

Omaha Public Power District
1623 Farney Omaha, Nebraska 68102
402/536-4000

December 28, 1984
LIC-84-413

Mr. Darrell G. Eisenhut, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Division of Licensing
Washington, D.C. 20555

- References: (1) NRC Generic Letter 84-15 dated July 2, 1984
(2) Letter from OPPD (R. L. Andrews) to NRC (Mr. D. G. Eisenhut) dated August 6, 1984
(3) Letter from NRC (D. G. Eisenhut) to OPPD (R. L. Andrews) dated September 20, 1984
(4) Docket No. 50-285

Dear Mr. Eisenhut:

Diesel Generator Reliability
Generic Letter 84-15

The Omaha Public Power District received the Commission's letter dated July 2, 1984, (Reference 1). Accordingly, the District requested a time extension until December 15, 1984 (Reference 2). This request was granted in Reference 3. Pursuant to 10 CFR 50.54(f), please find attached, under oath or affirmation, forty (40) copies of the information requested in Reference 1. The information is presented as Enclosures corresponding to the Enclosures of Reference 1. The pertinent request is restated, followed by the District's response.

Recent telephone conversations were held with Fort Calhoun's Project Manager (Mr. E G. Tourigny) to discuss problems which arose during the management review of this submittal. In some cases, additional review is being conducted. These items are denoted where appropriate in the

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Mr. Darrel, G. Eisenhut
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enclosures. If the results of the additional review alter any information presented herein, it will be submitted by January 25, 1985.

Sincerely,



R. L. Andrews
Division Manager
Nuclear Production

RLA/DJM/rh-DD

Enclosures

cc: LeBoeuf, Lamb, Leiby & MacRae
1333 New Hampshire Avenue, N.W.
Washington, D.C. 20036

Mr. E. G. Tourigny, NRC Project Manager

Mr. L. A. Yandell, Senior Resident Inspector

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)
)
Omaha Public Power District) Docket No. 50-285
(Fort Calhoun Station,)
Unit No. 1))

AFFIDAVIT

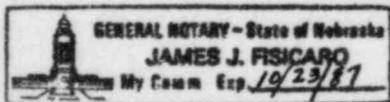
R. L. Andrews, being duly sworn, hereby deposes and says that he is Division Manager - Nuclear Production of the Omaha Public Power District; that he is duly authorized to sign and file with the Nuclear Regulatory Commission the attached response to Generic Letter 84-15 dated July 2, 1984; that he is familiar with the content thereof; and that the matters set forth therein are true and correct to the best of his knowledge, information and belief.

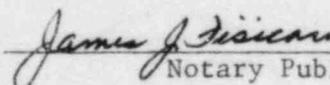


R. L. Andrews
Division Manager
Nuclear Production

STATE OF NEBRASKA)
) ss
COUNTY OF DOUGLAS)

Subscribed and sworn to before me, a Notary Public in and for the State of Nebraska on this 28 day of December, 1984.




Notary Public

Generic Letter 84-15
Enclosure 1

Reduction In Number Of Cold Fast Starts
Surveillance Tests For Diesel Generators

NRC Request - Fast Start Testing

"Licensees are requested to describe their current programs to avoid cold fast starts or their intended actions to reduce the number of cold fast surveillance tests from ambient conditions for diesel generators. Licensees are encouraged to submit changes to their Technical Specification to accomplish a reduction in the number of such fast starts."

District's Response

Late in 1983, the Omaha Public Power District received the Commission's Generic Letter 83-41, a request for information concerning the fast cold starts of diesel generators (i.e., starts with rapid acceleration and loading without prelubrication and warmup). In a letter dated January 6, 1984 (LIC-84-002), the District stated that the emergency diesel generators at Fort Calhoun Station are provided with prelubrication and warmup capabilities. The District also stated that our diesels are kept warm and ready for starting by a water jacket immersion heater. In addition, a lube oil pump circulates oil when the diesel is not operating. This oil is warmed by flowing through the lube oil heat exchanger. Based on these reasons, we concluded our system did not experience cold fast starts and that concerns expressed regarding cold fast starts of diesel generators affecting reliability and availability were not applicable to the Fort Calhoun Station.

Since that time, in response to NRC Generic Letter 84-15, the District has had a number of conversations with the diesel engine manufacturer. These conversations indicate that our diesels are, in fact, subjected to cold fast starts. This is because our preheat and continuous lube oil pump do not eliminate cold fast starts. Based upon the conclusion that the Fort Calhoun Station diesels are, at this time, subjected to cold fast starts, the District responds to the NRC's request for information as follows.

Fort Calhoun Station's cold fast start surveillance testing program is based on the present Technical Specification requirements. The Technical Specifications require a monthly cold fast start on each of the two diesel generators when not in a refueling shutdown, following each diesel generator's annual overhaul and prior to each reactor startup if not performed within the previous week. Please note that the diesel generators are equipped with a continuously operated engine warming and lube oil circulation system to help minimize the stresses on the system.

The present cold fast start program results in approximately 10 to 16 cold fast starts per calendar year, depending on the length of the refueling outages, length of fuel cycle, and number of unit outages during the fuel cycle. At the present time, the Technical Specifications permit no reduction in the cold fast start test program. The District will investigate Technical Specification changes and will submit revisions (if warranted).

NRC Request - Other Diesel Generator Testing

The staff is also concerned about a number of additional diesel generator tests currently required by Technical Specifications of some of the earlier licensed plants. "The affected licensees are encouraged to propose Technical Specifications to make such changes."

District's Response

Other testing of both diesel generators at the Fort Calhoun Station is currently required by the Technical Specifications and the Surveillance test program. The Technical Specifications require starting of at least one diesel generator (done to idle speed and not loaded) on loss of both auxiliary power transformers, loss of both house service transformers, loss of a 4.16 kV safety bus, loss of a diesel generator, or loss of containment cooling equipment. Additionally, a cold fast start is required as part of an undervoltage surveillance test in order to verify initiating circuits.

The District plans to review these Technical Specifications and the Surveillance test as a part of the effort described above for Cold Fast Starts. If any changes are believed to be warranted, they will be submitted.

Generic Letter 84-15
Enclosure 2

Diesel Generator Reliability Data

NRC Request - Reliability Data

Licensees are requested to report the reliability of each diesel generator at the plant for its last 20 and 100 demands. This should include the number of failures in the last 20 and 100 valid demands indicating the time history for these failures. Licensees are requested to indicate whether they maintain a record which itemizes the demands and failures experienced by each diesel generator unit, in the manner outlined in Regulatory Guide 1.108, Position C.3.a., for each diesel generator unit. Licensees should also indicate whether a yearly data report is maintained for each diesel generator's reliability. The criteria for determining the reliability of diesel generators is as follows:

- a. Valid demands and failures are to be determined in accordance with the recommendations of Regulatory Guide 1.108, Position C.2.e.
- b. The reliability of each diesel generator will be calculated based on the number of failures in the last 100 valid demands."

District Response

The District compiled a listing of the operating history for the diesel generators at Fort Calhoun. As noted in the cover letter, this information is currently under review. This listing was compiled in accordance with Regulatory Guide 1.108, Position C.2.e, with the following deviation:

A valid successful run was one in which the diesel was loaded to greater than 50% rated load for 40 minutes or more, and at the end of the run was shut down voluntarily, not to avoid damage due to a component failure.

The deviation above was necessary in order to compile an acceptable number of starts as requested by the generic letter. Data prior to 1977 were not included because operating procedures at that time did not require running the diesels more than 15 minutes. This produced misleading information for that time period which did not accurately reflect reliability history.

The reliability, utilizing criteria of Regulatory Guide 1.108 and the above stated deviation, yields figures of approximately 88.6% for DG-1 and 93.6% for DG-2. For the last 20 demands, the reliability was 90% for DG-1 and 90% for DG-2. The attachment to this enclosure summarizes the time history and cause of the failures as currently reviewed. If any additional information impacts the conclusions of this enclosure, it will be submitted by January 25, 1985.

The District does not at this time maintain a record in the manner outlined in Regulatory Guide 1.108, Position C.3.a, which itemized the demands and failures experienced by each diesel generator unit. At the present time we do not maintain a yearly report of each diesel generator's reliability. Upgrades to our methods of recordkeeping are under consideration and are discussed further in Enclosure 3.

DIESEL GENERATOR FAILURES

<u>DG-1</u>	<u>CAUSE</u>
06/16/78	100 Amp Fuse Failure
07/05/78	Generator Exciter Malfunction
07/07/78	Exciter Control
08/09/78	Exciter Control
07/09/80	Transformer Failure
09/10/80	Transformer Failure
11/05/80	Relay Contact Stuck
12/11/80	Secondary Air Start Motor Dirty
07/06/81	Speed Sensor Failure
11/11/83	Exciter Control Speed Sensor Controls
07/11/84	Governor Adjustment
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DG-1 Valid Tests	96
Failures	11

<u>DG-1</u>	<u>CAUSE</u>
11/27/78	Breaker Failure
01/22/80	Zener Diode Failure
01/22/80	Radiator Tube Leak
03/24/82	Coolant Leak
05/19/82	Pushbutton Failure
09/21/83	Exciter Control
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DG-2 Valid Tests	93
Failures	6

Attachment to
Enclosure 2

Enclosure 3

Diesel Generator Reliability

NRC Request - Reliability Improvement Program

Licensees were requested to "...describe their diesel generator reliability improvement program, if any, for attaining and maintaining a reliability goal. The program description should address the surveillance and testing the licensee performs to demonstrate the selected diesel generator reliability. All licensees have received the staff's previous letter transmitting the findings of NUREG/CR-0660, identifying areas where diesel generator operational problems were occurring in general. Licensees should consider the results of NUREG/CR-0660 in their reliability program. The staff has developed an example for a diesel generator reliability Technical Specification to support the maintenance of diesel generator reliability at a specified level. The proposed specification encompasses certain aspects of the existing requirements for surveillance testing of diesel generators stipulated in Regulatory Guide 1.108, and the qualitative recommendations of NUREG/CR-0660. This performance specification is presented, as an example, in the attachment. Licensees are requested to comment on and/or compare their program with the performance specifications and provide comments for staff consideration in finalizing surveillance testing requirements for diesel generators."

District's Response

At the Fort Calhoun Station, the diesel generator reliability program consists of three parts: operational testing, annual overhaul, and failure analysis. In addition, the District also has a fuel oil quality program.

The operational testing is a monthly surveillance testing and check program which verifies 10-second full-speed starts, manual starts, loading, and fuel oil transfer system. During each refueling the automatic operation, including sequencing of engineered safety features loads, is verified.

The annual overhaul consists of maintenance, calibration, inspection, and operation. Recommended maintenance is performed; i.e., filter change out and lubricating oil analysis as recommended for standby service. Diesel generator instrumentation is calibrated and checked for proper operation. The engine and generator are inspected for abnormal wear or deterioration. After completion of the preceding three areas, the engine and generator are checked for proper operation; i.e., overspeed test, 10-second start, and proper loading.

The fuel oil analysis program includes the following:

1. Monthly sampling and testing of each diesel generator day tank.
2. Each incoming fuel oil delivery.
3. Main storage tank - check for water every six months.

A yearly log is not maintained for each diesel generator. The failure analysis is part of a station wide program to insure proper review and disposition of failures of safety related equipment. The diesel generators are a part of the program.

The program is required by station Standing Orders, and is designated as an Operations Incident Report. This report insures proper notification, (including a License Event Report if required), a review by knowledgeable staff members, final disposition, and Plant Review Committee review. The District has recently computerized its maintenance history and is participating in NPRDS. This should enhance the ability to perform failure analysis using historical data.

Although Fort Calhoun maintains records in accordance with the Technical Specifications and Plant Standing Orders, a review of the District's failure data indicates that improved recordkeeping, maintenance history, and root-cause investigations would best improve reliability. This area will be investigated as part of the overall effort.

The District has reviewed NUREG/CR-0660 for applicability to the Fort Calhoun Station diesel generators. In general, the District finds that the design complies with the recommendations provided. The District plans to study those areas which could improve the engine reliability and will implement those areas wherever practical.

The District has reviewed the proposed diesel generator reliability improvement Technical Specifications. The District believes that these specifications are based on a specific design. It is the District's opinion that these specifications must to some degree be altered to accomplish diesel generator reliability improvement and accommodate the station (unit) specific design basis.

The District believes that the reliability specification, as it addresses requalification (both increased testing and actual requalification for nuclear service), must be limited to those items which actually affect engine/generator operability and the failure of which is reasonably attributable to those stresses which would be expected under engine starting and load testing. A more valid approach to the problem would be modifications to surveillance and maintenance requirements on failure-prone components. A case in point is the May 19, 1982 failure of the local pushbutton. The engine/generator was still fully functional via the remote manual and automatic starts. NUREG/CR-0660 also points out the failure definition problem. No useful purpose will be served by running the diesel generator if the "failure" is due to the random failure of a control switch.

The District believes that the "root-cause" approach will have the most significant impact on reliability. This would address specific failures and improve reliability without causing additional challenges to the entire system. Increased frequency of testing should be used as a tool to find the weak link in the system only if repeated failures are suspect. Some of these areas must be discussed in detail with vendors to ensure testing in fact improves reliability.

The District also is concerned with the use of present surveillance testing data to define the diesel generator's reliability as it relates to station blackout. The station blackout/diesel generator interaction does not demand the diesels be operable immediately; there is a two-hour period of time during which diesel generator availability is not essential. The test data for failures do not separate "repairable" failures from other failures. These failures should not be considered applicable for station blackout purposes.

The District would like to make one comment regarding the reporting requirements. After the initial report, the District believes all reporting should be done under either the present LER system or the monthly operating report. The discussed information can be adequately addressed within the framework of either the LER system or the monthly operating report without imposing a new set of reporting guidelines.