CHAPTER 11: RADIOACTIVE WASTE MANAGEMENT
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CHAPTER 11 RADIOACTIVE WASTE MANAGEMENT

11.1 SOURCE TERMS

This section of the referenced DCD is incorporated by reference with no departures or supplements.

11.2 LIQUID WASTE MANAGEMENT SYSTEMS

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

11.2.1.2.4 Controlled Release of Radioactivity

Add the following to the end of DCD Subsection 11.2.1.2.4:

PTN SUP 11.2-1 The guard pipe-enclosed radwaste discharge piping connects to the blowdown sump discharge piping downstream of the blowdown sump pumps. Dilution of the liquid radwaste is initiated as the radwaste enters the blowdown sump discharge stream. The content of the blowdown sump is a combination of waste streams largely comprised of reclaimed water or seawater from circulating water system blowdown during plant operation or from the alternate dilution flow paths when CWS blowdown is not sufficient or available for dilution.

Piping from the blowdown sump dilution connection point is routed to the deep injection wells, distributed in two branches; one branch is oriented in a north-south direction and located to the east of Unit 6. The second branch is oriented in the east-west direction and located to the south of Units 6 & 7, as shown on Figure 1.1-201.

This injectate piping to each deep injection well isolation valve is single-walled, partially buried, and constructed of material suitable for the range of injectate composition, flow rates, and pressures, as well as environmental factors. The injectate piping contains manifolds, valves, and controls necessary to supply any appropriate combination of the deep injection wells. The injectate piping also includes appurtenances, such as vacuum breakers, vent lines, and access ways, as necessary, for proper operation and maintenance of the piping.

The piping, manifolds, valves, controls, and appurtenances are designed to minimize inadvertent or unidentified releases to the environment. Integrity of the injectate piping will be monitored for leakage or will be accessible for visual inspection or remote surveillance in conjunction with groundwater monitoring, as necessary, as part of the Units 6 & 7 Groundwater Monitoring Program.

As stated in Appendix 12AA, NEI 08-08A is adopted for Turkey Point Units 6 & 7. The NEI 08-08A template guidance provides a description of the operational and programmatic elements and controls that minimize contamination of the facility, site, and the environment, to meet the requirements of 10 CFR 20.1406.

11.2.1.2.5.2 Use of Mobile and Temporary Equipment

Add the following information at the end of DCD Subsection 11.2.1.2.5.2:

STD COL 11.2-1 When mobile or temporary equipment is selected to process liquid effluents, the equipment design and testing meets the applicable requirements of Regulatory Guide 1.143. When confirmed through sampling that the radioactive waste contents do not exceed the A_2 quantities for radionuclides specified in Appendix A to 10 CFR Part 71, liquid effluent may be processed with mobile or temporary equipment in the Radwaste Building. When the A_2 quantities are exceeded, liquid effluent is processed in the Seismic Category I auxiliary building.

Mobile and temporary equipment are designed in accordance with the applicable mobile and temporary radwaste treatment systems guidance provided in Regulatory Guide 1.143, including the codes and standards listed in Table 1 of the Regulatory Guide.

Mobile or temporary equipment has the following features:

- Level indication and alarms (high-level) on tanks.
- Screwed connections are permitted only for instrument connections beyond the first isolation valve.
- Remote operated valves are used where operations personnel would be required to frequently manipulate a valve.
- Local control panels are located away from the equipment, in low dose areas.
- Instrumentation readings are accessible from the local control panels (i.e., temperature, flow, pressure, liquid level, etc.).
- Wetted parts are 300 series stainless steel, except flexible hose and gaskets.
- Flexible hose is used only for mobile equipment within the designated “black box” locations between mobile components and at the interface with the permanent plant piping.
- The contents of tanks are capable of being mixed, either through recirculation or with a mixer.

- Grab sample points are located in tanks and upstream and downstream of the process equipment.

Inspection and testing of mobile or temporary equipment is in accordance with the codes and standards listed in Table 1 of Regulatory Guide 1.143 with the following additions:

- After placement in the station, the mobile or temporary equipment is hydrostatically, or pneumatically, tested prior to tie-in to permanent plant piping.
- A functional test, using demineralized water, is performed. Remote operated valves are stroked (open-closed-open or closed-open-closed) under full flow conditions. The proper function of the instrumentation, including alarms, is verified. The operating procedures are verified correct during the functional test.
- Tank overflows are routed to floor drains.
- Floor drains are confirmed to be functional prior to placing mobile or temporary equipment into operation.

11.2.3.5 Estimated Doses

Replace the information in DCD Subsection 11.2.3.5 with the following paragraphs and subsections.

PTN COL 11.2-2
PTN COL 11.5-3

Treated liquid radioactive waste from Units 6 & 7 operation is discharged to the plant sump discharge line before ultimate release to the Boulder zone via the deep injection wells (see Subsection 9.2.6.2.1). As discussed in Subsection 2.4.12, the highly saline Boulder Zone of the Lower Floridan aquifer is used for deep well injection of treated municipal wastewater and reverse osmosis concentrate in Miami-Dade County. Injection occurs below the middle confining layer at depths of approximately 2900 feet or greater, approximately 900 feet below the base of the lowest underground source of drinking water. The Boulder Zone is not a source for potable water and there is no credible pathway for the injection well releases to reach potable water. Hence, there is no credible liquid effluent pathway dose due to normal plant operations and no cost benefit analysis was performed.

For off-normal operations, a conceptual receptor exposure scenario considers the Boulder Zone as a water source. Although unrealistic, this scenario bounds any other potential exposure scenarios, such as vertical migration from the Boulder Zone to potable water aquifers despite the presence of dual zone monitoring wells.

The conceptual exposure scenario requires drilling a water supply well into the Boulder Zone for water use. An initial evaluation of receptor distance from the deep injection wells determined a credible location of the receptor, based on distance from a centroid, considering the location of the deep injection wells, and land use constraints at each location. The results of this initial evaluation are summarized in the paragraphs below.

Receptor 1 is located southeast of the deep injection wells at an approximate distance of 2084 feet. This location is part of Biscayne National Park. The location is not considered a realistic receptor location for a water supply well since it is located on land that is only accessible from Biscayne Bay, would generally not be considered usable for applications that would require a freshwater supply, and access would likely not be granted by the U.S. Department of the Interior. This scenario was therefore determined to be unrealistic and was not further considered.

Receptor 2 is located north of the deep injection wells at an approximate distance of 9824 feet. This location is located in Homestead Bayfront Park. The location is not considered a realistic location for a water supply well since it is located within a county park and therefore is unlikely to be a realistic area usable for applications that would require a freshwater water supply (e.g. residence). This receptor location was therefore determined to be unrealistic and was not further considered.

Receptor 3 is located northwest of the deep injection wells at an approximate distance of 9776 feet. This location is on land not owned by FPL and is considered a realistic location for the installation and use of a water supply well in the Boulder zone. For off-normal operations, this location was therefore determined to be the closest location for assessment of liquid effluent doses.

In order to determine the decay time for the injectate front to reach Receptor 3, an analysis was performed that considered the injection rate, aquifer thickness, and porosity of the Boulder zone. This decay, or travel time, was calculated using a form of the continuity equation, given as follows:

$$Qt_0 = \pi R^2 b n_e \qquad \text{(Equation 1)}$$

Where:

Q = well injection rate, ft^3/year
R = radius of injectate front, feet
b = aquifer thickness, feet
n_e = effective porosity
t_o = time required for the injectate front to travel to the receptor

An injection rate (Q) of approximately 12,500 gallons per minute (gpm) using 100 percent reclaimed water (8.76E08 ft^3/yr) was selected as the bounding discharge flow (for two units). (Note: Although the injection rate for a 100 percent saltwater source is greater at 58,175 gpm, using the smaller flow is conservative as it yields higher radionuclide concentrations, which are below 10 CFR 20, Appendix B, Table 2 regulatory limits at the point of discharge.) A radial distance (R) of 9776 feet was used, as previously discussed. A Boulder Zone aquifer thickness (b) of 200 feet was assumed. This is a conservative assumption since EPA (Reference 201) has reported a typical Boulder Zone Aquifer thickness of 500 feet. This assumption also considers the potential presence of a lower density layer of water (e.g., reclaimed water), 200 feet in thickness, which could eventually develop in the Boulder Zone. The result is a lower injectate front travel time, based on a lower assumed aquifer thickness. Use of the saltwater injectate, which is closer in density to the Boulder Zone water, would likely mix more readily with the Boulder Zone water and, therefore, a larger water layer thickness would be more appropriate for analysis, resulting in a larger injectate front travel time. Finally, an effective porosity of 0.2 was assumed (Reference 201).The resulting time required for the injectate to reach Receptor 3 is approximately 13.7 years. This horizontal travel time through the Boulder Zone is used in the dose calculation described below.

The NRC-endorsed LADTAP II computer program is used to calculate doses to an individual at Receptor 3 from liquid effluents. This program implements the radiological exposure models described in RG 1.109 to estimate the doses. The following exposure pathways are considered in LADTAP II:

- Consumption of drinking water
- Consumption of meats and vegetables produced with irrigation water (there are no milk animals within five miles of the plant)

The site-specific input parameters used in LADTAP II are the following:

- Liquid effluent discharge - A discharge rate of 27.9 cfs is used, corresponding to the reclaimed water dilution flow rate of 12,500 gpm, which bounds the saltwater discharge rate of approximately 58,000 gpm, as it yields less dilution.
- Source terms - The isotopic activity releases are from DCD Table 11.2-7.
- Irrigation rate - The irrigation rate is 110 L/m^2-month, corresponding to 1 inch per week.
- Transit time - The transit time from discharge to drinking water and irrigated foods is 13.7 years, the time required for the injectate to reach Receptor 3.

The resulting maximum doses per unit are 2.5 mrem to the total body, 2.4 mrem to the thyroid, and 3.1 mrem to the liver of a child. Even though these doses are not due to normal operations, they conform to the 10 CFR 50, Appendix I guidelines of 3 mrem total body and 10 mrem organ.

As indicated in 10 CFR 50, Appendix I, Section II.D, a cost- benefit analysis is required to determine whether radwaste system augments can yield reductions in the 50-mile population dose at a cost of less than $1000 per person-rem. Based on the above discussion, use of Boulder Zone water for potable water use is not a reasonable scenario. The only potential exposure pathway discussed for liquid effluents is a nearby receptor drilling into the Boulder Zone to obtain potable water. This off-normal, conceptual scenario applies to an individual, not the population. Therefore, a cost-benefit analysis was not performed.

11.2.3.6 Quality Assurance

Add the following to the end of DCD Subsection 11.2.3.6:

STD SUP 11.2-1 Since the impact of radwaste systems on safety is limited, the extent of control required by Appendix B to 10 CFR Part 50 is similarly limited. Thus, a supplemental quality assurance program applicable to design, construction, installation and testing provisions of the liquid radwaste system is established by procedures that complies with the guidance presented in Regulatory Guide 1.143.

PTN SUP 11.2-2 The quality assurance program for design, construction, procurement, materials, welding, fabrication, inspection and testing activities conforms to the quality control provisions of the codes and standards recommended in Table 1 of RG 1.143.

11.2.5 COMBINED LICENSE INFORMATION

11.2.5.1 Liquid Radwaste Processing by Mobile Equipment

STD COL 11.2-1 This COL Item is addressed in Subsection 11.2.1.2.5.2.

11.2.5.2 Cost Benefit Analysis of Population Doses

PTN COL 11.2-2 This COL item is addressed in Subsection 11.2.3.5.

11.2.6 REFERENCES

201. U.S. Environmental Protection Agency, *Relative Risk Assessment of Management Options for Treated Wastewater in South Florida*, Office of Water, EPA 816/R-03-010, pp. 4–9, April 2003.

11.3 GASEOUS WASTE MANAGEMENT SYSTEM

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

11.3.3 RADIOACTIVE RELEASES

Add the following new paragraph at the end of DCD Subsection 11.3.3:

STD SUP 11.3-2 There are no gaseous effluent site interface parameters outside of the Westinghouse scope.

11.3.3.2 Estimated Annual Releases

Add the following new paragraph at the end of DCD Subsection 11.3.3.2:

PTN SUP 11.3-1 The effluent concentrations in DCD Table 11.3-4 are based on an atmospheric dispersion factor of 2.0E-05 seconds per cubic meter, as indicated in the table footnotes. The site-specific atmospheric dispersion factor at the site boundary is 3.4E-5 seconds per cubic meter, as shown in Table 2.3.5-202. As concentration is directly proportional to dispersion factor, the concentrations in DCD Table 11.3-4 are multiplied by the ratio of 3.4E-05 to 2.0E-05, a factor of 1.7. The overall fraction of effluent concentration limit for the expected releases increases from the DCD value of 0.030 to the site-specific value of 0.051. Similarly, the fraction for maximum releases increases from 0.33 to 0.56. Both are within the allowable value of 1.0.

11.3.3.4 Estimated Doses

Add the following information at the end of DCD Subsection 11.3.3.4.

PTN COL 11.5-3 The site-specific atmospheric dispersion factor for the site boundary provided in Subsection 2.3.4.2 is bounded by the value given in DCD Table 2-1.

With the annual airborne releases listed in DCD Table 11.3-3, the Units 6 & 7 site specific air doses at ground level at the site boundary are 4.2 mrad for gamma radiation and 18 mrad for beta radiation. These doses are based on the annual average atmospheric dispersion factor from Section 2.3. These doses are below the 10 CFR Part 50, Appendix I design objectives of 10 mrad per year for gamma radiation or 20 mrad per year for beta radiation.

Doses and dose rates to people were calculated using the GASPAR II computer code. This code is based on the methodology presented in the RG 1.109. Factors common to both estimated individual dose rates and estimated population dose are addressed in this subsection. Unique data is addressed in the respective subsections.

Exposure pathways considered for the individual are plume, ground deposition, inhalation, and ingestion of vegetables and meat. Exposure pathways considered for the population are plume, ground deposition, inhalation, and ingestion of vegetables, meat, and milk (both cow and goat).

Based on site meteorological conditions, the highest rate of plume exposure and ground deposition occurs at the site boundary 0.56 kilometers (0.35 miles) south-southeast of the plant (Figure 2.1-204).

The projected population distribution within 81 kilometers (50 miles) of the site in the year 2090 is in Figure 2.1-225.

Agricultural products are estimated from U. S. Department of Agriculture National Agricultural Statistics Service. Vegetable, milk, and meat production data is in Table 11.3-203.

11.3.3.4.1 Estimated Individual Doses

Dose rates to individuals are calculated for airborne decay and deposition, inhalation, and ingestion of meat and vegetables. Because there are no milk animals identified within 5 miles of Units 6 & 7, no dose from ingestion of milk is calculated. Dose from plume and ground deposition are calculated as affecting all age groups equally.

Plume exposure at the site boundary, 0.56 kilometers (0.35 miles) south-southeast of Units 6 & 7, produces a maximum dose rate to a single organ of 13 mrem/year to skin. The maximum total body dose rate was calculated to be 2.6 mrem/year.

Ground deposition at the site boundary, 0.56 kilometers (0.35 miles) south-southeast of Units 6 & 7, produces a maximum dose rate to a single organ of 1.2 mrem/year to skin. The maximum total body dose rate was calculated to be 1.1 mrem/year.

Inhalation dose at the nearest residence, 4.3 kilometers (2.7 miles) north of Units 6 & 7, results in a maximum dose rate to a single organ of 0.014 mrem/year to a child's thyroid. The maximum total body dose rate is calculated to be 0.0012 mrem/year to a teenager.

Vegetable consumption assumes that the dose is received from the nearest garden, 7.7 kilometers (4.8 miles) northwest of the plant. The GASPAR II default vegetable consumption values are used in lieu of site-specific vegetable consumption data as permitted by RG 1.109. The maximum dose rate to a single organ is 0.21 mrem/year to a child's thyroid. The maximum total body dose rate is calculated to be 0.020 mrem/year to a child.

Meat consumption assumes that the dose is received from the nearest meat animal, 4.3 kilometers (2.7 miles) north of Units 6 & 7. The GASPAR II default meat consumption values are used in lieu of site-specific meat consumption data as permitted by RG 1.109. The maximum dose rate to a single organ is 0.018 mrem/year to a child's bone. The maximum total body dose rate is calculated to be 0.0038 mrem/year to a child.

The milk pathway to the individual is not considered because there are no milk animals within 5 miles of Units 6 & 7.

The maximum dose rate to any organ considering every pathway is calculated to be 0.24 mrem/year to a child's thyroid. The maximum total body dose rate is calculated to be 0.038 mrem/year to a child, which includes the pathway doses (meat, vegetable, and inhalation) plus the plume and ground deposition doses (Table 11.3-204). These are below the 10 CFR Part 50, Appendix I design objectives of 5 mrem/year to total body, and 15 mrem/year to any organ, including skin.

Table 11.3-201 contains GASPAR II input data for dose rate calculations. Information regarding the locations for the nearest residence, meat animal, garden, and the site boundary is located in Section 2.3. Table 11.3-204 contains total organ dose rates based on age group. Table 11.3-205 contains total air doses at each special location. Table 11.3-206 shows the total site doses from

Units 6 & 7 as well as the two existing Units 3 & 4 are within the regulatory limits of 40 CFR Part 190.

11.3.3.4.2 Estimated Population Dose

The estimated population dose within 81 kilometers (50 miles) is calculated as 4.0 person-rem total body and 7.5 person-rem thyroid per unit. Table 11.3-207 contains the estimated population doses by nuclide group (noble gases, iodines, particulates, C-14, and H-3).

PTN COL 11.3-1

11.3.3.4.3 Gaseous Radwaste Cost Benefit Analysis Methodology

The methodology of Regulatory Guide 1.110 was used to satisfy the cost benefit analysis requirements of 10 CFR Part 50, Appendix I, Section II.D. The parameters used in calculating the Total Annual Cost (TAC) are fixed and are given for each radwaste treatment system augment listed in Regulatory Guide 1.110, including the Annual Operating Cost (AOC) (Table A-2), Annual Maintenance Cost (AMC) (Table A-3), Direct Cost of Equipment and Materials (DCEM) (Table A-1), and Direct Labor Cost (DLC) (Table A-1). The following variable parameters were used:

- Capital Recovery Factor (CRF) — This factor is taken from Table A-6 of Regulatory Guide 1.110 and reflects the cost of money for capital expenditures. A cost-of-money value of 7 percent per year is assumed in this analysis, consistent with the "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission" (NUREG/BR-0058). A CRF of 0.0806 was obtained from Table A-6.

- Indirect Cost Factor (ICF) — This factor takes into account whether the radwaste system is unitized or shared (in the case of a multi-unit site) and is taken from Table A-5 of RG 1.110. It is assumed that the radwaste system for this analysis is a unitized system at a 2-unit site, which equals an Indirect Cost Factor of 1.625.

- Labor Cost Correction Factor (LCCF) — This factor takes into account the differences in relative labor costs between geographical regions and is taken from Table A-4 of Regulatory Guide 1.110. A factor of 1 (the lowest value) is assumed in this analysis.

The value of $1000 per person-rem is prescribed in Appendix I to 10 CFR Part 50.

The analysis used a conservative assumption that the respective radwaste treatment system augment is a "perfect" system that reduces the effluent and dose by 100 percent. The gaseous radwaste treatment system augment's annual costs were determined and the lowest annual cost considered a threshold value. The lowest-cost option for gaseous radwaste treatment system augments is the Steam Generator Flash Tank Vent to Main Condenser at $6320 per year, which yields a threshold value of 6.32 person-rem total body or thyroid from gaseous effluents.

For AP1000 sites with population dose estimates less than 6.32 person-rem total body or thyroid dose from gaseous effluents, no further cost-benefit analysis is needed to demonstrate compliance with 10 CFR Part 50, Appendix I Section II.D.

11.3.3.4.4 Gaseous Radwaste Cost Benefit Analysis

The Units 6 & 7 population doses are given in Subsection 11.3.3.4.2. The augments provided in RG 1.110 were reviewed and were found not to be cost beneficial in reducing the population dose of 4.0 person-rem total body and 7.5 person-rem thyroid. The lowest cost gaseous radwaste system augment is $6320, which would be $6320/4.0 person-rem total body or $1580 per person-rem total body, and $6320/7.5 person-rem thyroid or $843 per person-rem thyroid. The total body cost per person-rem reduction exceeds the $1000 per person-rem criterion provided in RG 1.110 and is therefore not cost beneficial. Although the cost of thyroid dose reduction is below the threshold, this is assuming the augment completely eliminates the dose. As shown in Table 11.3-207, 2.1 of the 7.5 person-rem thyroid dose is due to noble gases, which will not be mitigated by the Steam Generator Flash Tank Vent to Main Condenser. With the noble gas contribution unaffected by the augment, the cost of thyroid dose reduction is $1170 per person-rem thyroid. Although the cost of $1170 only slightly exceeds the benefit of $1000, this augment is for the addition of a vent to a flash tank that is presumed to exist. Since the AP1000 design does not include a flash tank, the cost of the tank would have to be added to the cost of this augment, further increasing the cost relative to the benefit.

11.3.3.6 Quality Assurance

STD SUP 11.3-1 Add the following to the end of DCD Subsection 11.3.3.6:

Since the impact of radwaste systems on safety is limited, the extent of control required by Appendix B to 10 CFR Part 50 is similarly limited. Thus, a supplemental quality assurance program applicable to design, construction, installation, and testing provisions of the gaseous radwaste system is established by procedures that complies with the guidance presented in Regulatory Guide 1.143.

PTN SUP 11.3-1 The quality assurance program for design, construction, procurement, materials, welding, fabrication, inspection and testing activities conforms to the quality control provisions of the codes and standards recommended in Table 1 of Regulatory Guide 1.143.

11.3.5 COMBINED LICENSE INFORMATION

11.3.5.1 Cost Benefit Analysis of Population Doses

PTN COL 11.3-1 This COL Item is addressed in Subsections 11.3.3.4.3 and 11.3.3.4.4.

PTN COL 11.5-3 This COL Item is addressed in Subsection 11.3.3.2.

11.3.6 References

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201. Florida Power & Light Company, *2010 Annual Radiological Environmental Operating Report,* Turkey Point Units 3 & 4, U.S. NRC ADAMS Accession No. ML11140A084, April 2011.

202. National Agricultural Statistics Service, *Florida Annual Statistical Bulletin* 2008. Available at http://www.nass.usda.gov/Statistics_by _State/Florida/ Publications/ AnnuaL Statistical_Bulletin/fasb08p.htm, accessed August 27, 2013.

203. U.S. Department of Agriculture, *Commercial Red Meat: Production, by State and U.S.*, National Agricultural Statistics Bulletin. Available at http:// www.nass.usda.gov/Statistics_by Statellowa/PublicationsI Annual_ Statistical_ Bulletin/2007107 1 02.pdf, accessed August 27, 2013.

204. U.S. Department of Agriculture, *2002 Census of Agriculture*, Florida State and County Data, Vol. 1, June 2004. Available at www.nass.usda.gov/Publications/2002/index.php, accessed August 27, 2013.

205. Florida Power & Light Company, *Annual Radioactive Effluent Release Report*, *January 2004 through December 2004,* Turkey Point Units 3 & 4, U.S. NRC ADAMS Accession No. ML050960370, March 2005.

206. Florida Power & Light Company, *Annual Radioactive Effluent Release Report*, *January 2005 through December 2005,* Turkey Point Units 3 & 4, U.S. NRC ADAMS Accession No. ML060940646, March 2006.

207. Florida Power & Light Company, *Annual Radioactive Effluent Release Report*, January *2006 through December 2006,* Turkey Point Units 3 & 4, U.S. NRC ADAMS Accession No. ML070920509, March 2007.

208. Florida Power & Light Company, *Annual Radioactive Effluent Release Report, January 2007 through December 2007*, Turkey Point Units 3 & 4, U.S. NRC ADAMS Accession No. ML080940605, March 2008.

209. Florida Power & Light Company, *Annual Radioactive Effluent Release Report, January 2008 through December 2008*, Turkey Point Units 3 & 4, U.S. NRC ADAMS Accession No. ML090760628, February 2009.

PTN COL 11.3-1

PTN COL 11.5-3

Table 11.3-201
GASPAR II Input

Input Parameter	Value
Number of Source Terms	1
Source Term	DCD Table 11.3-3
Population Data	Table 11.3-202
Fraction of the year leafy vegetables are grown	1.0
Fraction of the year milk cows are on pasture	1.0[(a)]
Fraction of max individual's vegetable intake from own garden	0.76
Fraction of the year goats are on pasture	1.0
Fraction of goat feed intake from pasture while on pasture	1.0
Fraction of the year beef cattle are on pasture	1.0
Fraction of beef-cattle feed intake from pasture while on pasture	1.0
Total Production Rate for the 50-mile area	
– Vegetables (kg/yr)	Table 11.3-203
– Milk (l/yr)	Table 11.3-203
– Meat (kg/yr)	Table 11.3-203
Special Location Data	FSAR Section 2.3.5

(a) There are no milk animals identified within 5 miles of Units 6 & 7 (Reference 201).

PTN COL 11.3-1

PTN COL 11.5-3

Table 11.3-202
Population Distribution in 2090

Direction	Distance (miles)									
	0–1	1–2	2–3	3–4	4–5	5–10	10–20	20–30	30–40	40–50
S	—	—	—	—	—	76	1,749	19	—	—
SSW	—	—	—	—	—	12	361	7,598	4,811	893
SW	—	—	—	—	—	—	—	—	—	12
WSW	—	—	—	—	—	207	450	41	—	2
W	—	—	—	—	—	38,378	12,086	—	—	—
WNW	—	—	—	—	—	121,964	40,618	—	9	5
NW	—	—	—	8	8	86,987	21,406	78	797	26
NNW	—	—	12	—	—	60,646	480,443	248,964	153	30
N	2,872	—	4,698	—	—	44,579	419,603	957,596	1,048,495	717,732
NNE	—	—	—	—	—	—	11,133	828,933	809,459	302,611
NE	—	—	—	—	—	—	30	—	—	—
ENE	—	—	—	—	—	6	—	—	—	—
E	—	—	—	—	—	—	—	—	—	—
ESE	—	—	—	—	—	—	—	—	—	—
SE	—	—	—	—	—	84	—	—	—	—
SSE	—	—	—	—	—	6,748	—	—	—	—
Total	2,872	0	4,710	8	8	359,687	987,879	2,043,229	1,863,724	1,021,311
									Grand Total	6,283,428

Note: Based on Figures 2.1-215 and 2.1-225.

PTN COL 11.3-1

PTN COL 11.5-3

Table 11.3-203
Vegetable, Milk, and Meat Production Data

Food(a)	State Production(b)				Production Basis(c)			50-Mile Fraction(d)	50-Mile Production(e)			
					Measure	State	50-mile		Current		2090	
Red Meat	6.67E+07	lbm	3.03E+07	kg	No. of beef cows	9.82E+05	2.01E+03	2.05E–03	6.19E+04	kg	1.12E+05	kg
Broilers	4.25E+08	lbm	1.93E+08	kg	No. of broilers	1.97E+07	3.44E+02	1.74E–05	3.36E+03	kg	6.09E+03	kg
Milk	2.11E+08	lbm	9.57E+07	L	No. of milk cows	1.45E+05	6.60E+01	4.56E–04	4.36E+04	L	7.89E+04	L
Vegetables	5.18E+07	cwt	2.35E+09	kg	Harvested acres	2.31E+06	5.95E+04	2.57E–02	6.04E+07	kg	1.09E+08	kg

(a) Meat Production — in calculating population doses, the red meat and broiler values are added to conservatively estimate the total meat production.

(b) State Production — The production rates are converted into units of kilograms (1 cwt = 100 lbm = 45.36 kg); milk density is assumed to be 1 kilogram/liter. State production values are from U.S. Department of Agriculture:
Broilers, milk and vegetables — *Florida Annual Statistical Bulletin 2008*, National Agricultural Statistics Service, http://www.nass.usda.gov/Statistics_by_State/Florida/Publications/Annual_Statistical_Bulletin/fasd08p.htm. (Reference 202)
Red meat — *Commercial Red Meat: Production, by State and U.S.*, U.S. Department of Agriculture, National Agricultural Statistics Bulletin, p. 102, http://www.nass.usda.gov/Statistics_by_State/Iowa/Publications/Annual_Statistical_Bulletin/2007/07_102.pdf. (Reference 203)

(c) Production Basis — The production bases for the state and the four counties (Broward, Collier, Dade, and Monroe) within 50 miles of the plant. The production values are from U.S. Department of Agriculture:
2002 Census of Agriculture, Florida State and County Data, Volume 1, U.S. Department of Agriculture, June 2004, www.nass.usda.gov/census/census02/volume1/fl/FLVolume104.pdf. (Reference 204)

(d) 50-Mile Fraction — The fraction of production within 50 miles is obtained by dividing the 50-mile value by the state value.

(e) 50-Mile Production — The current 50-mile production is obtained by multiplying the state production by the 50-mile fraction. The 2090 production is obtained by multiplying the current production by 1.81, representing the population increase from 3,464,756 in 2010 to 6,283,428 in 2090.

PTN COL 11.5-3

Table 11.3-204
Individual Dose Rates

Location[a]	Pathway		Dose Rate per Unit (mrem/yr)[b]							
			Total Body	GI-Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Residence 2.7 mi N	External	Plume	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0074	0.046
		Ground	0.0066	0.0066	0.0066	0.0066	0.0066	0.0066	0.0066	0.0077
		Total	0.013	0.013	0.013	0.013	0.013	0.013	0.014	0.053
	Inhalation	Adult	0.0012	0.0012	0.00016	0.0012	0.0012	0.0096	0.0015	0
		Teen	0.0012	0.0012	0.00019	0.0012	0.0012	0.012	0.0016	0
		Child	0.0010	0.0010	0.00023	0.0011	0.0011	0.014	0.0014	0
		Infant	0.00059	0.00058	0.00012	0.00063	0.00063	0.012	0.00087	0
Garden 4.8 miles NW	Vegetable	Adult	0.0064	0.0065	0.033	0.0064	0.0061	0.086	0.0055	0
		Teen	0.0092	0.0093	0.050	0.0096	0.0091	0.11	0.0083	0
		Child	0.020	0.019	0.11	0.021	0.020	0.21	0.018	0
Meat Animal 2.7 miles N	Meat	Adult	0.0026	0.0036	0.011	0.0027	0.0026	0.0094	0.0025	0
		Teen	0.0021	0.0027	0.0095	0.0022	0.0021	0.0070	0.0020	0
		Child	0.0038	0.0040	0.018	0.0039	0.0038	0.011	0.0037	0
MEI[c] — Sum of Residence, Garden, Meat Animal	All	Adult	0.023	0.025	0.058	0.023	0.023	0.12	0.023	0.053
		Teen	0.026	0.026	0.073	0.026	0.026	0.14	0.026	0.053
		Child	0.038	0.037	0.15	0.039	0.038	0.24	0.037	0.053
		Infant	0.014	0.014	0.013	0.014	0.014	0.025	0.015	0.053

(a) Locations are from Table 2.3.5-202.
(b) 10 CFR 50 Appendix I: Total body dose limit = 5 mrem/year, skin dose = 15 mrem/year, and dose to any organ = 15 mrem/year.
(c) MEI dose rates represent the summation of dose rates from each pathway (plume, ground, inhalation, vegetable, and meat). There are no milk animals identified within 5 miles of Units 6 & 7 (Reference 201).

PTN COL 11.5-3

Table 11.3-205
Doses in Millirads at Special Locations per Unit

Special Location	Beta Air Dose	Gamma Air Dose
Site Boundary[a]	18	4.2
Nearest Residence/Meat Animal	0.068	0.012
Nearest Vegetable Garden	0.048	0.0099

(a) 10 CFR 50 Appendix I Design Objective: Gamma Air Dose = 10 mrad and Beta Air Dose = 20 mrad.

PTN COL 11.5-3

Table 11.3-206
Comparison of Individual Doses with 40 CFR 190 Criteria

	Dose (mrem/yr)			
	Units 6 & 7[a]	Units 3 & 4[b]	Site Total	Limit
Total Body	7.8	0.0029	7.8	25
Thyroid	15	0.0059	15	75
Other Organ - Lung	8.4	0.0059	8.4	25

(a) Site boundary doses from a single new unit are doubled.
(b) Bounding site boundary doses from five years of annual effluent reports for the existing units (References 205 through 209); lung dose assumed to be same as thyroid dose.

PTN COL 11.5-3

Table 11.3-207
Estimated Population Doses per Unit

	Dose (person-rem/yr)	
	Total Body	Thyroid
Noble Gases	2.1	2.1
Iodines	0.013	3.5
Particulates	1.2	1.2
C-14	0.21	0.21
H-3	0.48	0.48
Total	4.0	7.5

11.4 SOLID WASTE MANAGEMENT

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

11.4.2 SYSTEM DESCRIPTION

Add the following information after DCD Subsection 11.4.2.4.2:

11.4.2.4.3 Contingency Plans for Temporary Storage of Low-Level Radioactive Waste (LLW)

PTN SUP 11.4-2 In the event that offsite shipping of radwaste is not available when Units 6 & 7 become operational, temporary storage capability is available on site for greater than two years at the expected rate of radwaste generation and greater than one year at the maximum rate of radwaste generation, as described in DCD Subsection 11.4.2.1 paragraph ten. Implementation of waste minimization strategies could extend the duration of temporary radwaste storage capability.

If additional onsite radwaste storage capability were required, then onsite facilities would be designed, constructed, and operated in accordance with the design guidance provided in NUREG-0800, Standard Review Plan Chapter 11 Radioactive Waste Management Appendix 11.4-A, Design Guidance for Temporary Storage of Low-Level Radioactive Waste.

11.4.5 QUALITY ASSURANCE

Add the following information to the end of DCD Subsection 11.4.5:

STD SUP 11.4-1 Since the impact of radwaste systems on safety is limited, the extent of control required by Appendix B to 10 CFR Part 50 is similarly limited. Thus, a supplemental quality assurance program applicable to design, construction, installation and testing provisions of the solid radwaste system is established by procedures that complies with the guidance presented in Regulatory Guide 1.143.

PTN SUP 11.4-2 The quality assurance program for design, construction, procurement, materials, welding, fabrication, inspection and testing activities conforms to the quality control provisions of the codes and standards recommended in Table 1 of Regulatory Guide 1.143.

11.4.6 COMBINED LICENSE INFORMATION FOR SOLID WASTE MANAGEMENT SYSTEM PROCESS CONTROL PROGRAM

Add the following information to the end of DCD Subsection 11.4.6.

This COL Item is addressed below.

STD COL 11.4-1 A Process Control Program (PCP) is developed and implemented in accordance with the recommendations and guidance of NEI 07-10A (Reference 201). The PCP describes the administrative and operational controls used for the solidification of liquid or wet solid waste and the dewatering of wet solid waste. Its purpose is to provide the necessary controls such that the final disposal waste product meets applicable federal regulations (10 CFR Parts 20, 50, 61, 71, and 49 CFR Part 173), state regulations, and disposal site waste form requirements for burial at a low level waste (LLW) disposal site that is licensed in accordance with 10 CFR Part 61.

Waste processing (solidification or dewatering) equipment and services may be provided by the plant or by third-party vendors. Each process used meets the applicable requirements of the PCP.

No additional onsite radwaste storage is required beyond that described in the DCD.

Table 13.4-201 provides milestones for PCP implementation.

PTN SUP 11.4-1 Low-level radioactive waste is packaged to meet transportation and disposal site acceptance requirements. Packaging of waste for offsite shipment complies with applicable DOT (49 CFR Parts 173 and 178) and NRC regulations (10 CFR Part 71) for transportation of radioactive material. The packaged waste is stored on site on an interim basis before being shipped offsite to a licensed processing, storage, or disposal facility. Onsite storage for more than a year at the maximum rate of generation is provided in the waste accumulation room of the radwaste building. Radioactive waste is shipped offsite by truck.

Consistent with current commercial agreements, a third-party contractor processes, stores, owns, and ultimately disposes of low-level waste generated as a result of operations. Activities associated with the transportation, processing, and ultimate disposal of low-level waste comply with applicable laws and regulations in order to ensure the public's health and safety. In particular, the third-party contractor conducts its operations consistent with NRC regulations (e.g., 10 CFR Part 20).

Under 10 CFR 20.2001, reactor licensees may transfer low-level radioactive waste material to another licensee that is specifically licensed to accept and treat waste prior to disposal. Studsvik, Inc., has a licensed low-level radioactive waste treatment facility in Erwin, Tennessee. FPL has signed a letter of intent with Studsvik to enter into negotiations for a contract for the performance of work by Studsvik to include the shipment, processing, storage, and disposal of low-level radioactive waste produced by Units 6 & 7 (Reference 205). Under the proposed contract, Studsvik would treat the Class B and C waste at its Erwin, Tennessee facility and thereafter take responsibility for storage and final disposal.

All packaged and stored radwaste is shipped to offsite disposal/storage facilities and temporary storage of radwaste is only provided until routine offsite shipping can be performed. Accordingly, there is no expected need for permanent onsite storage facilities at Units 6 & 7.

If additional storage capacity for Class B and C waste were required, further temporary storage would be designed, constructed, and operated in accordance with the design guidance provided in NUREG-0800, Standard Review Plan 11.4, Appendix 11.4-A. The change to the facility to provide additional onsite storage would be evaluated by performing written safety analyses in accordance with 10 CFR 50.59. If the acceptability of the proposed additional storage could not be demonstrated by 10 CFR 50.59 analyses, a license amendment would be sought to approve the proposed storage.

11.4.6.1 Procedures

STD SUP 11.4-1 Operating procedures specify the processes to be followed to ship waste that complies with the waste acceptance criteria (WAC) of the disposal site, 10 CFR 61.55 and 61.56, and the requirements of third party waste processors.

Each waste stream process is controlled by procedures that specify the process for packaging, shipment, material properties, destination (for disposal or further processing), testing to verify compliance, the process to address non-conforming materials, and required documentation.

Where materials are to be disposed of as non-radioactive waste (as described in DCD Subsection 11.4.2.3.3), final measurements of each package are performed to verify there has not been an accumulation of licensed material resulting from a buildup of multiple, non-detectable quantities. These measurements are obtained using sensitive scintillation detectors, or instruments of equal sensitivity, in a low-background area.

Procedures document maintenance activities, spill abatement, upset condition recovery, and training.

Procedures document the periodic review and revision, as necessary, of the PCP based on changes to the disposal site, WAC regulations, and third party PCPs.

11.4.6.2 Third Party Vendors

Third party equipment suppliers and/or waste processors are required to supply approved PCPs. Third party vendor PCPs describe compliance with Regulatory Guide 1.143, Generic Letter 80-09, and Generic Letter 81-39. Third party vendor PCPs are referenced appropriately in the plant PCP before commencement of waste processing.

11.4.7 REFERENCES

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201. Nuclear Energy Institute, *Generic FSAR Template Guidance for Process Control Program (PCP)*, NEI 07-10A, Rev. 0, NRC ADAMS Accession No. ML091460627, March 2009.

202. Not Used.

203. Not Used.

204. Not Used.

205. Florida Power & Light Company, Letter of Intent Between Florida Power & Light Company and Studsvik, Inc., dated May 22, 2009.

11.5 RADIATION MONITORING

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

11.5.1.2 Power Generation Design Basis

Revise the fourth bullet in DCD Subsection 11.5.1.2 as follows:

PTN COL 11.5-2

- Data collection and data storage to support compliance reporting for the applicable NRC requirements and guidelines, such as General Design Criterion 64 and Regulatory Guide 1.21 and Regulatory Guide 4.15, Revision 2.

11.5.2.4 Inservice Inspection, Calibration, and Maintenance

Add the following information at the end of DCD Subsection 11.5.2.4:

STD COL 11.5-2

Daily checks of effluent monitoring system operability are made by observing channel behavior. Detector response is routinely observed with a remotely-positioned check source in accordance with plant procedures. Instrument background count rate is also observed to determine proper functioning of the monitors. Any detector whose response cannot be verified by observation during normal operation or by using the remotely-positioned check source can have its response checked with a portable check source. A record is maintained showing the background radiation level and the detector response.

Calibration of the continuous radiation monitors is done with commercial radionuclide standards that have been standardized using a measurement system traceable to the National Institute of Standards and Technology.

11.5.3 EFFLUENT MONITORING AND SAMPLING

Add the following information at the end of DCD Subsection 11.5.3.

PTN COL 11.5-2 Units 6 & 7 use the existing fleet program for quality assurance of radiological effluent and environmental monitoring that is based on RG 4.15, Revision 2.

PTN SUP 11.5-1 The effluent from the reclaimed water treatment facility (RWTF) is monitored for measurable quantities of unregulated radioactive material. If present, a fraction of this radioactive material would be adsorbed in RWTF treatment sludge and another fraction would remain in the treated RWTF effluent as circulating water supply. The RWTF sludge fraction is characterized as required to demonstrate compliance with the waste acceptance criteria established by the commercial sludge disposal facility, as well as applicable transportation regulations. The RWTF effluent fraction, including some end products of processing that may be bypassed to the plant blowdown sump (as warranted by operational conditions), is characterized to enable its differentiation from radioactive material attributed to Units 6 & 7 operations (to ensure the reporting of deep injection well system discharge quantities and dose solely reflects Units 6 & 7 radioactive material).

The Units 6 & 7 ODCM developed and made available for NRC inspection prior to fuel load describes the sampling, monitoring, analysis, and assessment of the RWTF effluent as it relates to reporting deep injection well system discharge quantities and doses.

11.5.4 PROCESS AND AIRBORNE MONITORING AND SAMPLING

Add the following information at the end of the first paragraph in DCD Subsection 11.5.4.

PTN COL 11.5-2 The sampling program for liquid and gaseous effluents will conform to RG 4.15, Revision 2 (see Appendix 1AA).

Add the following information at the end of DCD Subsection 11.5.4.

11.5.4.1 Effluent Sampling

STD COL 11.5-2 Effluent sampling of potential radioactive liquid and gaseous effluent paths is conducted on a periodic basis to verify effluent processing meets the discharge limits to offsite areas. The effluent sampling program provides the information for the effluent measuring and reporting required by 10 CFR 50.36a and 10 CFR Part 20 and implemented through the Offsite Dose Calculation Manual (ODCM) and plant procedures. The frequency of the periodic sampling and analyses described herein are nominal and may be increased as permitted by procedure. Tables 11.5-201 and 11.5-202 summarize the sample and analysis schedules and sensitivities, respectively. The information contained in Tables 11.5-201 and 11.5-202 are derived from Regulatory Guide 1.21.

Laboratory isotopic analyses are performed on continuous and batch effluent releases in accordance with the ODCM. Results of these analyses are compiled and appropriate portions are utilized to produce the Radioactive Effluent Release Report.

11.5.4.2 Representative Sampling

Representative samples are obtained from well-mixed stream of volumes of effluent liquid through the use of proper sampling equipment, proper location of sampling points, and the development and use of sampling procedures. The recommendations of ANSI N 42.18 (Reference 203) are considered for the selection of instrumentation specific to the continuous monitoring of radioactivity in liquid effluents.

Sampling of effluent liquids is consistent with guidance in Regulatory Guide 1.21. When practical, effluent releases are batch-controlled, and prior to sampling, large volumes of liquid waste are mixed, in as short a time span as practicable, so that solid particulates are uniformly distributed in the liquid volume. Sampling and analysis is performed, and release conditions set, before release. Sample points are located to minimize flow disturbance due to fittings and other characteristics of equipment and components. Sample lines are flushed consistent with plant procedures to remove sediment deposits.

Representative sampling of process effluents is attained through sample and monitor locations and methods and criteria detailed in plant procedures.

Composite sampling is employed to analyze for hard to measure radionuclides and to monitor effluent streams that normally are not expected to contain significant amounts of radioactive contamination. Composite liquid samples are collected in proportion to the volume of each batch of effluent release. The composite is thoroughly mixed prior to analysis. Collection periods for composites are as short as practicable and periodic checks are performed to identify changes in composite samples. When grab samples are collected instead of composite samples, the time of the sample, location, and frequency are considered to provide a representative sample of the radioactive materials.

The pressure head of the fluid, if available, is used for taking samples. If sufficient pressure head is not available to take samples, then sample pumps are used to draw the sample from the process fluid to the detector panels and back to the process.

Testing and obtaining representative samples using the radiation monitors described in DCD Subsection 11.5 will be performed in accordance with ANSI N13.1 (Reference 201).

For obtaining representative samples in unfiltered ducts, isokinetic probes are tested and used as recommended by ANSI N13.1 (Reference 201).

Analytical Procedures

Typically, samples of process and effluent gases and liquids are analyzed in the station laboratory or by an outside laboratory via the following techniques:

- Gross alpha/beta counting
- Gamma spectrometry
- Liquid scintillation counting

"Available" instrumentation and counting techniques change as other instruments and techniques become available. For this reason, the frequency of sampling and the analysis of samples are generalized in this subsection.

Gross alpha/beta analysis may be performed directly on unprocessed samples (e.g., air filters) or on processed samples (e.g., evaporated liquid samples). Sample volume, counting geometry, and counting time are chosen to match measurement capability with sample activity. Correction factors for sample detector geometry, self-absorption and counter resolving time are applied to provide the required accuracy.

Liquid effluent samples are prepared for alpha/beta counting by evaporation onto steel planchets. Gamma analysis may be done on any type of sample (gas, solid or liquid) in a gamma spectrometer.

Tritiated water vapor samples are collected by condensation or adsorption, and the resultant liquid is analyzed by liquid scintillation counting techniques.

Radiochemical separations are used for the routine analysis of Sr-89 and Sr-90.

Liquid samples are collected in polyethylene bottles to minimize absorption of nuclides onto container walls.

11.5.6.5 Quality Assurance

Add the following information at the end of DCD Subsection 11.5.6.5.

PTN COL 11.5-2 The sampling program and the associated monitors conform to RG 4.15, Revision 2 (see Appendix 1AA).

11.5.8 COMBINED LICENSE INFORMATION

STD COL 11.5-1 An Offsite Dose Calculation Manual (ODCM) is developed and implemented in accordance with the recommendations and guidance of NEI 07-09A (Reference 202). The ODCM contains the methodology and parameters used for calculating doses resulting from liquid and gaseous effluents. The ODCM addresses operational setpoints, including planned discharge rates, for radiation monitors and monitoring programs (process and effluent monitoring and environmental monitoring) for the control and assessment of the release of radioactive material to the environment. The ODCM provides the limitations on operation of the radwaste systems, including functional capability of monitoring instruments, concentrations of effluents, sampling, analysis, 10 CFR Part 50, Appendix I dose and dose commitments, and reporting. The ODCM will be finalized prior to fuel load with site-specific information.

PTN SUP 11.5-2 The site-specific conditions addressed in the ODCM include information addressing the deep injection wells, describe methods that are used in controlling and monitoring discharges of liquid effluents via deep injection wells, and describe how water samples are collected and sampled from each dual zone monitoring well. Also addressed are well development and purging, containment and processing of purged well water, and sample processing including sample collection, sample preservation, and quality control.

STD COL 11.5-1 Table 13.4-201 provides milestones for ODCM implementation.

PTN COL 11.5-1 Formal administrative controls will be implemented by the licensees of Turkey Point Units 6 & 7 and Turkey Point Units 3 & 4 coordinating their direct radiation contributions and liquid and gaseous effluent release concentrations so that applicable site-allocated dose and dose rate limits (10 CFR 20 and 40 CFR 190) are not exceeded. These administrative controls will be incorporated into each licensee's procedures controlling direct radiation and effluent releases for normal operations and anticipated operational occurrences. The administrative controls and coordination process will be described in the ODCM.

STD COL 11.5-2 This COL Item is addressed in Subsections 11.5.2.4, 11.5.4.1, 11.5.4.2.

PTN COL 11.5-2 This COL Item is addressed in Subsections 11.5.1.2, 11.5.3, 11.5.4, and 11.5.6.5.

PTN COL 11.5-3 This COL Item is addressed in Subsection 11.2.3.5 and 11.3.3.2 for liquid and gaseous effluents, respectively.

Add the following subsection after DCD Subsection 11.5.8.

11.5.9 REFERENCES

201. American National Standards Institute, *Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities*, ANSI N13.1-1969.

202. Nuclear Energy Institute, *Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description*, NEI 07-09A, Rev. 0, NRC ADAMS Accession No. ML091050234, March 2009.

203. American National Standards Institute, *Specification and Performance of On-Site Instrumentation for Continuous Monitoring Radioactivity in Effluents*, ANSI N42.18-2004.

STD COL 11.5-2

Table 11.5-201 Minimum Sampling Frequency

Stream	Sampled Medium	Frequency
Gaseous	Continuous Release	A sample is taken within one month of initial criticality, and at least weekly thereafter to determine the identity and quantity for principal nuclides being released. A similar analysis of samples is performed following each refueling, process change, or other occurrence that could alter the mixture of radionuclides.
		When continuous monitoring shows an unexplained variance from an established norm.
		Monthly for tritium.
	Batch Release	Prior to release to determine the identity and quantity of the principal radionuclides (including tritium).
	Filters (particulates)	Weekly.
		Quarterly for Sr-89 and Sr-90.
		Monthly for gross alpha.
Liquid	Continuous Releases	Weekly for principal gamma-emitting radionuclides.
		Monthly, a composite sample for tritium and gross alpha.
		Monthly, a representative sample for dissolved and entrained fission and activation gases.
		Quarterly, a composite sample for Sr-89, Sr-90, and Fe-55.
	Batch Releases	Prior to release for principal gamma-emitting radionuclides.
		Monthly, a composite sample for tritium and gross alpha.
		Monthly, a representative sample from at least one representative batch for dissolved and entrained fission and activation gases.
		Quarterly, a composite sample for Sr-89, Sr-90 and Fe-55.

STD COL 11.5-2

Table 11.5-202
Minimum Sensitivities

Stream	Nuclide	Sensitivity
Gaseous	Fission & Activation Gases	1.0E-04 µCi/cc
	Tritium	1.0E-06 µCi/cc
	Iodines & Particulates	Sufficient to permit measurement of a small fraction of the activity that would result in annual exposures of 15 mrem to thyroid for iodines, and 15 mrem to any organ for particulates, to an individual in an unrestricted area.
	Gross Radioactivity	Sufficient to permit measurement of a small fraction of the activity that would result in annual air dose of 1) 10 mrad due to gamma, and 2) 20 mrad of beta at any location near ground level at or beyond the site boundary.
Liquid	Gross Radioactivity	1.0E-07 µCi/ml
	Gamma-emitters	5.0E-07 µCi/ml
	Dissolved & Entrained Gases	1.0E-05 µCi/ml
	Gross Alpha	1.0E-07 µCi/ml
	Tritium	1.0E-05 µCi/ml
	Sr-89 & Sr-90	5.0E-08 µCi/ml
	Fe-55	1.0E-06 µCi/ml