June 25, 1996

Mr. E. Thomas Boulette, Ph.D
Senior Vice President - Nuclear
Boston Edison Company
Pilgrim Nuclear Power Station
RFD #1 Rocky Hill Road
Plymouth, MA 02360

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - EMERGENCY DIESEL GENERATOR ALLOWED OUTAGE TIME TECHNICAL SPECIFICATION CHANGE (TAC NO. M95277)

Dear Mr. Boulette:

By letter dated April 25, 1996, Boston Edison Company requested changes to the Pilgrim plant's Technical Specifications. Specifically, the proposed changes would allow an outage of up to 14 days for each emergency diesel generator (EDG) in order to perform a preventive maintenance activity requiring disassembly of the EDG during plant operation. The NRC staff has reviewed your request and determined that additional information, as discussed in the enclosure, is necessary in order for the staff to complete its review. We request that you respond as soon as possible in support of your refueling outage schedule.

Questions regarding this request should be sent to me at the letterhead address or you can contact me at (301) 415-1445.

Sincerely,
ORIGINAL SIGNED BY:
Alan B. Wang, Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-293

Enclosure: Request for Additional Information

cc w/encl: See next page

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NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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Alan Wang

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cc:

Mr. Leon J. Olivier
Vice President of Nuclear
Operations & Station Director
Pilgrim Nuclear Power Station
RFD #1 Rocky Hill Road
Plymouth, MA 02360

Resident Inspector
U. S. Nuclear Regulatory Commission
Pilgrim Nuclear Power Station
Post Office Box 867
Plymouth, MA 02360

Chairman, Board of Selectmen
11 Lincoln Street
Plymouth, MA 02360

Chairman, Duxbury Board of Selectmen
Town Hall
878 Tremont Street
Duxbury, MA 02332

Office of the Commissioner
Massachusetts Department of
Environmental Protection
One Winter Street
Boston, MA 02108

Office of the Attorney General
One Ashburton Place
20th Floor
Boston, MA 02108

Mr. Robert M. Hallisey, Director
Radiation Control Program
Massachusetts Department of
Public Health
305 South Street
Boston, MA 02130

Regional Administrator, Region I
U. S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Ms. Jane Fleming
8 Oceanwood Drive
Duxbury, MA 02332

Mr. Jeffery Keene
Licensing Division Manager
Boston Edison Company
600 Rocky Hill Road
Plymouth, MA 02360-5599

Ms. Nancy Desmond
Manager, Reg. Affairs Dept.
Pilgrim Nuclear Power Station
RFD #1 Rocky Hill Road
Plymouth, MA 02360

Mr. David F. Tarantino
Nuclear Information Manager
Pilgrim Nuclear Power Station
RFD #1, Rocky Hill Road
Plymouth, MA 02360

Ms. Kathleen M. O'Toole
Secretary of Public Safety
Executive Office of Public Safety
One Ashburton Place
Boston, MA 02108

Mr. David Rodham, Director
Massachusetts Emergency Management
Agency
400 Worcester Road
P.O. Box 1496
Framingham, MA 01701-0317
Attn: James Muckerheide

Chairmen, Citizens Urging
Responsible Energy
P. O. Box 2621
Duxbury, MA 02331

Citizens at Risk
P. O. Box 3803
Plymouth, MA 02361

W. S. Stowe, Esquire
Boston Edison Company
800 Boylston St., 36th Floor
Boston, MA 02199

Chairman
Nuclear Matters Committee
Town Hall
11 Lincoln Street
Plymouth, MA 02360

Mr. William D. Meinert
Nuclear Engineer
Massachusetts Municipal Wholesale
Electric Company
P.O. Box 426
Ludlow, MA 01056-0426

REQUEST FOR ADDITIONAL INFORMATION
EMERGENCY DIESEL GENERATOR ALLOWED OUTAGE TIME
PILGRIM NUCLEAR POWER STATION

1. Provide details of scheduled periodic inspection with approximate time required and frequency of performing each action. Also, provide total maximum time required in the past to complete inspections and overhaul.

2. Because of the potential safety impact of the extended emergency diesel generator (EDG) allowed out-of-service time (AOT) for preventive maintenance (PM), the staff believes that the plant should have an alternate ac (AAC) power source which can be substituted for the inoperable EDG. Additionally, certain compensatory measures are needed during the extended EDG AOT to assure safe operation of the plant. Provide a discussion of how you would address each condition listed below as related to Pilgrim Nuclear Power Station.

   a. The Technical Specifications (TS) should include verification that the systems, subsystems, trains, components, and devices that depend on the remaining EDG as a source of emergency power are operable before removing an EDG for PM. In addition, positive measures should be provided to preclude subsequent testing or maintenance activities on these systems, subsystems, trains, components, and devices while the EDG is inoperable.

   b. Before taking an EDG out for an extended period to perform maintenance, the AAC source should be verified: functional and is capable of being connected to the safety bus associated with the EDG to be taken out of service prior to the start of PM and once every shift thereafter.

   c. Voluntary entry into a limiting condition of operation (LCO) action statement to perform PM should be contingent upon a determination that the decrease in plant safety is small enough and the level of risk is acceptable for the period and is warranted by operational necessity.

   d. Voluntary entry into an LCO action statement should not be abused by repeated entry into and exit from the LCO.

   e. Voluntary removal from service of safety systems and important non-safety equipment, including offsite power sources, should be precluded during the outage of the EDG for PM.

ENCLOSURE

f. Component testing or maintenance that increases the likelihood of a plant transient should be avoided; plant operation should be stable during the EDG PM.

3. As stated in the April 25, 1996, letter from the licensee, the purpose of the requested amendment is to allow an increased outage time during plant power operation for performing EDG inspection and overhaul, which would include disassembly of the EDG. The staff is concerned that disassembly of an EDG would require subsequent pre-operational testing of the EDG (such as full load rejection tests) following this maintenance. This would imply that such testing would have to be performed while the plant is operating instead of during shutdown, which has been the past practice. In order to resolve this concern, the following should be addressed:

   a. What would be the typical and worse-case voltage transients on the 4160-V safety buses as a result of a full-load rejection?

   b. If a full-load rejection test were used to test the EDG governor after maintenance, what assurance would there be that an unsafe transient condition on the safety bus (i.e., load swing or voltage transient) due to improperly performed maintenance on or repair of a governor would not occur?

   c. Using maintenance and testing experience on the EDG, identify any other possible transient conditions caused by improperly performed maintenance on the EDG governor and voltage regulator. Predict the electrical system response to these transients.

   Also, the licensee should provide a description of the tests to be performed after the overhaul to declare the EDG operable and provide justification for performing those tests at power.

4. Provide the calculated total core damage frequency (CDF) resulting from all probabilistic safety assessment (PSA) sequences involving station blackout (SBO) before and after the SBO Rule (10 CFR 50.63) implementation. Also provide the calculated total CDF from all SBO sequences after accounting for the increase in EDG unavailability due to the extended allowed outage time requested. Provide the instantaneous change in the CDF value for the worst-case plant configuration allowed under the proposed Specification. Explain how the EDG PM and subsequent on-line operability testing is treated in the CDF calculation.

5. Provide the EDG reliability and availability values used in the PSA analysis to calculate the SBO CDF values requested in Question 4 above. Discuss these in relation to any goals associated with the implementation of the maintenance rule and in comparison with actual past performance of the EDG's at the plant. Also compare the values used in the PSA analysis to the target values committed to for SBO.

6. The condition of offsite sources of electrical power prior to and during an extended EDG outage have additional importance. Discuss what considerations should be given to not performing a proposed extended maintenance when the offsite grid condition or configuration is degraded or when adverse or extreme weather conditions (e.g., high winds, lightning, icing conditions) are expected. Discuss how planning of an extended EDG maintenance should consider the time needed to complete the extended EDG maintenance and the ability to accurately forecast weather conditions that are expected to occur during the maintenance. Discuss what, if any, contingency plans should be developed to restore the inoperable EDG in the event of unanticipated adverse weather or degraded grid conditions occurring which can significantly increase the probability of losing offsite electrical power.

7. The NRC staff expects that licensees will have addressed three aspects, or tiers, in proposing risk-informed modifications and associated amendments.

   In the first tier, the licensee is expected to determine the change in plant operational risk (specifically, the change in core damage frequency (CDF) and core damage probability (CDP)) as a result of the proposed TS modification and discuss its significance. Credit for any compensatory actions should be explicitly quantified and substantiated. In addition, in order to better understand the impact of the amendment on containment performance, the staff expects the licensee to perform an analysis of the large early release frequency (LERF) under the modified TS conditions and discuss the results or, if applicable, an analysis of offsite consequences.

   The second tier should provide reasonable assurance that risk-significant plant equipment outage configurations will not occur while the plant is subject to the Limiting Condition for Operation (LCO) proposed for modification.

   The third tier should assure that, before performing maintenance activities including removal of any equipment from service, the licensee will perform a thorough assessment of the overall impact on safety functions of related TS activities, as required by the proposed Maintenance Rule. This should be an intrinsic part of all maintenance scheduling, and involve risk insights.

The staff's review consists of an assessment of (1) the appropriateness of licensee activities in each tier, (2) the applicability of the licensee's probabilistic risk assessment (PRA) methodology to support the proposed TS change, and (3) an evaluation of the impact of the proposed TS change on plant operational risk and containment performance, and the adequacy of licensee proposed compensatory measures.

The staff's final recommendation will be based upon the licensee's commitment to the compensatory measure, insights and findings from the PRA model, and the adequacy of relevant portions of the licensee's program to meet the requirements of the Maintenance Rule, which will be in effect as of July 1996.

Three sets of questions that correspond to these three tiers have been developed as follows:

7.a Tier 1

(a) Probabilistic Safety Assessment (PSA), or Probabilistic Review Assessment (PRA)

What are the success criteria for the station blackout (SBO) condition at Pilgrim for the three loss of offsite power (LOSP) conditions: plant centered, grids, and severe weather?

What review of the PRA has been made to ensure that the PRA represents the as-built, as-operated plant, and contains the fine structure (resolution) necessary to evaluate the proposed TS requirements? Were any changes made to the PRA due to such reviews?

Your current PRA may be different from your IPE. Explain any major differences, specifically with respect to LOSP/SBO sequences. Include quantitative results and bases for any credit taken which impacted the LOSP/SBO contribution to CDF and/or LERF.

Please provide the minimal cut set truncation cutoff used to quantify the plant CDF changes. In particular, indicate what efforts were made to avoid underestimation when the impact calculated was negligible or non-existent.

Provide a discussion of the LOSP events at your facility.

Discuss the impact of severe weather on switchyard condition and offsite power at your facility and how this was addressed in the PRA. Are you committed to any of the severe weather shutdown requirements and procedures of NUMARC 87-00? What requirements do you plan in order to avoid entering the 14 day AOT if severe weather is anticipated? What is the contribution of severe weather to SBO-induced core damage.

Please describe the peer reviews performed on your PRA. Indicate which reviews were performed in-house versus those performed by outside consultants. Summarize their overall conclusions and insights.

(b) Quantitative results

Please provide the following calculations and quantitative PRA results due to the AOT extension with and without credit taken for compensatory actions (or plant improvements) not credited in the IPE submitted to the NRC in response to GL 88-20.

(1) Change in average CDF ($\Delta m(CDF)$):

$m(CDF)$ = average CDF (per year)

$m_2(CDF)$ = The conditional m(CDF) with the proposed 14 day AOT in place

$m_1(CDF)$ = The original m(CDF) with the current 3 day AOT in place

Therefore, $\Delta m(CDF) = m_2(CDF) - m_1(CDF)$

(2) Change in instantaneous CDF (ΔCDF_i):

$CDF_i(2)$ = The conditional CDF when the plant is in the AOT

$CDF_i(1)$ = The CDF when the plant is not in the AOT

i = AOT configuration with one EDG unavailable

Therefore, $\Delta CDF_i = CDF_i(2) - CDF_i(1)$

(3) Change in conditional core damage probability ($\Delta CCDP$):

CCDP(2) = The CCDP while the plant is in the AOT

CCDP(1) = The CCDP while the plant is not in the AOT

Therefore, $\Delta CCDP = CCDP(2) - CCDP(1)$

(4) Change in average large early release frequency ($\Delta LERF$)

LERF(2) = LERF with proposed AOT in place

LERF(1) = LERF with current AOT in place

Therefore, $\Delta LERF = LERF(2) - LERF(1)$

What are the projected average corrective maintenance and preventive maintenance downtimes for EDGs used in your calculations? Explain how they were obtained. Have you performed any sensitivity analyses on your corrective maintenance (CM) and preventive maintenance (PM) downtimes that affect the risk results in the previous question? If so, please discuss insights gleaned from the study.

Have you performed any sensitivity analyses for this requested AOT change? If so, discuss how the results of your evaluation, consideration and uncertainty ensure the PRA results in your application are robust and that the plant will not be subject to an unexpected sudden increase in the risk profile.

7.b Tier 2

Given the AOT plant configuration, what does your PRA indicate are the other risk-significant systems? Is the significance the same for each EDG, or EDG combination? Please discuss any differences.

For the other risk-significant systems you identified above, how would you ensure that no risk-significant plant equipment outage configurations would occur while the plant is subject to the LCO proposed for modification? Are the bases for this assurance reflected in your administrative procedures or FSAR?

Have you thoroughly reviewed your TS to see if there is a need for any other changes to your TS or (in addition to the TS amendment items you are currently requesting) due to your request for an EDG AOT of 14 days? Please identify any administrative procedure or FSAR changes made to ensure that the plant will not enter any risk-significant configuration while in the AOT.

7.c Tier 3

Describe your ability to perform a contemporaneous assessment of the overall impact on safety functions before conducting maintenance activities including removal of any equipment from service. Please explain how this tool, or other processes, will be used to ensure that risk-significant plant configurations will not be entered during the AOT. Please describe how this tool and its use will be incorporated in the Administrative Procedures, TS Bases or FSAR.

Explain how you are going to address the issue of configuration control, consistent with the Maintenance Rule, i.e., evaluate the impact of maintenance activities on plant configurations.