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ARTHUR E. LUNDVALL, JR.
VICE PRESIDENT
SUPPLY

September 26, 1984

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

ATTENTION: Mr. Darrell G. Eisenhut, Director
Division of Licensing

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2, Docket Nos. 50-317 & 50-318
Generic Letter 84-15; "Proposed Staff Actions to Improve and Maintain
Diesel Generator Reliability"

Gentlemen:

The enclosure and accompanying attachment provided herein constitute our reply to your request for information made in Generic Letter 84-15. Enclosure (1) is a discussion of and reply to your specific items and questions. One table is provided in Enclosure (1) and has been segregated in a manner that reflects the specific concerns of Item 2 in Generic Letter 84-15.

Pending safety committee review, we plan to submit a proposed Technical Specification change involving diesel generators. The requested change is proposed not only on behalf of previous commitments to Generic Letters 83-28 and 83-41, but to ensure the reliability of the emergency diesel generators installed at our facility is maintained.

Considering the critical role diesel generators play in mitigating various transients and postulated events following a loss of offsite power, we feel diesel generator reliability is important to the early solution to USI A-44, Station Blackout. It is our judgment that timely actions regarding diesel generator reliability will have a significant safety benefit.

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Should you have further questions regarding this reply, please do not hesitate to contact us.

Very truly yours,

Arthur E. Lundvall Jr.

AEL/SRC/ms

Enclosure (1)

STATE OF MARYLAND :

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TO WIT:

CITY OF BALTIMORE :

Arthur E. Lundvall, Jr., being duly sworn states that he is Vice President of the Baltimore Gas and Electric Company, a corporation of the State of Maryland; that he provides the foregoing response for the purposes therein set forth; that the statements made are true and correct to the best of his knowledge, information, and belief; and that he was authorized to provide the response on behalf of said Corporation.

WITNESS my Hand and Notarial Seal:

Minnie L. Roberson
Notary Public

My Commission Expires:

July 1, 1986

ENCLOSURE 1

REPLY TO NRC GENERIC LETTER 84-15

NRC REQUEST

1. Reduction in Number of Cold Fast Start Surveillance Tests for Diesel Generators.

This item is directed towards reducing the number of cold fast start surveillance tests for diesel generators which the staff has determined results in premature diesel engine degradation. Licensees are requested to describe their current programs to avoid cold fast start surveillance testing or their intended actions to reduce cold fast start surveillance testing for diesel generators.

BG&E RESPONSE

Based on maintenance experience at our facility and studies performed in reply to Generic Letter 83-41 (Fast Cold Starts of Diesel Generators), we feel that frequent fast cold starts and excessive surveillance testing of the diesel generators have the potential to cause undue wear and damage to moving parts and thereby degrade safety. As stated in the Generic Letter, industry experience shows that an overall improvement in diesel engine availability can be gained by performing diesel starts for surveillance testing using engine prelube and other manufacturer recommended procedures. Accordingly, we have studied various options and discussed them with our vendor. A short term solution has been provided by performing engine prelubrication prior to every start except those specifying ambient starting conditions in the Technical Specifications. Of a long term nature, our staff is evaluating modifications to the diesel lube oil system designed to ensure a prelubed condition upon fast start. This would eliminate cold fast starts and improve overall reliability. There are two modifications undergoing analysis and evaluation.

- (1) Engine prelube system designed to maintain continuous warm lube oil flow through the diesel generator when shutdown. This modification is intended to lubricate the lower internals up to the upper crankline.
- (2) Lube oil injection system designed to instantly lubricate upon demand. This modification uses pressure from the air start system and a bladder-type container to inject at high pressure oil into the engine when air start system demand is actuated.

We currently have an installed lube oil heating system performing continuous lube oil warm-up. We are considering a modification that would increase the lube oil heating capacity to limit the effects of ambient starting by raising the lube oil temperature to a level approximating normal loaded conditions.

ENCLOSURE 1

REPLY TO NRC GENERIC LETTER 84-15

Consistent with the concern expressed in NUREG/CR-0660, and Generic Letters 83-41 and 84-15, we too have been investigating the impact of needless diesel engine test starts. Our staff has changed several Surveillance Test Procedures (STP's) to minimize the amount of surveillance testing. We previously had two separate STP's testing the diesel generator under Technical Specification requirements for verification of operability and under-voltage starts. These have since been combined into one procedure, eliminating many redundant requirements.

In review of NUREG-1024 and Generic Letter 83-28 "Required Actions Based on Generic Implications of Salem ATWS Events", we have committed to reviewing those Technical Specifications which potentially degrade safety. Certain required surveillance tests, testing frequencies, and action statements have been determined to be performance degrading. We have identified several Technical Specifications that impose needless test starts and accordingly, are developing proposed amendments to those previously mentioned. For example, Technical Specification 3/4.8.1 offers many opportunities to relax needless diesel generator testing. In our proposed Technical Specification amendment (to be submitted after safety committee review), we are developing changes to the requirement to demonstrate diesel generator operability from one hour to eight or 24 hours (depending on circumstances) after entering the action statement. In addition, we are requesting deletion of the retest requirement every eight hours until the other AC power source is restored. Deletion of this requirement along with the extended time to verify operability will reduce the number of needless safety-degrading diesel starts.

Concurrent with our changes proposed for the action statements, we have identified areas to be modified in the Surveillance Requirements. We are requesting a change to Surveillance Requirement 4.8.1.1.2.a that eliminates the term Staggered Test Basis to ensure that diesel generators (including the common unit) are not tested more often than the intent of the Technical Specifications. We have deleted the requirement in Technical Specification 4.8.1.1.2.a.4 that specifies starting the diesel each time under ambient conditions, and as recommended in Generic Letter 84-15, we have proposed adding a new item that requires testing under ambient conditions every 184 days instead. We feel these changes to our Technical Specifications will significantly reduce unnecessary fast cold starts.

NRC REQUEST

2. Diesel Generator Reliability Data

This item requests licensees to furnish the current reliability of each diesel generator at their plants, based on surveillance test data. Licensees are requested to provide the information requested in Enclosure 2 of Generic Letter 84-15.

ENCLOSURE 1

REPLY TO NRC GENERIC LETTER 84-15

BG&E RESPONSE

Table 2-1 in Attachment 1 to Enclosure 1 provides the reliability data requested. As this data indicates, we have established a high level of diesel generator reliability, and we feel our current practices are a considerable success.

In addition to the reliability information requested, we have evaluated surveillance test data provided to the NRC in a letter to R. A. Clark, from A. E. Lundvall, Jr., dated October 7, 1981, addressing USI A-44, Station Blackout. All valid demands between 1976 and 1980 inclusive were analyzed and the results showed that each individual diesel generator had a start reliability greater than 95%. Over a period of five years, each diesel generator attained an average reliability of 98%, with the lowest reliability for an individual diesel unit in a single year reaching 96.7%. While continually monitoring diesel generator surveillance test data, if our reliability should fall below 95%, we would impose a reliability improvement program designed to raise the level of reliability to 95% or greater. This program is discussed further in Item 3.

NRC REQUEST

3. Diesel Generator Reliability

Licensees are requested to describe their program, if any, for attaining and maintaining a reliability goal for their diesel generators. An example of a performance Technical Specification to support a diesel generator reliability goal has been provided by the staff in Enclosure 3 to Generic Letter 84-15. Licensees are requested to comment on, and compare their existing program or any proposed program with the example performance specification.

BG&E RESPONSE

Our goal is to maintain all diesel generators at or above a reliability of 95%. We have initiated a program to monitor diesel generator operations and testing to record results of all valid demands (defined in Regulatory Guide 1.108, Position C.2.e.). If an individual diesel generator reliability should fall below 95%, we will impose a program to improve reliability. That program is described in Attachment 2.

Part of our overall effort to maintain reliability was explained in response to Item 1. As stated in that response, we are committed to proposing changes to the Technical Specifications aimed at eliminating unnecessary diesel generator testing. As mentioned in that item, we are considering diesel engine modifications that minimize the affects of cold fast starts.

In addition to our commitments made in Item 1, we have other mechanisms in place to help maintain our high reliability. We routinely review all mechanical Surveillance Test and Preventive Maintenance procedures for their applicability and intent. Our diesel engine vendor periodically provides suggested practices and programs for operation. We maintain communications with our diesel engine manufacturer to keep up to date on equipment changes and problems. We perform complete mechanical inspections every cycle which require a qualified factory representative on hand to assist and advise.

ENCLOSURE 1

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We record and maintain data and results from testing required in the Technical Specifications, and will trend them over time, providing a valuable tool to evaluate projected diesel generator reliability. This parameter trending program will help predict potential problems before they become irreversible. The STP's we discussed in our response to Item 1 are the Surveillance Requirements that provide the trending data.

NUREG/CR-0660, "Enhancement of On-Site Emergency Diesel Generator Reliability", has many recommendations for licensees to improve their diesel generator reliability. We have been evaluating the recommendations and have implemented some changes. Additionally, much of the philosophy contained in the NUREG has been adopted at our facility. We project a completion date for review of all recommendations in the NUREG by January 31, 1985. At that time we may decide to make additional modifications to enhance diesel generator reliability.

All of the previously mentioned projects, proposals, and programs are part of our comprehensive diesel generator reliability program. We have compared our program and philosophy with the example performance specification provided in Generic Letter 84-15. Although the performance specification utilizes many concepts similar to ours, there exists some elements that differ substantially with our philosophy. The performance specification appears to be more punitive than constructive. We feel a reliability program should attempt to identify the incipient causes of failure and provide assurance of reliability. In our judgment, the example reliability improvement program requires excessive testing beyond what we feel is necessary. There appears to be little flexibility for staff action and even fewer mechanisms available allowing a timely solution to reliability problems. We agree that the frequency for diesel generator testing must be increased when reliability becomes unacceptable to ensure the correct causes were identified and corrected. However, accelerated testing is a trade-off made in NUREG/CR-0660 which must be controlled to minimize excessive diesel generator starts. It is our judgment that the increased frequency of testing required by the example performance specification will degrade rather than enhance safety. Those sections of the example Technical Specification that limit diesel generator tests and allow engine prelubrication and/or warm-up agree with our concerns and the manufacturer's recommendations. Accordingly, we are proposing such changes to our Technical Specifications.

ATTACHMENT 1 TO ENCLOSURE 1

TABLE 2-1

	# OF FAILURES	PERCENT RELIABILITY	# OF FAILURES	PERCENT RELIABILITY	# OF FAILURES	PERCENT RELIABILITY
Last 20 Valid Demands*	0	100	1	95	0	100
Last 100 Valid Demands	3	97	3	97	0	100

NO. 11 DIESEL GENERATOR

Last 100 Valid Demands - August 9, 1983 - June 1, 1984

FAILURE TIME HISTORY

August 17, 1983	Diesel Generator failed to reach rated speed and voltage within 10 seconds on start
January 12, 1984	Diesel Generator failed to reach rated speed and voltage within 10 seconds upon start
January 12, 1984	Diesel Generator failed to reach rated speed and voltage within 10 seconds upon start

Last 20 Valid Demands - March 5, 1984 - June 1, 1984

No Failures

NO. 12 DIESEL GENERATOR

Last 100 Valid Demands - September 9, 1983 - June 1, 1984

FAILURE TIME HISTORY

September 27, 1983	Failure to reach rated speed and voltage within 10 seconds upon start
November 14, 1983	Failure to reach rated speed and voltage within 10 seconds upon start
April 4, 1984	Failure to reach rated speed and voltage within 10 seconds upon start

Last 20 Valid Demands - March 11, 1984 - June 1, 1984

April 4 1984	Failure mentioned above
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No. 21 DIESEL GENERATOR

Last 100 Valid Demands - June 22, 1983 - June 1, 1984

No Failures

Last 20 Valid Demands - February 15, 1984 - June 1, 1984

No Failures

NOTE: All start attempts mentioned above were failures because the diesel generator did not attain rated speed and/or voltage within 10 seconds. It should be noted that the diesel generators did start and did reach rated voltage and speed only a few seconds after the required time.

* Valid Demand is defined in Regulatory Guide 1.108 position C.2.e.

ATTACHMENT 2 TO ENCLOSURE 1

DIESEL GENERATOR RELIABILITY IMPROVEMENT PROGRAM

1. If a diesel generator has two failures in the last 20 valid demands* but less than six failures in the last 100 valid demands, then the testing frequency will be increased to at least once per week until the number of failures in the last 20 valid demands is less than two. All failure causes and corrective actions will be reviewed.
2. If a diesel generator has three or more failures in the last 20 valid demands or six or more failures in the last 100 valid demands, the General Supervisor - Operations shall review the causes and corrective action of all failures in the last 100 valid demands and approve a program of accelerated testing and/or inspection as appropriate to address the nature of the failures. The results of this program will be presented to the Plant Operations & Safety Review Committee (POSRC).
3. If a diesel generator has 10 or more failures in the last 100 valid demands it will be declared inoperable. Prior to returning the diesel generator to service, the POSRC will review the causes and corrective actions for all failures in the last 100 valid demands and prescribe a program of testing and/or inspection as it deems necessary.

NOTE: All start attempts (valid demands) shall be logged and maintained in accordance with Position C.3 of Regulatory Guide 1.108.

* Criteria for determining the number of failures and valid tests shall be in accordance with Position C.2.e of Regulatory Guide 1.108.