



February 19, 1997

L-97-040

10 CFR 50.4

10 CFR 70.14

10 CFR 70.24

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

Re: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Request for Exemption from 10 CFR 70.24

Pursuant to 10 CFR 70.14(a) and 10 CFR 70.24(d), Florida Power and Light Company (FPL) requests an exemption from the requirements of 10 CFR 70.24, "Criticality Accident Requirements," for areas designated for new (unirradiated) fuel handling and storage at St. Lucie (PSL) Units 1 and 2. Such an exemption would relieve FPL from the requirement of having a criticality alarm system (as described in the regulation) in these areas. Because of the inherent features associated with handling and storage of unirradiated fuel, FPL has determined that granting the requested exemption will not endanger public life or property or the common defense and security and is otherwise in the public interest.

The attachment to this letter contains the basis for this request, which is similar to that previously approved as part of each unit-specific 10 CFR Part 70 license issued during plant construction. It has been brought to our attention (see attachment) that the prior exemptions were not incorporated into the Part 50 operating license for either St. Lucie unit. However, because of the prior exemptions, the St. Lucie Plant design for each new fuel storage and handling area includes only one area radiation monitor which provides both local and control room alarms, whereas 10 CFR 70.24(a)(1) requires two detector coverage for a criticality accident monitor. The as-built system was found acceptable by the NRC, and is consistent with the design and licensing bases described in the Updated Final Safety Analysis Report for each unit.

Please contact us if there are any questions about this submittal.

Very truly yours,

J.A. Stall
Vice President
St. Lucie Plant

JAS/RLD

9702210106 970219
PDR ADDCK 05000335
P PDR

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant

Introduction

Pursuant to 10 CFR 70.14(a) and 10 CFR 70.24(d), Florida Power and Light Company (FPL) requests an exemption from the requirements of 10 CFR 70.24, "Criticality Accident Requirements," for areas designated for new (unirradiated) fuel handling and storage at St. Lucie (PSL) Units 1 and 2. Such an exemption would relieve FPL from the requirement of having a criticality alarm system (as described in the regulation) in these areas. Because of the inherent features associated with the storage and inspection of unirradiated fuel, FPL has determined that granting the requested exemption will not endanger public life or property or the common defense and security and is otherwise in the public interest.

Background

An exemption from 10 CFR 70.24 requirements for areas designated for new fuel storage at each St. Lucie (PSL) unit was previously approved as part of the respective unit specific Part 70 license issued during plant construction.^{1, 2} The specific Part 70 license expired upon conversion of the unit construction permit to a commercial operating license, which was issued pursuant to 10 CFR 50.57.^{3, 4} The operating license for each PSL unit requires the receipt, possession, and use of source, byproduct, and special nuclear material, as authorized by the license, to be in accordance with the Commission's regulations in 10 CFR Parts 30, 40, and 70. Part 2.B(2) of the operating license further licenses FPL to "receive, possess, and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Safety Analysis Report, as supplemental and amended." Neither Part 50 operating license, however, explicitly describes the previously approved exemption from Part 70.24 (for new reactor fuel) which was the authority for FPL to not include a criticality accident monitoring system in the Fuel Handling Building (FHB) new fuel storage and handling area during design and construction of each St. Lucie unit.

In response to an August 31, 1987 letter to the NRC dealing with exemption from criticality monitoring requirements of 10 CFR 70.24 for Browns Ferry Units 1, 2, and 3, and incorporation of the exemption into the Part 50 operating licenses for these units, the NRC stated, "The staff

¹ St. Lucie Unit 1: USNRC Special Nuclear Material License No. SNM-1514, Docket No. 70-1838, issued 2/11/75.

² St. Lucie Unit 2: USNRC Materials License No. SNM-1902, Docket No. 70-2957, issued 10/14/82.

³ St. Lucie Plant Unit 1 Facility Operating License No. DPR-67, issued March 01, 1976.

⁴ St. Lucie Plant Unit 2 Facility Operating License No. NPF-16, issued April 6, 1983.

considers that the previously issued exemptions are still in effect even though the specific provisions of the Part 70 licenses were not incorporated into the Part 50 license." Further, "Section 2.B(2) of the Units 1, 2, and 3 licenses states that TVA is authorized to receive, possess and use special nuclear material as reactor fuel in accordance with Part 70. In view of this provision, the previously issued exemptions should not be considered to have expired and you are hereby advised that the staff does not consider a further exemption necessary." ⁵ During telephone conversations between FPL and the NRC/NRR Project Manager for St. Lucie Units 1 and 2, it was learned that the NRC no longer supports the position stated in the letter to TVA, and that the previously approved exemptions for the PSL new fuel storage and handling areas are considered to have expired with the specific Part 70 licenses that had been issued during construction.

10 CFR 70.24(a) requires a monitoring system using gamma- or neutron-sensitive radiation detectors which will energize clearly audible alarm signals, if accidental criticality occurs, to be maintained in each area where licensed special nuclear material (in amounts greater than specified minimum quantities) is handled, used, or stored. 10 CFR 70.24(a)(1) requires coverage of all such areas to be provided by two detectors. The PSL design for each FHB new fuel storage and handling area includes one gamma-sensitive area radiation monitor system which provides both local and control room alarms, and does not designate that system specifically as a "criticality accident monitor." The as-built PSL system was found acceptable by the NRC,^{6, 7} and is consistent with the design and licensing basis described in the Updated Final Safety Analysis Report (UFSAR) for each unit.

Bases for Exemption from 10 CFR 70.24 as it applies to New Fuel Storage and Handling Areas at St. Lucie Units 1 and 2

St. Lucie Unit 1

The new (unirradiated) fuel storage racks are located between the 48' and 62' elevations inside the Fuel Handling Building and consist of 80 cavities arranged in two 4 X 10 arrays. The separation between arrays is approximately 42 inches. The storage cells in each array are spaced

⁵ Letter from Robert A. Herman (NRC) to S.A. White (TVA), Docket Nos. 50-259/260/296: CRITICALITY MONITORING (TAC 00214/00215/00216), Re: Browns Ferry Nuclear Plant, Units 1, 2, and 3; May 11, 1988.

⁶ Safety Evaluation of the St. Lucie Plant Unit No. 1, Docket 50-335: U.S. Atomic Energy Commission Directorate of Licensing, Washington D.C, November 8, 1974.

⁷ NUREG-0843, Safety Evaluation Report related to the operation of St. Lucie Plant, Unit No. 2, Docket No. 50-389: U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation; October, 1981.

on 21-inch centers providing sufficient spacing between assemblies to maintain a subcritical array under the most reactive conditions. Each cell has a hinged top cover and accommodates one 14 X 14 fuel assembly in a vertical position. The new fuel is normally stored in a dry (air) environment which results in an extremely subcritical configuration. The supporting structure is designed to limit deflections so that subcriticality is maintained under all anticipated loadings.

In support of Amendment No. 92 to the PSL1 Facility Operating License DPR-67, FPL provided a safety evaluation and criticality safety analysis of the new fuel storage vault with 4.5 weight-percent (U-235) enriched 14 X 14 fuel assemblies to the NRC for review.⁸ The staff concluded that appropriate acceptance criteria for subcriticality were met to support 4.5 weight percent fuel to be stored in the new fuel storage racks for various degrees of neutron moderation, including the case of full flooding with nonborated water and the limiting case of optimum moderation.⁹ The geometric spacing and the maximum allowed quantities or form of special nuclear material periodically stored in the new fuel racks have not been changed, and the assumptions and conclusions of the referenced analysis remain valid. In addition, administrative controls provide assurance that new fuel is stored in a dry environment which provides further assurance that a potential for criticality does not exist.

St. Lucie Unit 2

The new (unirradiated) fuel storage racks are located between the 48' and 62' elevations inside the Fuel Handling Building and consist of 80 cavities arranged in two 4 X 10 arrays. The separation between arrays is approximately 69 inches. The storage cells in each array are spaced on 23-inch centers providing sufficient spacing between assemblies to maintain a subcritical array under the most reactive conditions. Each cell has a hinged top cover and accommodates one 16 X 16 fuel assembly in a vertical position. Provisions are made for the future storage of 16 additional fuel assemblies. The new fuel is normally stored in a dry (air) environment which results in an extremely subcritical configuration. The supporting structure is designed to limit deflections so that subcriticality is maintained under all anticipated loadings.

In support of Amendment No. 7 to the PSL2 Facility Operating License NPF-16, FPL provided the results of a criticality analysis and description of the method of analysis of the new (unirradiated) fuel storage vault with 4.5 weight-percent (U-235) enriched 16 X 16 fuel assemblies

⁸ Letter L-88-16 from C.O. Woody (FPL) to USNRC/DCD: St. Lucie Unit 1, Docket 50-335, Proposed License Amendment, New Fuel Storage Racks Fuel Assembly Enrichment; January 20, 1986.

⁹ Letter from E.G. Tourigny (NRC) to W.F. Conway (FPL), Docket 50-335: ST. LUCIE UNIT 1 - ISSUANCE OF AMENDMENT RE: U-235 ENRICHMENT INCREASE (TAC NO. 67066); April 5, 1988.

to the NRC for review.¹⁰ Consideration was given to a full range of moderator (non-borated water) densities from mist to full immersion. The results indicated that sufficient margin exists to cover all other uncertainties such as rack dimension and material tolerances to assure a subcritical array (k -effective less than 0.98) assuming the most reactive condition. Although reference to this FPL submittal was not documented in the staff safety evaluation,¹¹ Amendment No. 7 was issued with Technical Specification 5.6.1.b revised to read, "The new fuel storage racks are designed for dry storage of unirradiated fuel assemblies having a U-235 enrichment less than or equal to 4.5 weight-percent, while maintaining a k_{eff} of less than or equal to 0.98 under the most reactive condition." The geometric spacing and the maximum allowed quantities or form of special nuclear material periodically stored in the new fuel racks have not been changed, and the assumptions and conclusions of the referenced analysis remain valid. In addition, administrative controls provide assurance that new fuel is stored in a dry environment which provides further assurance that a potential for criticality does not exist.

Shipping Containers, Fuel Handling, and Storage

New reactor fuel is received only in approved shipping containers. While in the container, the unirradiated fuel is precluded from criticality events due to shipping container construction, number of assemblies per container, and storage configuration. The fuel assemblies are frequently shipped in polyethylene dust wrappers. To preclude any potential neutron moderation that could result from the wrappers filling with water, procedural controls assure that these wrappers are removed from each fuel assembly following unloading from the shipping container and prior to storage.

Handling of reactor fuel assemblies, including removal from the shipping container for receipt inspection and storage in the FHB, is permitted only by the use of approved written procedures. These procedures are designed to process (unload, inspect, and store) only one fuel assembly at a time. In addition, use of current FHB equipment precludes more than one new fuel assembly which is not in an acceptable (designed) fuel assembly location, e.g., the new fuel rack, new fuel elevator, or spent fuel storage pool, from being outside its shipping container strongback/restraint at any given time.

¹⁰ Letter L-84-219 from J.W. Williams (FPL) to J.R. Miller (NRC/NRR), Docket 50-389: Request for Additional Information- Spent Fuel Rack Submittal; August 29, 1984.

¹¹ Letter from Donald E. Sells (NRC) to J.W. Williams (FPL), with enclosed Amendment No. 7 to Facility Operating License No. NPF-16 and related Safety Evaluation, Docket No. 50-389; October 16, 1984.

USNRC Regulatory Guide (RG) 8.12, Criticality Alarm Systems

This guide was issued to describe a system acceptable to the NRC staff for meeting the Commission's requirements for a criticality accident alarm system. The regulatory position taken by the staff, in part, states:

"The guidance on criticality accident alarm systems contained in ANSI/ANS-8.3-1986, 'Criticality Accident Alarm System' is generally acceptable to the NRC staff, subject to the following limitations:

1. Section 70.24 of 10 CFR Part 70 requires alarm coverage 'in each area in which such licensed special nuclear material is handled, used, or stored ...,' whereas paragraph 4.2.1 of the standard states that the need for criticality alarms must be evaluated for such areas. If such an evaluation does not determine that a potential for criticality exists, as for example where the quantities or form of special nuclear material make criticality practically impossible or where geometric spacing is used to preclude criticality, such as in some storage spaces for unirradiated nuclear power plant fuel, it is appropriate to request an exemption from Section 70.24."

The preceding discussions for the new (unirradiated) fuel storage areas for St. Lucie Units 1 and 2 show that criticality is precluded in these areas. Therefore, an exemption from Section 70.24 will be consistent with staff position C.1 of RG 8.12, and is appropriate.

Impact on Public Life or Property, or the Common Defense or Security

Accidental criticality is precluded by the design of the new fuel storage racks, in conjunction with technical specifications which limit the U-235 enrichment to 4.5 weight-percent and require the fuel to be stored in a dry environment, and is further assured by plant administrative controls related to the handling of new reactor fuel. Thus, the absence of criticality accident monitoring systems in the new fuel handling and storage areas of St. Lucie Units 1 and 2 does not pose an undue risk to public health and safety nor endanger life or property. Moreover, a criticality accident monitoring system is not related to the loss or diversion (safeguarding) of special nuclear material or the availability of special nuclear material for defense needs. Therefore, exemption from 10 CFR 70.24 does not endanger the common defense or security.

Conclusion

During construction, FPL received an exemption from 10 CFR 70.24 as part of the special nuclear materials (Part 70) license for each St. Lucie unit. With the exemptions, there was no need for criticality accident monitoring of the new fuel storage and handling areas as described in the regulation, and area radiation monitors, each consisting of only one gamma-sensitive detector

St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Request for Exemption from 10 CFR 70.24

L-97-040
Attachment
Page 6 of 6

with local and remote alarms, were installed in these areas. This design was found acceptable by the NRC and is consistent with the UFSAR for each unit.

Since issuance of the operating license and expiration of the Part 70 license for each unit, there have been no changes in the type of use, storage facilities, or handling methods for special nuclear material that have created new conditions for which compliance with 10 CFR 70.24 in the new fuel handling and storage areas would be necessary. The maximum allowed fuel enrichment has been increased from the time when the Part 70.24 exemptions were previously granted, but the results of criticality analyses accounting for the higher enrichment (4.5 weight-percent U-235) have been docketed for both St. Lucie units and show that an acceptable subcritical margin of unirradiated fuel in the new fuel storage racks is assured under the most reactive conditions.

The requested exemption is authorized by law, and FPL believes that the criteria delineated in 10 CFR 70.14(a) and 10 CFR 70.24(d) for granting such an exemption is satisfied for St. Lucie Unit 1 and St. Lucie Unit 2.