10CFR70.24

**Boston Edison**
Pilgrim Nuclear Power Station
Rocky Hill Road
Plymouth, Massachusetts 02360-5599

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BECo Ltr. 2.98.101

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

Docket No. 50-293
License No. DPR-35

**EXEMPTION REQUEST FROM 70.24(a) CRITICALITY ACCIDENT MONITORING REQUIREMENTS**

Boston Edison Company (BECo) requests exemption from the requirements of 10 CFR 70.24(a), "Criticality Accident Requirements," for Pilgrim Nuclear Power Station under the purview of 10CFR70.24(d). Section 10CFR70.24(d) states:

> Any licensee who believes that good cause exists why he should be granted an exemption in whole or in part from the requirements of this section may apply to the Commission for such exemption. Such application shall specify his reason for the relief requested.

Pilgrim requests this exemption to provide operational flexibility when handling new fuel.

The attachment to this letter provides Pilgrim's responses to the seven NRC criteria provided in SECY 97-155, dated July 21, 1997, and NRC Information Notice 97-77, dated October 10, 1997, concerning the granting of exemptions to 10CFR70.24(a).

The new fuel storage area is included in the scope of this exemption request to preserve flexibility for future activities. The use of the new fuel storage area would require an evaluation of the optimum moderator hypothesis. A precaution in PNPS Procedure No. 4.2, "Inspection and Channeling of Nuclear Fuel", requires an analysis for optimum moderation before the new fuel storage area is used for the storage of new fuel. However, since use of the new fuel area for fuel storage is considered a contingency option, and since there is no current need for using this area, Pilgrim does not intend to pursue an optimum moderator evaluation at this time.

We request you grant this exemption expeditiously to support the arrival of Pilgrim's new fuel in preparation for refueling No.12. Should you require further information on this issue, please contact P.M.Kahler at (508) 830-7939.

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## Attachment

## EXEMPTION REQUEST FROM 70.24(a) CRITICALITY ACCIDENT MONITORING REQUIREMENTS

Pilgrim Nuclear Power Station requests exemption from the requirements of 10 CFR 70.24(a), "Criticality Accident Requirements". Below are Pilgrim's responses to the seven NRC criteria provided in SECY 97-155, dated July 21, 1997, and NRC Information Notice 97-77, dated October 10, 1997, concerning the granting of exemptions to 10CFR70.24(a).

### NRC Criterion # 1

*Plant procedures do not permit more than 3 new fuel assemblies to be in transit between their associated shipping cask and dry storage rack at one time.*

### Pilgrim Response tc # 1

Plant procedures adequately address the storage and transit of new reactor fuel bundles. A summary description of new fuel handling activities and related procedural controls is provided below.

New fuel bundles are transported and received in NRC approved packaging (commonly referred to as shipping containers). Package design for the shipping containers ensures that a geometrical criticality safe configuration is maintained during transport, handling, and storage. Pilgrim considers the metal inner container the approved shipping container for new fuel.

New fuel shipments are stored on the refuel floor in the approved shipping containers until the bundles are inspected and placed in the spent fuel pool. Inspection involves removing individual fuel bundles from the shipping container, placement in the new fuel inspection stand and inspection, installation of fuel channels, and then storage in the spent fuel pool pending use in the reactor. Handling of both new and irradiated fuel is carefully controlled by Pilgrim's fuel handling procedures. Strict limits are established for the maximum number of fuel bundles allowed out of approved storage locations at any given time as prescribed in Pilgrim Procedure No. 4.3, "Fuel Handling". The procedure also identifies approved storage areas for new and irradiated fuel.

Specific limitations regarding the number of new fuel assemblies allowed out of storage are specified in PNPS Procedure 4.3, which prohibits four or more (that is 3 or less) fuel bundles outside of the normal storage areas or properly designed shipping containers (section 6.2.1[7]). This procedural prohibition is consistent with the NRC criteria of allowing no more than three bundles out of storage locations.

In the fuel pool and reactor cavity, no more than 3 fuel bundles are allowed out of storage locations. A specific evaluation must be performed if more than three bundles are desired to be out of storage locations, and for the removal and storage of individual

fuel rods from fuel bundles. These provisions are considered consistent with the NRC criteria.

**NRC Criterion # 2**

*The k-effective of the fresh fuel storage racks filled with fuel of the maximum permissible U-235 enrichment and flooded with pure water does not exceed 0.95, at a 95 percent probability, 95 percent confidence level.*

**Pilgrim Response to # 2**

The maximum design basis k-effective for the new fuel storage racks is 0.95 (flooded condition) as Specified in Chapter 10.2, "New Fuel Storage," and 10.3, "Spent Fuel Storage," of Pilgrim's Updated Final Safety Analysis Report (UFSAR) and Section 4.3 of Pilgrim's Technical Specifications.

Pilgrim's storage racks ensure subcriticality by not allowing any bundle to have a k-infinity larger than that used in the analysis of record as defined in General Electric Standard Application for Reactor Fuel (GESTAR), NEDE-24011-P-A. Additional detail on this methodology is provided in Section 3.5 of NEDE-24011-P-A-13 and is consistent with NRC Criterion 2 and 4.

**NRC Criterion # 3**

*If optimum moderation of fuel in the fresh fuel storage racks occurs when the fresh fuel storage racks are not flooded, the k-effective corresponding to this optimum moderation does not exceed 0.98, at a 95 percent probability, 95 percent confidence level.*

**Pilgrim Response to # 3**

As noted above, the current Pilgrim licensing basis for the new fuel storage racks is described in Chapter 10.2 of the UFSAR and Section 4.3 of Pilgrim's Technical Specifications, and does not include requirements for a hypothesized optimum moderator configuration analysis. Pilgrim has not determined whether the conditions necessary to create such a configuration are credible in Pilgrim's new fuel storage area. Therefore, Pilgrim has not previously attempted to demonstrate conformance with this particular criteria for the new fuel storage area. This general issue has, however, been previously considered in GE Service Instruction Letter (SIL) 152, "Criticality Margins for Storage of New Fuel," which provided a number of recommendations to further reduce the remote probability of a criticality occurrence associated with an optimum moderator configuration.

Pilgrim currently does not use the new fuel storage area because we find the shipping containers provide a more convenient means for temporary storage prior to inspection and placement in the spent fuel pool. Also, direct placement in the fuel pool reduces the number of fuel moves required.

However, to preserve flexibility for future activities, the new fuel storage area is included in the scope of this exemption request. Prior to these racks being used for

storage of new fuel, it would be necessary to revise PNPS Procedure No. 4.2, "Inspection and Channeling of Nuclear Fuel," to reinstate the new fuel storage area. In support of the procedure revision, Pilgrim would evaluate the optimum moderator hypothesis as a prerequisite for use of the new fuel area for storage. This evaluation would consist of an analysis of an optimum moderator configuration, or implementation of administrative or physical barriers similar to those recommended in SIL 152. Procedure 4.2 contains a precaution statement requiring an analysis prior to using the new fuel storage area for the storage of new fuel. Since use of the new fuel area for fuel storage is considered a contingency option, and since there is no current need for using this area, Pilgrim does not intend to pursue an optimum moderator evaluation at this time.

**NRC Criterion # 4**

*The k-effective of spent fuel storage racks filled with fuel of the maximum permissible U-235 enrichment and filled with pure water does not exceed 0.95, at a 95 percent probability, 95 percent confidence level.*

**Pilgrim Response to # 4**

The design basis for the spent fuel storage racks is described in UFSAR Chapter 10.3 and Section 4.3 of the Pilgrim Technical Specifications. As indicated in Section 4.3 the maximum allowed design k-effective for the spent fuel pool is 0.95.

Pilgrim's storage racks ensure subcriticality by not allowing any bundle to have a k-infinity larger than that used in the analysis of record as defined in General Electric Standard Application for Reactor Fuel (GESTAR), NEDE-24011-P-A. Additional detail on this methodology is provided in Section 3.5 of NEDE-24011-P-A-13 and is consistent with NRC Criterion 2 and 4.

**NRC Criterion # 5**

*The quantity of forms of special nuclear material, other than nuclear fuel, that are on site in any given area is less than the quantity necessary for a critical mass.*

**Pilgrim Response to # 5**

Currently, the largest single amount of non-fuel SNM stored in the same area is the SNM storage cage on 91 ft. elevation in the reactor building which contains 6 grams of U-235 sealed in nuclear detectors. The quantity of SNM specified to be enough for a critical mass in Section 1.1 of Regulatory Guide 10.3, "Guide for the Preparation of Applications for Special Nuclear Material Licenses of Less than Critical Mass Quantities", is 350 grams of U-235, 200 grams of U-233, and 200 grams of Pu-239. Therefore, the quantity of SNM in the SNM storage cage is below the amounts for which criticality monitoring would be of concern.

The total quantity of SNM (U-235) in the form of new and used incore detectors is very small and is currently less than 6.5 grams. Pilgrim also has several sources containing small amounts (less than 0.001 grams) of Plutonium-239. Thus, the net total amount of

non-fuel SNM is far below the Regulatory Guide 10.3 values for that necessary for achieving a critical mass. The geometry of the SNM forms (small quantities in multiple individual detectors) is also not conducive to support the formation of a critical configuration.

**NRC Criterion # 6**

*Radiation monitors, as required by GDC 63, are provided in storage and associated handling areas when fuel is present to detect excessive radiation levels and to initiate appropriate safety actions.*

**Pilgrim Response to # 6**

Area radiation monitors (ARMS) are located in the vicinity of the spent fuel storage pool, new fuel handling area of the refueling floor, and in the new fuel storage vault at the next lower elevation. ARMs are permanently installed gamma sensitive radiation monitors designed to detect abnormal radiation levels in plant areas where radioactive material may be present, stored, or handled. These monitors have local area alarm and control room annunciation capability. The alarm function serves to warn operating personnel of equipment malfunctions causing increased radiation levels, and also serves to provide a general radiation hazard warning to plant personnel if abnormal radiation levels occur in the plant area. With regard to personnel safety, the function of the ARM system is included in general employee training, and employees are instructed to immediately vacate the vicinity upon ARM alarms. A description of the operating characteristics of the ARMs is provided in UFSAR Section 7.13, "Area Radiation Monitoring System," and the specific locations of the ARMS, including the subject ARMs mentioned above, is provided in UFSAR Table 7.13-2, "Location of Fixed Area Radiation Monitors." Pilgrim believes these radiation monitors satisfy the objectives of the GDC at Pilgrim in providing a means to detect excessive radiation and to initiate appropriate operational or personnel safety actions. New fuel stored in approved shipping containers does not require monitoring.

**NRC Criterion # 7**

*The maximum nominal U-235 enrichment is 5 wt percent.*

**Pilgrim Response to # 7**

Pilgrim Technical Specification Section 4.3.1.1. states:

The spent fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum k-infinity of 1.32 for standard core geometry, calculated at the burnup of maximum bundle reactivity, and an average U-235 enrichment of 4.6% averaged over the axial planar zone of highest average enrichment.