PMTurkeyCOLPEm Resource

From: Comar, Manny
Sent: Thursday, October 30, 2014 9:27 AM
To: TurkeyCOL Resource
Subject: FW: FPL Letter L-2014-324 Dated 10-23-2014: Radwaste Building Safety Classification Demonstration
Attachments: L-2014-324 Dated 10-23-14 RWB Safety Classification.pdf

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From: Orthen, Richard [mailto:Richard.Orthen@fpl.com]
Sent: Thursday, October 23, 2014 10:24 AM
To: Williamson, Alicia; Maher, William; Comar, Manny; Hoeg, Tim; Terry, Tomeka; McCree, Victor
Subject: FPL Letter L-2014-324 Dated 10-23-2014: Radwaste Building Safety Classification Demonstration

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
Radwaste Building Safety Classification Demonstration

References:

1. Letter from Jerry Hale (NRC) to Christopher M. Fallon (Progress Energy Florida), dated December 27, 2012, Request for Additional Information Letter No. 110 Related to SRP Section 11.2 for the Levy County Nuclear Plant, Units 1 and 2 Combined License Application.

2. Letter from Jerry Hale (NRC) to Christopher M. Fallon (Progress Energy Florida), dated March 11, 2013, Request for Additional Information Letter No. 112 Related to SRP Section 11.2 for the Levy County Nuclear Plant, Units 1 and 2 Combined License Application.

Florida Power & Light Company (FPL) provides, as an attachment to this letter, information specific to Turkey Point Units 6 & 7 that was requested by the Nuclear Regulatory Commission (NRC) of Progress Energy Florida, Inc. (now Duke Energy Florida, Inc., or DEF) in Levy County Nuclear Plant (LNP), Units 1 and 2 Combined License Application Request for Additional Information (RAI) Letters No. 110 (Reference 1) and No. 112 (Reference 2), and in discussions between Duke Energy Florida, Inc. and the NRC during public meetings on June 13, 2013, and July 25, 2013. The Turkey Point information is based on DEFs responses to the referenced NRC RAI letters, with modifications for Units 6 & 7 site-specific interfaces.

The attachment demonstrates that for radwaste systems located in the Turkey Point Units 6 & 7 radwaste buildings, the systems, structures and components meet the requirements for the classification of RW-IIc (Non-Safety) as specified in Regulatory Guide (RG) 1.143 Rev. 2, Regulatory Position 5.4 and AP1000 DCD Appendix 1A. The attachment also identifies changes that will be made in a future revision of the Turkey Point Units 6 and 7 Combined License Application to incorporate operations considerations implementing certain RG 1.143 provisions.

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L-2014-324
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October 23, 2014

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Turkey Point Units 6 and 7 Combined License Application to incorporate operations considerations implementing certain RG 1.143 provisions.

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

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

Executed on October 23, 2014.

Sincerely,

William Maher
Senior Licensing Director – New Nuclear Projects

WDM/RFO

Attachment: Radwaste Building Safety Classification Demonstration

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

Voluntary Submittal Background

With this voluntary response Florida Power & Light Company (FPL) is providing the information requested by the Nuclear Regulatory Commission (NRC) of Progress Energy Florida, Inc. (now Duke Energy Florida, Inc., or DEF) in Levy County Nuclear Plant (LNP), Units 1 and 2 Combined License Application Request for Additional Information (RAI) Letters No. 110 dated December 27, 2012, and No. 112 dated March 11, 2013, and in discussions between Duke Energy Florida, Inc. and the NRC during public meetings on June 13, 2013, and July 25, 2013. The following background and discussion information is a paraphrasing of the NRC's requests to DEF and DEF's response to each NRC request. Additional information has been included for clarity and completeness.

NRC RAI Letter No. 110 requested information related to the design of the AP1000 Radiological Waste Building (RWB) for the LNP COLA. Per the AP1000 Design Control Document (DCD), FSAR Tier 2, Rev. 19, Section 1, Appendix 1A (Regulatory Guide 1.143, Rev. 2, Criteria Section C.1.1.3, of Appendix 1A) the RWB is designed to the requirements of a RW-IIc (Non-Safety) building in accordance with Regulatory Guide 1.143, Rev. 2.

AP1000 DCD, FSAR Tier 2, Rev. 19, Section 1, Appendix 1A (Regulatory Guide 1.143, Criteria Section C.5) endorsement of the Regulatory Guide makes no distinction as to the type of processing system and, consequently, the endorsement of that provision of the Regulatory Guide applies to all wastes and cumulative inventories that would be held in the RWB, regardless of the origins or forms of waste streams being processed or held there. As a result, Appendix 1A states that when the inventory of the radioactivity being treated could result in a processing system to be classified as RW-IIa (High Hazard), that processing system will be relocated in the Auxiliary Building, a seismic Category I structure.

NRC regulatory requirements and design/review guidance applicable to radioactive waste management structures, systems, and components (SSCs) are as follows:

- GDC 2, Design of Bases for protection against natural phenomena, states that SSCs shall be designed to withstand the effects of natural phenomena … without loss of capability to perform their safety functions and shall reflect, in part, the importance of the safety functions to be performed.

- GDC 61, Fuel storage and handling and radioactivity control, states that the fuel storage and handling, radioactive waste, and other systems which may contain radioactivity shall be designed to assure adequate safety under normal and

postulated accident conditions and shall be designed with appropriate containment, confinement, and filtering systems, among other aspects.

- Regulatory Guide 1.143, Design Guidance for Radioactive Waste Management Systems, Structures, and Components in Light Water Cooled Nuclear Power Plants, provides guidance to licensees and applicants on methods acceptable to the staff for complying with NRC regulations for radioactive waste management systems. Revision 2 to the Regulatory Guide was published in November 2001.

- Regulatory Guide 1.143, Rev. 2 states that "for a given structure housing radwaste processing systems or components, if the total design basis unmitigated radiological release (considering the maximum inventory) at the boundary of the unprotected area is greater than 500 millirem per year or the maximum unmitigated exposure to site personnel within the protected area is greater than 5 rem per year, the external structures are classified as RW-IIa." [NUREG-0800 Standard Review Plan Section 11.2 states "For the purpose of this SRP, the dose limit cited in Section 5 of Regulatory Guide 1.143, addressing unmitigated releases of radioactive materials, is revised to be consistent with that of 10 CFR 20.1301. The annual dose limit of Part 20.1301 is 100 mrem for members of the public located in unrestricted areas."]

- NUREG-0800 Standard Review Plan Section 11.2, Liquid Waste Management System, SRP Acceptance Criteria 3 states "The seismic design of structures housing LWMS components, the quality group classification of liquid radwaste treatment equipment, and provisions to prevent and collect spills from indoor and outdoor storage tanks should conform to the guidelines of RG 1.143 for liquids and liquid wastes produce during normal operation and AOOs."

Therefore, given the acceptance criteria in Regulatory Guide 1.143, FPL understands that it is the NRC's position that if the structure housing radwaste systems and components (such as the RWB) is classified as less than RW-IIa, the resulting unmitigated doses to a worker and member of the public must not exceed 5 rem or 100 mrem, respectively. In considering the maximum inventory, the unmitigated dose should include the combined source term from all radioactive sources present in the building, including all radioactivity contained in permanent and skid-mounted systems and their components, and monitoring tanks, in addition to pre-processed waste being held or stored in the building. The associated doses would be assessed over a two-hour period without taking credit for any shielding, structural integrity, or procedures to mitigate the exposure to workers or members of the public by any means. (Note: For consistency with similar SRP analyses (Chapters 11 and 12), the NRC applies a two-hour time

frame in evaluating the radiological impacts and acceptability of the dose results against the acceptance criteria of Regulatory Guide 1.143).

The DEF LNP COLA FSAR, Rev. 5, Section 11.2.1.2.5.2 makes a commitment for skid-mounted liquid waste processing equipment placed into operation in the RWB to not exceed the 10 CFR Part 71, Appendix A, Table A-1, A_2 quantities. LNP COLA FSAR Section 11.2.1.2.5.2 is standard content provided by AP1000 COL applicants unless a site-specific departure to the content is necessary. The FPL Turkey Point Units 6 & 7 COLA FSAR, Rev. 5, Section 11.2.1.2.5.2 contains the same standard content as the corresponding LNP COLA FSAR, Rev. 5, i.e., to not exceed the 10 CFR Part 71, Appendix A, Table A-1, A_2 quantities.

Based on the above NRC regulatory requirements and guidance and the commitment made in the LNP and Units 6 & 7 COLA Part 2 FSAR for skid mounted equipment, the following NRC requested additional information on the LNP COLA is considered by FPL to be applicable to the Units 6 & 7 COLA safety evaluation:

1. Please explain how the limits on unmitigated dose to a worker or member of the public will be met given the possible quantities of all forms of radioactive materials (liquid, solid, etc.) in the RWB and the classification of the RWB as RW-IIc.

2. Describe the likely inventory in quantities and type of all radioactive materials that are planned to be contained within the RWB.

3. Explain how the inventory of radioactive materials will be controlled to ensure that the unmitigated exposure limits are not exceeded.

4. Provide a list of all procedures in place, or that will be in place to ensure compliance with the applicable regulatory requirements consistent with the commitments made in the FSAR and DCD.

5. If procedures are not yet in place, please provide a commitment in the form of a proposed license condition that will assure procedures will be in place prior to operation of radiological waste systems and storage of radiological waste in the RWB.

The NRC RAI Letter Nos. 110 and 112 responses provided by DEF for the LNP COLA, and clarification information provided at the two public meetings with DEF referenced above, were used to prepare the Units 6 & 7 question responses provided in the Discussion section below.

Discussion

QUESTION 1. Please explain how the limits on unmitigated dose to a worker or member of the public will be met given the possible quantities of all forms of radioactive materials (liquid, solid, etc.) in the RWB and the classification of the RWB as RW-IIc.

Radioactive Materials in the Radwaste Building

The Units 6 & 7 Radwaste Buildings (RWB) are separate structures that are used to segregate various categories of waste prior to processing, to process waste using mobile systems and to store processed waste in shipping containers. The following types of contaminated waste are expected to be stored and processed in each RWB.

- Processed liquid radwaste is stored in up to three 56,775 L (15,000 gal) monitor tanks prior to discharge from the plant. The activity mixture in each tank is limited to a quantity that is less than the corresponding normal form A_2 mixture quantity from 10 CFR 71 Appendix A. Therefore, the maximum activity in a monitor tank will be the A_2 mixture quantity. The area containing the monitor tanks is curbed to sufficient height to contain the contents of a single monitor tank, and the area is provided with floor drains that route any spillage to the liquid radwaste holdup tanks in the Auxiliary Building.

- Mobile processing systems are stored in the RWB and may be used to process liquid radwaste. Prior to processing any liquid radwaste in the RWB, the amount of activity in the radwaste to be processed is determined. If processing the radwaste in the RWB results in an amount of activity on the mobile processing equipment that is less than the A_2 mixture quantity, it may be processed in the RWB; otherwise it is processed in the Auxiliary Building. Therefore, the maximum activity accumulated in a mobile processing system will be the A_2 mixture quantity.

- Solid wastes and wastes that have been packaged for shipment and disposal are also stored in the RWB. The waste accumulation room is used to collect solid radwaste, primarily dry active waste. The dry active waste is sorted and then processed for shipment to a storage or disposal facility. Low and moderate activity filter cartridges may also be accumulated and packaged for disposal in this area. High activity filter cartridges are stored in shielded portable casks. When a truck-load quantity of waste containers accumulates, a shipment to a storage or waste disposal facility is initiated using shielded shipping containers if required.

Radiation Exposure Pathways Following an Unmitigated Release

The doses that result from the unmitigated release from the RWB are determined by first evaluating potential exposure pathways. Potential exposure pathways include inhalation of or immersion in airborne activity released from the RWB, ingestion of liquid activity released from the RWB, and direct radiation from activity released from the RWB. As described above, the form of radioactive material located in the RWB includes liquid radwaste in the monitor tanks or mobile processing systems, filter media (e.g., resins) located in the mobile processing systems, or solid radwaste located in the package storage area. The monitor tanks are located downstream from the degasifier which is located in the Auxiliary Building and removes gaseous effluents prior to the liquid radwaste being transferred to the RWB. Since the liquid radwaste is stored at atmospheric conditions in tanks vented to the room atmosphere and any potential gaseous activity is continuously removed from the room by the RWB ventilation system, there is no accumulation of gaseous activity. Therefore, the airborne exposure pathways to a worker or member of the public are not applicable to the unmitigated release. While an unmitigated release of liquid radwaste is postulated to occur, the time frame for assessing the exposure is so short (two hours) that the ingestion exposure pathway, either through drinking contaminated water or ingesting contaminated food stocks, is not considered applicable. Based on these considerations, only the direct radiation exposure pathway (workers or members of the public) following an unmitigated release of activity from the RWB is deemed applicable.

Inside the RWB there are three sources of activity that could lead to direct exposures of on-site personnel: liquid radwaste in the monitor tanks, liquid and solid radwaste in the mobile processing equipment, and solid radwaste in the accumulation and storage area. Regulatory Guide (RG) 1.143, Section B, states for solid radwaste that the radwaste system terminates at the point of storage of packaged solid wastes. Therefore, the sources that are considered in unmitigated release exposure scenarios are the liquid radwaste in the monitor tanks and the liquid and solid radwaste in the mobile processing equipment. Each of these sources is addressed independently in order to establish the corresponding maximum unmitigated release exposure scenarios as specified in Regulatory Position 5.1 and 5.2 of RG 1.143.

Activity in the Radwaste Building

- Activity in the Monitor Tanks

  To determine the activity in the monitor tank, it is conservatively assumed that the activity has the same nuclide distribution as the effluent holdup tank listed in

the Units 6 & 7 FSAR Table 2.4.13-201 but with an adjustment for a higher defective fuel fraction of 0.25%. The radwaste in the effluent tank is normally processed through demineralizers before being transferred to the monitor tanks, but it is conceivable that transfer could occur without treatment. Therefore, this nuclide distribution is considered bounding for the monitor tanks after it is adjusted for a defective fuel fraction of 0.25%.

Table 2.4.13-201 is based on a defective fuel failure fraction of 0.125%. In order to base the classification of the RWB on the design basis defective fuel fraction of 0.25%, the A_2 quantity of activity in the monitor tank is calculated from the reactor coolant activity listed in Turkey Point Units 6 & 7 FSAR Table 2.4.13-201. This is the same activity listed in DCD Table 11.1-2 without the noble gas nuclides. Short-lived radionuclides listed in DCD Table 11.1-2 that will decay prior to collection and processing in the RWB and for which nuclide-specific A_2 values are not provided in 10 CFR 71 Appendix A Table A-1 are also not considered in the calculation of RWB source terms. Excluding the short-lived nuclides produces significantly more conservative results.

The monitor tank will contain a mixture of normal form radionuclide activity, so it is appropriate that the A_2 quantity for the tank mixture is determined using the condition provided in Section IV(d) of 10CFR 71 Appendix A:

$$A_2 = \frac{1}{\sum_i \frac{f(i)}{A_2(i)}}$$

A_2 = A_2 quantity for the whole mixture,

f(i) = fraction of activity for nuclide *i* in the mixture,

A_2 *(i)* = appropriate A_2 quantity for radionuclide i from 10 CFR 71 Appendix A, Table A-1, and

I = indicates the summation is done for all nuclides in the mixture.

Table 1 summarizes the determination of the activity in a monitor tank. It includes a list of the nuclides in the tank; the corresponding A_2 value from 10 CFR 71, Appendix A, Table A-1; the nuclide concentration in the reactor coolant; and the nuclide inventory in the monitor tank. The final column in Table 1 is the A_2 fraction for each radionuclide in a monitor tank with an A_2 fraction summation

equal to one, The Table 1 monitor tank inventory is also the limiting inventory in the mobile radwaste processing equipment since this equipment is only used to process radwaste that results in less than an A_2 quantity of activity on the mobile radwaste processing equipment.

The statement above, "The radwaste in the effluent tank is normally processed through demineralizers before being transferred to the monitor tanks, but it is conceivable that transfer could occur without treatment" is intended to describe the basis for the assumed distribution of radionuclides used in safety classification dose rate calculations. The statement that transfer of liquid wastes from an effluent tank to a Radwaste Building Monitor Tank may occur without treatment was not intended to imply that A_2 procedural controls would not be applied or that A_2 limits would not be met.

The post-transfer A_2 radionuclide inventory for the destination Radwaste Building Monitor Tank and applicable mobile radwaste processing system train is calculated and compliance with inventory limits is verified prior to each transfer of a batch of liquid waste to the Radwaste Building. The procedures ensure RWB compliance with safety classification criteria specified in Section 5 of RG 1.143. A calculation has been performed as described above that demonstrates that procedural controls to limit radioactivity below A_2 quantities for radionuclides specified in Appendix A to 10 CFR Part 71 in each of the three RWB monitor tanks, and separately in each of up to three mobile radwaste systems ensures compliance with the dose criteria specified in Section 5 of RG 1.143. The procedures also ensure that activities in additional equipment located in the RWB are limited to A_2 quantities.

- Activity in the Mobile Radwaste Processing Systems

  As described in Section 11.4 of the AP1000 DCD, the use of mobile radwaste processing systems for processing radwaste permits the use of the latest technology and avoids the equipment obsolescence problems experienced with installed radwaste processing equipment. The most appropriate mobile radwaste processing systems will be used in the RWB. Since the systems that may be selected in the future cannot be anticipated in sufficient detail at this time, it is not possible to assign source term inventory fractions to each of the processing components of such systems. However, it is possible to define the total maximum inventory contained in all of the components of such a system and develop a bounding source term model.

To develop a source term model of anticipated waste processing units, current systems were evaluated. These systems are expected to be composed of various components (filters, demineralizers, etc.). To conservatively estimate the dose rate from an entire mobile radwaste processing unit, an A_2 quantity of activity is assumed to be consolidated in a single vessel the size and geometry of a demineralizer vessel typically included in such systems (50 ft^3). This is more conservative than assuming multiple vessels since multiple vessels will result in more self-shielding and a more dispersed source, which will produce lower dose rates. The use of a single vessel of this size is also bounding for a mobile dewatering system, which is included within the scope of unpackaged waste considered in the RWB classification basis. The dose from the single vessel is multiplied by three to account for the possibility of up to three mobile radwaste processing systems in the RWB.

As stated in Section 11.2.1.2.5.2 of the Units 6 & 7 COLA FSAR, radioactive waste will not be processed in the RWB if it is anticipated that the radioactive waste contents could exceed the A_2 quantities specified in Appendix A to 10 CFR Part 71. Therefore, the total inventory contained in each mobile radwaste processing system is necessarily limited to the A_2 mixture quantity.

- Activity in the Accumulation Room

  The accumulation room will contain either packaged wastes that require no further processing, or packaged, but unsorted, low specific activity dry active waste (LSA DAW) that will periodically be sorted and re-placed in packaging suitable for disposal. Only packaged mixed waste is received and stored in the accumulation room. The quantity of LSA DAW being processed at any given time (and thus not in a packaged, ready for shipment form) is limited and the sorting process is a routine activity performed consistent with ALARA work practices. Potential dose rate contributions from unpackaged LSA DAW undergoing sorting in the accumulation room will be limited to less than 0.1 rem/hr consistent with DCD Figure 12.3-1 and are considered insignificant relative to the RG 1.143, Section 5 building classification criterion for site personnel of 5 rem maximum applied over an assumed event period of two hours.

  Unpackaged wastes other than LSA DAW undergoing sorting and packaging that are handled or processed in the RWB are limited to a) Monitor Tank fluids, and b) liquid and wet wastes associated with mobile radwaste processing systems. These potential sources are addressed in the dose calculations. Transfer and packaging of spent media from a mobile radwaste processing system is

controlled by a process control program and is considered in the evaluation of unmitigated, unshielded dose. The liquid in the monitor tanks may also be considered unprocessed waste, which is also considered in the unmitigated release exposure scenarios.

Thus, all significant unpackaged radiological waste sources potentially present at any time in the RWB are considered in the dose calculations. The total dose from unmitigated radiological release and exposure of all unpackaged and unprocessed wastes will be maintained less than the RG 1.143, Section 5 building classification criteria assuming a two hour exposure period. Since all other wastes in the Radwaste Building will be packaged and ready for shipment, RG 1.143, Section 5 does not require their consideration when determining RWB unmitigated release and exposure scenarios.

Dose to a Worker from an Unmitigated Release

To calculate the dose to site personnel inside the protected area from an unmitigated exposure to potential RWB sources, it is conservatively assumed that site personnel remain inside the protected area at the location of their activities. The potential sources include a) three (3) monitor tanks each containing the inventory listed in Table 1, and b) up to three (3) mobile radwaste processing systems, each assumed to be a demineralizer with a volume of 1.42 m^3 (50 ft^3) and each containing the inventory listed in Table 1.

Consistent with the assumed 2-hour period of exposure, the distance between maximum exposed site personnel and RWB sources is conservatively assumed to be ten (10) feet. Ten feet conservatively bounds the location of the RWB relative to normally occupied areas of the site. Unlimited worker occupancy workstations and low dose rate waiting areas are located no closer than ten (10) feet from a mobile radwaste processing system or a waste monitor tank.

Individuals working inside the RWB are trained workers who receive occupational dose as defined in 10 CFR 20.1003. These workers normally occupy low dose areas away from radiation sources consistent with as low as reasonably achievable guidance and philosophy described in Regulatory Guide 8.8, “Information Relevant To Ensuring That Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable.” Tasks requiring physical access in close proximity to high dose rate radiation sources are infrequent and stay times are pre-planned and limited by routine radiation protection work practices. Thus, the assumed ten (10) foot distance is justified for personnel performing activities inside the RWB based on infrequent need

to access high dose rate sources, and routine work practices that limit stay times in close proximity to high dose rate radiation sources. Additionally, unlimited worker occupancy workstations and low dose rate waiting areas are located no closer than ten (10) feet from a mobile radwaste processing system or a waste monitor tank.

Individuals working outside the RWB that could potentially receive exposure from radiation sources located inside the building include personnel in transit or performing activities in the yard, or inside AP1000 structures adjacent to the RWB. Activities performed outside the RWB cannot be specifically identified with certainty, but would reasonably not involve continuous occupancy for a two (2) hour period in contact with or in close proximity to RWB exterior walls. The assumed ten foot distance for individuals performing activities outside the RWB is based on the location outside the RWB closest to potential locations of sources inside the RWB.

The unmitigated dose to site personnel from exposure to the monitor tanks is determined by calculating the limiting dose rate from a single monitor tank. Each tank is modeled as a right circular cylinder with a volume of 56,775 L (15,000 gal) containing the inventory listed in Table 1. The unmitigated, unshielded dose rate from a single tank is calculated at ten (10) feet from the center of the tank's side surface. The calculated dose rate for a single tank is 49 mrem/hr. This dose rate is assumed to be applicable to each of the three monitor tanks in the RWB.

Each mobile radwaste processing system is modeled as a 1.42 m^3 (50 ft^3) right circular cylinder containing the inventory listed in Table 1, and the unmitigated dose rate assuming no shielding is calculated ten (10) feet from the center of the side surface of the unshielded demineralizer media. The resulting dose rate is 323 mrem/hr. This dose rate is assumed to apply to each of the three mobile radwaste processing systems in the RWB.

The total individual dose to site personnel from an unmitigated exposure (considering the maximum inventory) is calculated by summing the dose rates from three monitor tanks and three mobile radwaste processing systems, and then multiplying the sum by the assumed two (2) hour exposure period. The resulting site personnel individual dose is 2230 mrem.

In addition to performing site personnel unmitigated exposure calculations at an assumed distance of ten (10) feet, supplementary calculations are performed using the same source terms and equal distance assumptions to determine how close site personnel would need to be continuously present over the assumed two hour exposure

period before exceeding the 5 rem RWB classification criteria. This distance was calculated to be approximately six (6) feet.

Dose to a Member of the Public from an Unmitigated Release

To calculate the dose to a member of the public from a potential unmitigated release of RWB radiological sources, it is assumed that the maximally exposed individual is located at the boundary of the protected area closest to the RWB. The potential RWB sources include a) three (3) monitor tanks each containing the inventory listed in Table 1, and b) up to three (3) mobile radwaste processing systems, each modeled as a demineralizer with a volume of 1.42 m^3 (50 ft^3) and each containing the inventory listed in Table 1.

For Units 6 & 7, the closest distance to the protected area boundary from the RWB for either Unit 6 or Unit 7 is 110 m (360 ft). It is assumed the liquid from all three monitor tanks is released from the RWB and flows on the ground to the protected area boundary without being absorbed into the ground. The result is a shallow pool of water located between the RWB and the protected area boundary. A rectangular source (175 feet by 360 feet) approximately 1.15 inch in depth is used to model the pool and the dose rate is calculated at an edge dose point located at the protected area boundary and three feet above the surface of the water. The calculated dose rate is 47.0 mrem/hr.

A similar approach is used to calculate the dose rate to a member of the public from an unmitigated release from the mobile radwaste processing equipment, with the following exception. Essentially all of the activity in the mobile radwaste processing equipment will be attached to the media used to remove radioactive contaminants from the process fluids. Therefore, this radionuclide inventory is not available to flow out of the RWB. Each mobile radwaste processing system is modeled as a right circular cylinder representative of 1.42 m^3 (50 ft^3) of unshielded demineralizer media. The unmitigated dose rate is calculated at a distance of 110 m (360 ft) from the surface of the demineralizer. The resulting dose rate is 0.215 mrem/hr. The result for a single unit is multiplied by three to account for three mobile radwaste processing systems with the same limiting inventory. The resultant total unmitigated dose rate from three mobile radwaste processing systems at the protected area boundary is 0.646 mrem/hr.

The total dose to a member of the public from an unmitigated release (considering the total maximum inventory of unpackaged waste potentially present in the RWB) is calculated by summing the dose rates from the RWB monitor tanks and the mobile radwaste processing equipment unmitigated releases and then multiplying the sum by

an assumed exposure period of two hours. The resultant total unmitigated dose to a member of the public is 95.2 mrem.

The current schedule estimates the commercial operation of Unit 6 to begin one year before the commercial operation of Unit 7 (FSAR Table 1.1-203). The configuration of the portion of the protected area boundary (PAB) separating the operational Unit 6 from the under construction Unit 7 (the temporary Unit 6 west PAB, the boundary closest to the Unit 6 RWB) has not been finalized but will be as part of ongoing construction based on actual circumstances in the field. Therefore, the final configuration of the temporary Unit 6 west PAB will consider RG 1.143 radiological considerations for a RW-IIc (Non-Safety) classification. If needed, compensatory measures (e.g., positive access controls) would be adopted such that no member of the public could receive a dose in excess of 100 mrem in two hours at the Unit 6 west PAB as a result of a postulated unmitigated release from the Unit 6 RWB.

Summary and Conclusion

In summary, based on the evaluations presented above, the following is demonstrated:

- The total dose to a member of the public located at the protected area boundary resulting from the unmitigated release of the maximum RWB radionuclide inventory considering a two (2) hour exposure period is less than 100 mrem.

- The unmitigated exposure to site personnel within the protected area to the maximum RWB radionuclide inventory over a two (2) hour exposure period is less than 5 rem.

- The amount of activity in each monitor tank and each mobile liquid waste processing system in the RWB is maintained less than the A_2 quantity from 10 CFR 71 Appendix A.

Therefore, for radwaste systems located in the RWB, the systems, structures and components meet the requirements for the classification of RW-IIc (Non-Safety) as specified in RG 1.143, Regulatory Position 5.4 and AP1000 DCD Appendix 1A. The Units 6 & 7 COLA FSAR Section 11.2.1.2.5.2 will be updated in a future COLA revision to include information demonstrating that the mobile radwaste processing equipment and structures, systems, and components for storing unpackaged waste will be in conformance with the assigned classification of the RWB.

As described above and in the response to QUESTION 3, the activity in each of up to three (3) mobile radwaste processing systems will be limited to an equivalent A_2

quantity of radionuclides. When the disposable media is removed from the system, the process control program will be utilized to move the media from mobile radwaste processing system components and place the media into a package suitable for shipping. The mobile radwaste processing system will not be placed back into service until the media that has been removed is packaged and ready for shipment. Thus, the source term associated with spent mobile radwaste processing system media during transfer and packaging is accounted for in the unmitigated release and exposure evaluations for the mobile radwaste processing systems. This will be reflected in a future revision to the Units 6 & 7 COLA FSAR Section 11.4.6.

Table 1: A_2 Activity for Radionuclides in Monitor Tanks and Mobile Equipment

Nuclide	A_2 Value (Ci)	Reactor Coolant Activity (µCi/g)	Monitor Tank/ Mobile Equipment Activity (Ci)	A_2 Fraction
H-3	1.10E+03	1.00E+00	2.16E+00	1.96E-03
Br-83	(a)			
Br-84	(a)			
Br-85	(a)			
I-129	unlimited	1.50E-08	3.26E-08	
I-130	(a)			
I-131	1.90E+01	7.10E-01	1.54E+00	8.11E-02
I-132	1.10E+01	9.40E-01	2.03E+00	1.85E-01
I-133	1.60E+01	1.30E+00	2.83E+00	1.77E-01
I-134	8.10E+00	2.20E-01	4.77E-01	5.89E-02
I-135	1.60E+01	7.80E-01	1.69E+00	1.06E-01
Cs-134	1.90E+01	6.90E-01	1.50E+00	7.89E-02
Cs-136	1.40E+01	1.00E+00	2.16E+00	1.54E-01
Cs-137	1.60E+01	5.00E-01	1.08E+00	6.75E-02
Cs-138	(a)			
Cr-51	8.10E+02	1.30E-03	2.83E-03	3.49E-06
Mn-54	2.70E+01	6.70E-04	1.45E-03	5.37E-05
Mn-56	8.10E+00	1.70E-01	3.69E-01	4.56E-02
Fe-55	1.10E+03	5.00E-04	1.08E-03	9.82E-07
Fe-59	2.40E+01	1.30E-04	2.83E-04	1.18E-05
Co-58	2.70E+01	1.90E-03	4.12E-03	1.53E-04
Co-60	1.10E+01	2.20E-04	4.77E-04	4.34E-05
Rb-88	(a)			
Rb-89	(a)			
Sr-89	1.60E+01	1.10E-03	2.39E-03	1.49E-04
Sr-90	8.10E+00	4.90E-05	1.06E-04	1.31E-05
Sr-91	8.10E+00	1.70E-03	3.69E-03	4.56E-04
Sr-92	8.10E+00	4.10E-04	8.89E-04	1.10E-04
Y-90	8.10E+00	1.30E-05	2.83E-05	3.49E-06
Y-91m	5.40E+01	9.20E-04	2.00E-03	3.70E-05
Y-91	1.60E+01	1.40E-04	3.04E-04	1.90E-05
Y-92	5.40E+00	3.40E-04	7.38E-04	1.37E-04
Y-93	8.10E+00	1.10E-04	2.39E-04	2.95E-05
Zr-95	2.20E+01	1.60E-04	3.47E-04	1.58E-05
Nb-95	2.70E+01	1.60E-04	3.47E-04	1.29E-05
Mo-99[(c)]	2.00E+01	2.10E-01	4.55E-01	2.28E-02
Tc-99m	1.10E+02	2.00E-01	4.34E-01	3.95E-03
Ru-103	5.40E+01	1.40E-04	3.04E-04	5.63E-06
Rh-103m	1.10E+03	1.40E-04	3.04E-04	2.76E-07

Table 1: A_2 Activity for Radionuclides in Monitor Tanks and Mobile Equipment

Nuclide	A_2 Value (Ci)	Reactor Coolant Activity (µCi/g)	Monitor Tank/ Mobile Equipment Activity (Ci)	A_2 Fraction
Rh-106[(d)]	5.40E+00	4.50E-05	9.76E-05	1.81E-05
Ag-110m	1.10E+01	4.00E-04	8.68E-04	7.89E-05
Te-127m	1.40E+01	7.60E-04	1.65E-03	1.18E-04
Te-129m	1.10E+01	2.60E-03	5.63E-03	5.12E-04
Te-129	1.60E+01	3.80E-03	8.24E-03	5.15E-04
Te-131m	1.40E+01	6.70E-03	1.45E-02	1.04E-03
Te-131	(b)	4.30E-03	9.32E-03	
Te-132	1.10E+01	7.90E-02	1.71E-01	1.55E-02
Te-134	(a)			
Ba-137m	(b)	4.70E-01	1.02E+00	
Ba-140	8.10E+00	1.00E-03	2.16E-03	2.67E-04
La-140	1.10E+01	3.10E-04	6.71E-04	6.10E-05
Ce-141	1.60E+01	1.60E-04	3.47E-04	2.17E-05
Ce-143	1.60E+01	1.40E-04	3.04E-04	1.90E-05
Pr-143	1.60E+01	1.50E-04	3.26E-04	2.04E-05
Ce-144	5.40E+00	1.20E-04	2.61E-04	4.83E-05
Pr-144	(b)	1.20E-04	2.61E-04	
Total		**8.30E+00**	**1.80E+01**	**1.00E+00**

(a) These nuclides do not have a specific A_2 value in Table A-1 of 10 CFR Appendix A.

(b) A_2 values for these radionuclides are not listed since their A2 values are included in the A_2 values of their parent radionuclides. The half-lives of the daughter radionuclides are less than 10 days.

(c) The A_2 value for Mo-99 is listed as 1.6E+01 Ci. However, it is noted after Table A-1 in 10 CFR 71, Appendix A that the A_2 value of Mo-99 is 2.0E+01 Ci for domestic use.

(d) The A_2 value for Ru-106 is used for Rh-106 since there is no value for Rh-106 in Table A-1 of 10 CFR 71, Appendix A and Ru-106 and Rh-106 are in secular equilibrium [Ref. 7.5].

QUESTION 2. Describe the likely inventory in quantities and type of all radioactive materials that are planned to be contained within the RWB.

This information is presented in the response to *QUESTION 1* above.

QUESTION 3. Explain how the inventory of radioactive materials will be controlled to ensure that the unmitigated exposure limits are not exceeded.

FPL programmatic controls will be designed such that the aggregate activity quantities for all relevant sources in the RWB does not exceed the amount corresponding to the unmitigated dose acceptance criteria of RG 1.143. The RWB operations involving unprocessed and unpackaged waste is limited to liquid waste processing utilizing up to three mobile radwaste processing systems, which includes periodic spent media transfer and packaging and LSADAW sorting. The RWB only receives packaged mixed waste. Thus, the RWB classification unmitigated release and exposure scenario evaluation presented in response to QUESTION 1 above has considered the applicable sources of unpackaged waste.

A change to the Units 6 & 7 COLA FSAR Section 13.5.2.2.5, Radioactive Waste Management Procedures and License Condition 13 in Part 10 are provided (see the response to QUESTION 5) to specify that procedures will ensure that the inventory of unpackaged wastes, including liquid, wet, solid, gaseous, activated, and contaminated wastes in the RWB as well as all sources associated with the mobile radwaste processing units, is monitored such that the total unmitigated dose will not exceed RG 1.143 building classification criteria.

QUESTION 4. Provide a list of all procedures in place, or that will be in place to ensure compliance with the applicable regulatory requirements consistent with the commitments made in the FSAR and DCD.

The procedures that ensure compliance with the requirements have not yet been developed but will be available for NRC inspection prior to fuel load. A generalized compliance method (inventory controls) is identified in the response to Question 3.

QUESTION 5. If procedures are not yet in place, please provide a commitment in the form of a proposed license condition that will assure procedures will be in place prior to operation of radiological waste systems and storage of radiological waste in the RWB.

A proposed License Condition (LC) will be added to Part 10 of the Units 6 & 7 COLA in a future COLA revision. A conforming change to the Units 6 & 7 COLA FSAR Section 13.5.2.2.5 will also be included in a future COLA revision.

References:

1. Letter from Jerry Hale (NRC) to Christopher M. Fallon (PEF), dated December 27, 2012, Request for Additional Information Letter No. 110 Related to SRP Section 11.2 for the Levy County Nuclear Plant, Units 1 and 2 Combined License Application.
2. Letter from Jerry Hale (NRC) to Christopher M. Fallon (PEF), dated March 11, 2013, Request for Additional Information Letter No. 112 Related to SRP Section 11.2 for the Levy County Nuclear Plant, Units 1 and 2 Combined License Application.
3. Memorandum from Jerry Hale, Project Manager, LB4 (NRC) to Lawrence Burkhart, Chief LB4, dated July 1, 2013, Summary of a Public Teleconference on June 13, 2013, with AP1000 Design Center Combined License Applicants to Discuss Application Review Issues.
4. Memorandum from Jerry Hale, Project Manager, LB4 (NRC) to Lawrence Burkhart, Chief LB4, dated August 8, 2013, Summary of a Public Teleconference on July 25, 2013, with AP1000 Design Center Combined License Applicants to Discuss Application Review Issues.
5. Letter from Christopher M. Fallon (DEF) to U.S. Nuclear Regulatory Commission, dated February 11, 2013, Response to Request for Additional Information Letter No. 110 Related to Radioactive Waste Management, Serial: NPD-NRC-2013-004.
6. Letter from Christopher M. Fallon (DEF) to U.S. Nuclear Regulatory Commission, dated April 26, 2013, Response to Request For Additional Information Letter No. 112 Related to Radioactive Waste Management, Serial: NPD-NRC-2013-011.
7. Letter from Christopher M. Fallon (DEF) to U.S. Nuclear Regulatory Commission, date June 6, 2013, Revised Response to Request For Additional Information Letter No. 112 Related to Radioactive Waste Management, Serial: NPD-NRC-2013-024.
8. Letter from Christopher M. Fallon (DEF) to U.S. Nuclear Regulatory Commission, dated July 1, 2013, Revised Response to Request For Additional Information Letter No. 112 Related to Radioactive Waste Management, Serial: NPD-NRC-2013-028.
9. Letter from Christopher M. Fallon (DEF) to U.S. Nuclear Regulatory Commission, dated August 23, 2013, Revised Response to Request For Additional Information Letter No. 112 Related to Radioactive Waste Management, Serial: NPD-NRC-2013-036.
10. Letter from Christopher M. Fallon (DEF) to U.S. Nuclear Regulatory Commission, dated September 12, 2013, Revised Response to Request For Additional

Information Letter No. 112 Related to Radioactive Waste Management, Serial: NPD-NRC-2013-039.

ASSOCIATED COLA REVISIONS:

The first second paragraph of FSAR Subsection 11.2.1.2.5.2 will be updated in a future COLA revision, as shown below:

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 A2 quantities~~ **result in an inventory on a mobile system that is below the A_2 quantity limit** for radionuclides specified in Appendix A to 10 CFR Part 71, **the** liquid effluent may be processed with **the** mobile ~~or temporary equipment~~ **liquid waste processing system** in the Radwaste Building. When ~~the A_2 quantities are exceeded, liquid effluent is processed~~ **pre-process sampling and controls indicate that A_2 quantity limits may be exceeded by processing liquid effluent in the Radwaste Building, liquid waste is processed** in the Seismic Category I Auxiliary Building. **Procedural controls also ensure that the total cumulative source term of unpackaged wastes including liquid waste, wet waste, solid waste, gaseous waste, activated or contaminated metals and components, and contaminated waste present at any time in the Radwaste Building is limited consistent with RG 1.143, Revision 2, unmitigated radiological release criteria (as revised by Standard Review Plan 11.2, SRP Acceptance Criterion 3), so that an unmitigated release, occurring over a two hour time period, would not result in a dose of greater than 100 millirem at the protected area boundary, or an unmitigated exposure, occurring over a two hour time period, would not result in a dose of greater than 5 rem to site personnel located 10 feet from the total cumulative radioactive inventory. The unmitigated, unshielded worker dose is calculated at 10 feet from the source. Unlimited worker occupancy workstations and low dose rate waiting areas are located no closer than 10 feet from a mobile radwaste processing system or a Waste Monitor Tank.**

A new paragraph will be added after the first paragraph of FSAR Subsection 11.4.6 in a future COLA revision, as shown below:

When the disposable media is removed from mobile radwaste processing system, the process control program is utilized to move the media from the system and place the media into a package suitable for shipping. The mobile radwaste processing system is not placed back into service until the media that has been removed is packaged and ready for shipment.

A new paragraph will be added at the end of FSAR Subsection 13.5.2.2.5 in a future COLA revision, as shown below:

As required by License Condition, operating procedures that include provisions to assure that A_2 quantities for radionuclides specified in Appendix A to 10 CFR Part 71 are not exceeded will be developed, implemented and maintained prior to initial fuel load. Procedural controls limit the radionuclide inventory to less than the A_2 limit in each of the three (3) monitor tanks, and in each of up to three (3) mobile radwaste processing systems. Procedures also ensure that any additional equipment to be located in the Radwaste Building is limited to A_2 quantities. Spent media transfer from a mobile radwaste processing system located in the Radwaste Building is procedurally controlled such that spent media transfer and packaging for offsite shipment must be complete prior to placing the mobile radwaste processing system back into service. The procedures also ensure that the total cumulative source term of unpackaged wastes, including liquid waste, wet waste, solid waste, gaseous waste, activated or contaminated metals and components, and contaminated waste present at any time in the Radwaste Building is limited consistent with RG 1.143, Revision 2, unmitigated radiological release criteria (as revised by Standard Review Plan 11.2, SRP Acceptance Criterion 3), so that an unmitigated release, occurring over a two hour time period, would not result in a dose of greater than 100 millirem at the protected area boundary, or an unmitigated exposure, occurring over a two hour time period, would not result in a dose of greater than 5 rem to site personnel located 10 feet from the total cumulative radioactive inventory. The unmitigated, unshielded worker dose is calculated at 10 feet from the source. Unlimited worker occupancy workstations and low dose rate waiting areas are located no closer than 10 feet from a mobile radwaste processing system or a Waste Monitor Tank. The liquid radwaste system is discussed in Section 11.2.

New Proposed License Condition 13 will be added to COLA Part 10 in a future COLA revision, as shown below:

13. RADWASTE BUILDING RADIOACTIVITY LIMITS

PROPOSED LICENSE CONDITION:

Prior to initial fuel load, the licensee shall develop, implement, and maintain procedural controls limiting radionuclide inventory in each of the Radwaste Building Monitor Tanks, and separately in each of up to three (3) Radwaste Building mobile radwaste processing systems to below A_2 quantities for radionuclides specified in Appendix A to 10 CFR Part 71 (Tables A-1 and A-3), as described in FSAR Section 13.5.2.2.5. The procedures shall also ensure that any additional equipment located in the RWB is limited to the A_2 quantities and that the total cumulative radioactive inventory contained in unpackaged wastes (including liquid waste, wet waste, solid waste, gaseous waste, activated or contaminated metals and components, and contaminated waste present at any time in the Radwaste Building) is limited so that an unmitigated release, occurring over a two hour time period, would not result in a dose of greater than 100 millirem at the protected area boundary or an unmitigated exposure, occurring over a two hour time period, would not result in a dose of greater than 5 rem to site personnel located 10 feet from the total cumulative radioactive inventory.

ASSOCIATED ENCLOSURES:

None