Hydrazine]	Liquid	1600 gal	203 ft	Turbine building	IH
	pH Addition [Morpholine]	Liquid	1600 gal	203 ft	Turbine building	IH
	Sulfuric Acid	Liquid	800 gal	203 ft	Turbine building	IH
	Sulfuric Acid	Liquid	20,000 gal	436 ft	CWS area	IH
	Sodium Hydroxide	Liquid	800 gal	203 ft	Turbine building	S
	Sodium Hydroxide	Liquid	20,000 gal	436 ft	CWS area	S
	Fuel Oil	Liquid	60,000 gal	197 ft	DG fuel oil storage tank, DG building, Annex building	IH
	Corrosion Inhibitor [Sodium Molybdate]	Liquid	800 gal	203 ft	Turbine building	S
	Corrosion Inhibitor [Sodium Molybdate]	Liquid	10,000 gal	436 ft	CWS area	S
	Scale Inhibitor [Sodium Hexametaphosphate]	Liquid	800 gal	203 ft	Turbine building	S
	Scale Inhibitor [Sodium Hexametaphosphate]	Liquid	10,000 gal	436 ft	CWS area	S
	Biocide/Disinfectant [Sodium hypochlorite]	Liquid	800 gal	203 ft	Turbine building	S

FSAR Subsections 9.3.2.2, 9.3.2.2.2, 9.3.2.2.3, and 9.3.2.5 will be deleted.

Part 7, Departures and Exemption Requests, will be revised as follows:

The following departures are described and evaluated in Part A, STD and PTN Departures, of this report.

A.1 Departures That Can Be Implemented Without Prior NRC Approval

Departure Number	Description
STD DEP 1.1-1	Administrative departure for organization and numbering for the FSAR sections and subsections
PTN DEP 2.0-2	Maximum normal wet bulb (noncoincident) air temperature
PTN DEP 2.0-4	Population distribution exclusion area (site)
PTN DEP 2.5-1	DELETED
STD DEP 8.3-1	Class 1E voltage regulating transformer current limiting features
PTN DEP 9.3-1	~~Plant gas system – hydrogen gas portion~~ DELETED
PTN DEP 18.8-1	Operations support center location
PTN DEP 18.8-2	Technical support center location
PTN DEP 19.58-1	Severe winds and tornadoes

Part 7, Part A, Departures and Exemption Requests, will be revised as follows:

A. STD and PTN Departures

This Departure Report includes deviations in the Turkey Point Units 6 & 7 COL Application FSAR from the information in the applicable DCD, pursuant to 10 CFR Part 52, Appendix D, Section VIII and Section X.B.1.

A.1 Departures That Can Be Implemented Without Prior NRC Approval

Departure Number	Description
STD DEP 1.1-1	Administrative departure for organization and numbering for the FSAR sections and subsections
PTN DEP 2.0-2	Maximum normal wet bulb (noncoincident) air temperature
PTN DEP 2.0-4	Population distribution exclusion area (site)
PTN DEP 2.5-1	DELETED
STD DEP 8.3-1	Class 1E voltage regulating transformer current limiting features
PTN DEP 9.3-1	~~Plant gas system – hydrogen gas portion~~ DELETED
PTN DEP 18.8-1	Operations support center location
PTN DEP 18.8-2	Technical support center location
PTN DEP 19.58-1	Severe winds and tornadoes

Departure Number PTN DEP 9.3-1 will be revised as follows:

Departure Number: PTN DEP 9.3-1

DELETED

~~AFFECTED DCD/FSAR SECTIONS:~~

~~9.3.2.2, 9.3.2.5~~

~~SUMMARY OF DEPARTURE:~~

~~DCD Subsection 9.3.2.2.1 describes the low-pressure hydrogen gas portion of the plant gas system as a packaged system consisting of a liquid hydrogen storage tank and vaporizers. Units 6 & 7 will use a series of hydrogen storage banks that store hydrogen gas in banks of storage tubes instead of the liquid hydrogen storage tank and vaporizers. The hydrogen gas storage banks will be located at the hydrogen storage tank area.~~

~~SCOPE/EXTENT OF DEPARTURE:~~

~~The subsections associated with this departure are identified in the FSAR (at the subsections identified above).~~

~~DEPARTURE JUSTIFICATION:~~

~~To be consistent with the operating practice at Turkey Point Units 3 & 4, the low-pressure hydrogen gas portion of the plant gas system at Units 6 & 7 will be supplied from a series of hydrogen gas storage banks. The change from a liquid hydrogen storage tank and vaporizers to hydrogen gas storage banks affects only the source of hydrogen for the plant gas system. The plant gas system serves no safety-related function and has no nuclear safety design basis.~~

~~Toxicity, flammability, and explosion analyses have been performed. These analyses use a series of up to 40,000 standard cubic foot hydrogen banks of gaseous hydrogen placed 560 feet east of the Unit 6 control room. The cumulative volume of hydrogen gas contained in the banks would be equivalent to 1500 gallons of liquid hydrogen. The results of these analyses show no adverse effects on the safe operation or shutdown of Units 6 & 7, as described in FSAR Section 2.2.~~

~~DEPARTURE EVALUATION:~~

~~{The supply of gaseous hydrogen directly from banks of storage tubes is functionally equivalent to the supply of gaseous hydrogen via the process of vaporizing liquid hydrogen into a gas to then be distributed to the plant. The gas hydrogen banks will be located on a gas pad far enough from the nuclear island so as not to require a change in a SSC. Storing hydrogen in compressed gas cylinders is a proven technology and is used at most operating nuclear plants.~~

~~Departure Number: PTN-DEP-9.3-1 (continued)~~

~~Therefore, this departure does not:~~

1. ~~Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific DCD.~~
2. ~~Result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety and previously evaluated in the plant-specific DCD.~~
3. ~~Result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific DCD.~~
4. ~~Result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the plant-specific DCD.~~
5. ~~Create a possibility for an accident of a different type than any evaluated previously in the plant-specific DCD.~~
6. ~~Create a possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific DCD.~~
7. ~~Result in a design basis limit for a fission product barrier as described in the plant-specific DCD being exceeded or altered.~~
8. ~~Result in a departure from a method of evaluation described in the plant-specific DCD used in establishing the design bases or in the safety analyses.~~

~~This departure does not affect resolution of a severe accident issue identified in the plant-specific DCD. Therefore, this departure has no safety significance.}~~

~~NRC APPROVAL REQUIREMENT:~~

~~This departure does not require NRC approval pursuant to 10 CFR Part 52, Appendix D, Section VIII.B.~~