



Entergy Nuclear Generation Company
Pilgrim Nuclear Power Station
600 Rocky Hill Road
Plymouth, MA 02360

J. F. Alexander
Director
Nuclear Assessment

10 CFR 50.73

August 14, 2000
ENG C Ltr. 2.00.006

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

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

The enclosed supplemental Licensee Event Report (LER) 98-021-01, "Inadequate Emergency Diesel Generators Fuel Supply," is submitted in accordance with 10 CFR Part 50.73.

This supplemental report is submitted in accordance with a commitment in the original report. As discussed in the enclosed supplemental LER, design basis fuel supply concerns for the emergency diesel generators have been resolved by receipt of License Amendment No. 184, issued on March 17, 2000. The license amendment also resolves a related single-failure vulnerability concern reported in LER 98-001-00.

This letter contains no commitments.

Please do not hesitate to contact me if there are any questions regarding this report.

Sincerely,

J. F. Alexander

JRH/

Enclosure

cc: Mr. Hubert J. Miller
Regional Administrator, Region 1
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

INPO Records
700 Galleria Parkway
Atlanta, GA 30339-5957

Sr. NRC Resident Inspector
Pilgrim Nuclear Power Station

IE22

LICENSEE EVENT REPORT (LER)

(See reverse for number of digits/characters for each block)

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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Title (4)
Inadequate Emergency Diesel Generators Fuel Supply

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER	
09	02	1998	1998	021	01	08	14	00	N/A	05000	
									N/A	05000	
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (Check one or more) (11)									
N		20.2201 (b)			20.2203(a)(2)(v)			50.73(a)(2)(i)		50.73(a)(2)(viii)	
POWER LEVEL (10)		22.2203(a)(1)			20.2203(a)(3)(i)			X 50.73(a)(2)(ii)(B)		50.73(a)(2)(x)	
100		20.2203(a)(2)(i)			20.2203(a)(3)(ii)			50.73(a)(2)(iii)		73.71	
		20.2203(a)(2)(ii)			20.2203(a)(4)			50.73(a)(2)(iv)		OTHER	
		20.2203(a)(2)(iii)			50.36(c)(1)			50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A	
		20.2203(a)(2)(iv)			50.36(c)(2)			50.73(a)(2)(vii)			

LICENSEE CONTACT FOR THIS LER (12)

NAME James R. Haley - Regulatory Affairs Senior Engineer	TELEPHONE NUMBER (Include Area Code) (508) 830-8143
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	NO	EXPECTED SUBMISSION DATE(15)	MONTH	DAY	YEAR
X					

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On September 2, 1998, while revising original calculations for emergency diesel generator (EDG) fuel consumption, the tech spec required minimum of 19,800 gallons in each main fuel tank was determined to be insufficient for electrical loads assumed in the UFSAR. The EDGs were operable based on load management using emergency operating procedures.

The root cause analysis determined the original Architect-Engineer (A-E) calculations were non-conservative and focused on minimizing fuel consumption. Contributing causes included process weakness that permitted changes to electrical load analyses without assessing the direct impact on EDG fuel consumption, and failure to detect an error in the original A-E calculations.

Corrective actions were taken to revise the calculation control process to ensure consistency with the UFSAR and ensure EDG load changes are addressed in fuel capacity calculations. A proposed license amendment was submitted and approved. The amendment permits the use of additional on-site stored fuel to resolve the EDG fuel supply concerns.

This condition was identified while at 100 percent reactor power with the reactor mode selector switch in the RUN position. The reactor vessel pressure was approximately 1034 psig with the reactor water at the saturation temperature for that pressure. This condition posed no threat to public health and safety.

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REASON FOR SUPPLEMENT

This supplementary report is submitted in accordance with our commitment made in the original report. This report describes corrective actions taken to resolve the design basis emergency diesel generator (EDG) on-site fuel supply concerns. A proposed license amendment (Ltr. 2.99.029), submitted on May 5, 1999, was approved on March 17, 2000. The amendment resolves the EDG fuel supply concern.

BACKGROUND

The safety objective of the standby AC power source is to provide a source of on-site AC power adequate for the safe shutdown of the reactor following abnormal operational transients and postulated accidents assuming a complete loss of off-site power. Two emergency diesel generators (EDGs) and their associated fuel supply systems provide this source of standby AC power.

The fuel supply associated with each EDG (X-107A/B) consists of a separate main fuel storage tank (T-126A/B) with a capacity of approximately 25,000 gallons, a transfer pump (P-141A/B), and a day tank (T-124A/B) with a capacity of approximately 600 gallons. Provisions exist for manually cross-connecting the independent EDG fuel systems. The design basis for the on-site fuel supply is to support EDG operations for seven days following a loss-of-offsite power (LOOP) to achieve and maintain safe shutdown of the reactor under accident conditions. A minimum supply of 19,800 gallons per tank was established and used as the basis for Technical Specification (TS) 3.9.A.3 to ensure the design basis requirements were met.

In 1987, an Engineering Service Request (ESR 87-585) was generated to establish the basis for T.S. 3.9.A.3 (minimum 19,800 gallons/tank). The Architect-Engineer and Constructor, Bechtel, was contacted regarding the derivation of the 19,800 gallon requirement. In addition, safety-related calculation S&SA-55, "Minimum Onsite Diesel Fuel Requirement," was prepared to verify that as of 1987, the original basis (19,800 gallons per tank) was still valid. An Engineering Response Memorandum (ERM 87-526), which responded to ESR 87-585, contained both the Bechtel correspondence and calculation S&SA-55 as supporting documentation.

In 1989, Information Notice 89-50, "Inadequate Emergency Diesel Generator Fuel Supply," was issued. The notice was evaluated for the adequacy of the EDG fuel supply. The evaluation referenced ESR 87-585 and ERM 87-526 and concluded no further action was required to address IN 89-50.

Early in 1998, during a review of calculation S&SA-55 (rev. 5) several inconsistencies in design assumptions and UFSAR statements were identified. Assumptions concerning operator actions had been made in S&SA-55 resulting in non-conservative conclusions regarding the minimum EDG fuel requirements. It was assumed that operators would turn off several large pumps shortly into the event, thus minimizing the required quantity of fuel. Upon correcting the

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assumptions to be consistent with UFSAR Chapter 14 analyses, it was realized that the resultant increase in fuel consumption required the availability of both fuel tanks (T-126A/B). Therefore, the fuel transfer cross-connection capability would be required during the accident response to supply fuel to the diesel carrying the greatest load. At that time, it was discovered that a single-failure vulnerability existed in the cross-connection.

The single-failure concern was documented in a corrective action program document (PR 98.9052) and actions were initiated to address the single-failure vulnerability. Specifically, the failure of a main storage tank suction check valve (38-CK-101A/B) could prevent drawing fuel from the respective fuel tank (T-126A/B). LER 98-001-00, "Single-Failure Vulnerability of the Emergency Diesel Generator Fuel Oil Supply System," was submitted on March 3, 1998, describing the condition.

Engineering evaluation (EE) 98-011, Supplement 1, provided the basis for concluding the EDGs were operable for the potential single-failure condition. The Technical Specification 3.9.A.3 required minimum of 19,800 gallons of fuel in each EDG fuel tank was sufficient to ensure that either EDG could operate at specified loads, using emergency operating procedures (EOPs), for seven days without delivery of fuel from off-site sources. Administrative controls are in place to manually transfer fuel using the cross-connection, if required.

A root cause analysis (PR 98.9052.01) was performed as part of the corrective actions associated with LER 98-001-00. The root cause was determined to be a procedure used in 1987 that did not require calculation assumptions to be in accordance with the UFSAR. A contributing cause was the assumed independence of the EDGs, including the supply tanks (T-126A/B), and therefore, the Technical Specification 3.9.A.3 quantity of 19,800 gallons of fuel per tank must be adequate. As part of corrective actions, the design basis information project established criteria to require that assumptions used are in accordance with the UFSAR. Another corrective action addressed the fuel impact of new electrical loads which had been added to the EDGs since the original calculation was performed.

EVENT DESCRIPTION

On September 2, 1998, while revising calculation S&SA-55 (to rev. 6), original design calculations for EDG fuel consumption and supply were reviewed. It was discovered that a case requiring more fuel had not been included in the original Architect-Engineer (Bechtel) calculations for sizing tanks T-126A/B. The original calculations focused on the minimum quantity of fuel required on-site for both EDGs to ensure safe shutdown. Furthermore, assumptions used in the original calculations were non-conservative and inconsistent with the corresponding assumptions in UFSAR Chapter 14 (Accident Analyses). The Bechtel calculations assumed fewer AC powered core standby cooling system (CSCS) pumps operating than does UFSAR Chapter 14 when two EDGs are operating.

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As previously stated, the bounding seven day fuel consumption assumptions should have been consistent with UFSAR Chapter 14. Based on these revised assumptions, a minimum of 48,000 gallons is required, rather than the 34,000 gallons originally calculated for two EDGs. This value exceeds the original Technical Specification fuel requirement of 39,600 gallons that had been used as a conservative measure to ensure at least 17,000 gallons per EDG was available.

Problem report (PR) 98.9462 was written to document this concern and to initiate corrective actions. An engineering evaluation (EE 98-0076) provided the basis for an operability evaluation (OE 98-08) which concluded that, using approved EOPs, sufficient fuel was available in each tank (T-126A/B) to achieve safe shutdown following postulated accidents.

The NRC Operations Center was notified in accordance with 10 CFR 50.72(b)(1)(ii)(B), at 1844 hours on September 2, 1998, for a condition that was outside the design basis.

Subsequently, a more limiting fuel consumption case was identified and documented in PR98.9530. Engineering evaluation EE 98-083 was prepared to provide a basis for operability. This evaluation incorporated both EE 98-011 and EE 98-076 and supported operability evaluation OE 98-067. A standing order was written to require that the emergency response organization prepare a fuel management strategy to ensure the available fuel lasts seven days.

This condition was identified while at 100 percent reactor power with the reactor mode selector switch in the RUN position. The reactor vessel pressure was approximately 1034 psig with the reactor water at the saturation temperature for that pressure.

CAUSE

The root cause analysis determined the original Architect-Engineer's (Bechtel) design basis calculations used non-conservative assumptions regarding operator actions and electrical loads that would be powered in response to a design basis recirculation pipe break loss-of-coolant accident (LOCA) over the first seven days. These assumptions focused on minimum EDG fuel requirements and were not consistent with those used in the UFSAR Chapter 14 accident response (with both EDGs operating).

Contributing causes were: failure to consider the impact on fuel requirements for new electrical loads added to the EDGs through changes to electrical load analyses; failure to detect a separate error in the original Bechtel calculation; and failure to reverify the accuracy of the conclusion of the original calculations.

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CORRECTIVE ACTIONS TAKEN

Previous corrective action taken included revision of Procedure 2.2.8, "STANDBY AC POWER SYSTEM (DIESEL GENERATORS)." The revision (to rev. 47) added Attachment 8, "DIESEL OIL TRANSFER OPERATIONS WITH ALTERNATE SUCTION PATHS." Subsequent corrective actions taken include:

- Procedure 2.2.8 was revised (to rev. 54). The revision added ATTACHMENT 9, "DIESEL OIL TRANSFER FROM SBO DIESEL STORAGE TANKS TO EDG STORAGE TANKS," and ATTACHMENT 10, "EDG FUEL MANAGEMENT STRATEGY." These changes include an EDG fuel management strategy to ensure adequate fuel is available for both EDGs.
- A maximum bounding EDG fuel consumption calculation (S&SA-55 rev. 6) established the required quantity of fuel to support EDG operation at overload conditions for seven days. The revised quantity is 36,800 gallons per EDG.
- License Amendment No. 184, issued March 17, 2000, permits the use of the Station Blackout Diesel Generator (SBODG) fuel supply to augment the EDG fuel supply. The use of the existing on-site SBODG fuel supply provides the revised design basis quantity of 36,800 gallons of fuel for each EDG. Revisions to UFSAR sections 8.5 and 8.10 were made to clarify the use of SBODG fuel to permit the operation of both EDGs during a design basis accident response.

SAFETY CONSEQUENCES

This condition did not pose a threat to public health and safety.

Sufficient fuel has been available in each EDG fuel tank to provide approximately 4 days of operation for each diesel at full rated load and 7 days at managed load.

A comprehensive engineering evaluation EE 98-083, encompassing EE 98-011 and EE 98-076 provided the basis for operability evaluation OE 98-067. This evaluation provided an acceptable basis for use of two EDGs during an accident response. Revisions were made to the EDG procedure and a standing order (SO-98-03, rev. 3) was written to direct the emergency response organization to develop a fuel utilization strategy within 24 hours. These changes, along with implementation of License Amendment 184, ensure sufficient fuel is available for EDG operation.

The ability to use the additional on-site fuel provides greater accident response flexibility than previously existed and therefore, improves the safe operation of Pilgrim Station.

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REPORTABILITY

This report is submitted in accordance with 10 CFR 50.73(a)(2)(ii)(B) because the EDG fuel supply represented a condition that was outside the design basis.

SIMILARITY TO PREVIOUS EVENTS

A review was conducted of Pilgrim Station LERs submitted since 1994. The review focused on LERs submitted in accordance with 10 CFR 50.73(a)(2)(ii)(B) involving the EDG fuel supply system. The review identified LER 98-001-00, "Single-Failure Vulnerability of the Emergency Diesel Generator Fuel Oil Supply System."

ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) CODES

The EIIS codes for this report are as follows:

COMPONENTS	CODES
Generator, diesel Tank	DG TK
SYSTEMS	
Emergency on-site power supply system	EK
Fuel receiving storage, and transfer system	DE