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BGE

November 1, 1995

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
License Amendment Request; Enhancement of the Engineered Safety Features Electrical System

Pursuant to 10 CFR 50.90, the Baltimore Gas and Electric Company (BGE) hereby requests an Amendment to Operating License Nos. DPR-53 and DPR-69 by the incorporation of these changes to the Technical Specifications for Calvert Cliffs Unit Nos. 1 and 2.

In response to the Station Blackout Rule (10 CFR 50.63), BGE committed to upgrade the Engineered Safety Features (ESF) electrical system at Calvert Cliffs to provide additional protection from a loss of electrical power. These improvements included the addition of a fourth safety-related Emergency Diesel Generator (EDG) and an Alternate AC diesel generator. Addition of these new diesel generators involved changes to equipment names, the electrical distribution system, and the fuel oil system. Baltimore Gas and Electric Company submitted a series of design reports covering appropriate aspects of the design and qualification of the new diesel generators. Based upon these design reports, the Nuclear Regulatory Commission (NRC) approved the use of one of these diesel generators (No. 1A EDG) as a safety-related EDG for Calvert Cliffs. The changes to the ESF electrical system associated with the installation of the new diesel generators were evaluated in accordance with 10 CFR 50.59, and determined not to involve any unreviewed safety questions. The proposed change revises the Technical Specifications to reflect the new configuration and proposes the surveillance requirements necessary to demonstrate EDG operability.

In a separate change, Calvert Cliffs is upgrading the electrical capacity of the three existing EDGs. The details of the modifications were evaluated by BGE in accordance with 10 CFR 50.59, and were determined not to involve an unreviewed safety question. The qualification testing program was submitted to the NRC and approved. The approved testing program has been completed on No. 21 EDG, and this EDG has been qualified to the upgraded ratings. Number 11 EDG will be qualified to the upgraded ratings prior to the implementation of the changes requested in this letter. The proposed change revises the

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Technical Specifications to reflect the new electrical capacities for the two EDGs on which the modifications will be completed by the end of the 1996 refueling outage.

In addition to reflecting the new plant configuration and the increased capability of the upgraded Unit 2 EDGs, the proposed change will also provide consistent Technical Specifications between the existing and new EDGs. The proposed Technical Specifications will ensure a high in-service reliability is maintained for the four EDGs.

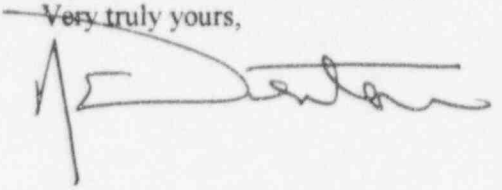
We have evaluated the significant hazards considerations associated with this change and have determined that there are none (see Attachment 2 for a complete discussion). We have also determined that operation with the proposed amendment would not result in any significant change in the types, or significant increases in the amounts of any effluents that may be released offsite, nor would it result in any significant increase in individual or cumulative occupational radiation exposure. Therefore, the proposed amendment is eligible for categorical exclusion as set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment is needed in connection with the approval of the proposed amendment.

The Plant Operations and Offsite Safety Review Committees have reviewed the proposed change to the Technical Specifications and concurred that the change involves no significant hazards considerations and operation with the proposed changes will not result in an undue risk to the health and safety of the public.

These modifications are to be performed during the next Unit 1 refueling outage, which is scheduled to begin on March 15, 1996. This change is requested to be approved and issued by February 23, 1996. Due to the necessary modifications to the ESF electrical system, implementation of these Technical Specifications cannot occur until No. 11 EDG is dedicated to 4.16 kV Bus No. 21, and both No. 11 EDG and No. 21 EDG are renamed No. 2A EDG and No. 2B EDG, respectively. This implementation schedule is necessary to ensure that the Unit 2 Technical Specifications correctly reflect the necessary components required to satisfy all operability requirements. This implementation schedule will result in a brief period where the Unit 1 Technical Specifications will indicate the new name for No. 12 EDG (No. 1B EDG) prior to this change occurring in the plant. However, this will not result in an operability compliance problem since the operators will be verifying the same equipment to ensure the Technical Specifications requirements are met. The necessary pre-outage training and other administrative controls will be put in place to avoid any confusion that could occur during this transition period.

Should you have questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,



STATE OF MARYLAND :
: **TO WIT:**
COUNTY OF CALVERT :

I hereby certify that on the 1st day of November, 1995, before me, the subscriber, a Notary Public of the State of Maryland in and for Calvert County, personally appeared Robert E. Denton, being duly sworn, and 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: Michelle D. Hall
Notary Public

My Commission Expires: February 2, 1998
Date

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Attachments:
(1) Description and Justification of Proposed Change
(2) Determination of Significant Hazards
(3) Unit 1 Technical Specification Marked-up Pages
(4) Unit 2 Technical Specification Marked-up Pages
(5) Pre-outage and Post-outage Engineered Safety Features Electrical System Configuration
(6) Pre-outage and Post-outage Fuel Oil System Configuration

cc: D. A. Brune, Esquire
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ATTACHMENT (1)

DESCRIPTION AND JUSTIFICATION OF PROPOSED CHANGE

Baltimore Gas & Electric Company
Docket Nos. 50-317 and 50-318
November 1, 1995

ATTACHMENT (1)

DESCRIPTION AND JUSTIFICATION OF PROPOSED CHANGE

Calvert Cliffs is a two-unit site. The existing Engineered Safety Features (ESF) electrical system relies on three 4160-volt, 3-phase, 60-cycle Fairbanks Morse Emergency Diesel Generators (EDGs), each of which has a continuous rating of 2500 kW. Normally, No. 11 EDG is dedicated to Unit 1 and is connected to ESF Bus No. 11, and No. 21 EDG is dedicated to Unit 2 and is connected to ESF Bus No. 24. Number 12 EDG is a "swing" diesel capable of providing power to Unit 1 ESF Bus No. 14 or Unit 2 ESF Bus No. 21. In the event of an accident, No. 12 EDG automatically connects to the affected unit. A diagram depicting the existing ESF electrical system is given in Attachment (5), Figure 1, "Pre-Outage Electrical Distribution Configuration."

During operation, the safety function of the ESF electrical system is to ensure that sufficient power will be available to supply the safety-related equipment required to safely shut down both units, following a design basis accident in one unit, and to maintain both units in a safe shutdown condition for extended time periods. During shutdown or refueling, the ESF electrical system ensures that the shutdown unit can be maintained in the shutdown or refueling condition for extended time periods, and that sufficient instrumentation and control capability is available for monitoring and maintaining the facility status.

The proposed change was prompted by two significant modifications to the plant — the addition of No. 1A EDG and the upgrade of the electrical capacity of two of the three existing EDGs. Each of these modifications, and the resulting Technical Specifications, are described below. The proposed Technical Specification changes are located in Attachments (3) and (4).

ADDITION OF NO. 1A EDG

In 1988, the NRC issued the Station Blackout (SBO) Rule, 10 CFR 50.63. It requires nuclear power plants to be able to withstand for a specified duration, and recover from a complete loss of alternating current electric power to the essential and nonessential switchgear busses. Baltimore Gas and Electric Company (BGE) made changes at Calvert Cliffs to address the threat described by the SBO Rule, including a commitment to install an additional safety-related EDG and a non-safety-related diesel generator (Reference a). In Reference (b), the NRC found the addition of the two new diesel generators an acceptable method of complying with the SBO Rule. Under the new configuration, each unit will have an EDG connected to each of two ESF busses. The non-safety-related diesel generator will be able to be manually connected to an ESF bus on either unit. To satisfy bus loading considerations the assignment of EDGs to each unit was changed. To simplify the equipment nomenclature, the EDGs will be assigned new identification numbers, as described in Table 1, EDG Nomenclature and Configuration.

Table 1 -- EDG Nomenclature and Configuration

Current EDG Identification No.	Current Unit / Preselected Bus	New EDG Identification No.	New Unit / Bus (Facility)
N/A	N/A	No. 1A EDG	Unit 1 / Bus No. 11 (ZA)
No. 12 EDG	Unit 1 / Bus No. 14 & Unit 2 / Bus No. 21	No. 1B EDG	Unit 1 / Bus No. 14 (ZB)
No. 11 EDG	Unit 1 / Bus No. 11	No. 2A EDG	Unit 2 / Bus No. 21 (ZA)
No. 21 EDG	Unit 2 / Bus No. 24	No. 2B EDG	Unit 2 / Bus No. 24 (ZB)

The ESF electrical system incorporates the two-channel concept, i.e., independent electrical controls and power systems supply redundant 4.16 kV equipment. The "A" and "B" in the new EDG names indicates the channel (or "facility") to which the EDG is connected; i.e., the A or B facility. Because the Alternate AC diesel generator is not dedicated to either unit and will be capable of being connected to any of the four ESF busses after the 1997 refueling outage, it is designated "0C". However, at this time, the "0C" diesel generator will not be incorporated into the Technical Specifications, nor will it be credited in this License Amendment Request. A schematic diagram depicting the new ESF electrical system is shown in Attachment (5), Figure 2, "Post-Outage Electrical Distribution Configuration."

The new safety-related No. 1A EDG is a 5400 kW (continuous rating) Class 1E diesel generator, to be connected to the ESF electrical system. The Diesel Generator Building, which houses No. 1A EDG is a Class 1 structure, and will provide protection from external events, such as seismic and tornado/missile events. The fuel oil system for No. 1A EDG is contained within the Diesel Generator Building, and is, therefore, also protected from external events. The Diesel Generator Building is physically separated from the Auxiliary Building, in which the three Fairbanks Morse EDGs are located. Number 1A EDG uses an engine cooling system that is completely independent of the Service Water System, which cools the jacket water for the Fairbanks Morse EDGs.

Baltimore Gas and Electric Company submitted a series of design reports covering appropriate aspects of the design and qualification of the new diesel generators (References c through g). Based upon these design reports, the NRC issued Safety Evaluations approving the use of one of these diesel generators (No. 1A EDG) as a safety-related EDG for Calvert Cliffs (References h through l.) The changes to the ESF electrical system associated with the installation of the new diesel generators were evaluated in accordance with 10 CFR 50.59, and determined not to involve an unreviewed safety question.

The Technical Specification changes resulting from the addition of No. 1A EDG fall into four categories: 1) nomenclature changes resulting from the new configuration; 2) elimination of references and special actions required by the "swing" diesel; 3) modification to the Unit 1 EDG surveillance requirements to incorporate No. 1A EDG; and 4) changes to the Unit 1 fuel oil requirements to reflect the self-contained fuel oil system for No. 1A EDG. Each of these categories of changes are described below.

Nomenclature Changes Resulting From the New EDG Configuration

As discussed above, the new ESF electrical system configuration will involve changing the EDG identification numbers, and in some cases, the units to which the EDGs are designated. As discussed in the following sections, various specifications which address specific requirements for each EDG will be revised to address technical changes resulting from the addition of No. 1A EDG, and the upgraded capacities of the Unit 2 EDGs. In all such cases, the new EDG identification numbers will be used.

In addition to revising those Specifications which specifically address requirements for each particular EDG, the new configuration also necessitates changes to the lists of fire detection instruments, fire protection sprinklers and fire hose stations contained in the Instrumentation and Plant Systems Technical Specifications, respectively. The instruments, sprinklers and fire hose stations listed in these Specifications are located in areas in which the prompt detection and suppression of fires will reduce the potential for damage to safety-related equipment. The Unit 1 Technical Specifications, which currently identify the fire detection instruments and sprinklers in the rooms housing Nos. 11 and 12 EDGs, will be revised to address the rooms housing Nos. 1A and 1B EDGs, and to list the four fire hose stations in the Diesel Generator Building. Similarly, the Unit 2 Technical Specifications, which currently identify the fire detection instruments and sprinklers in the room housing No. 21 EDG, will be revised to address the rooms housing Nos. 2A and 2B EDGs. This change will ensure the revised Technical Specifications maintain the same level of fire detection and suppression requirements currently found in the Technical Specifications.

Elimination of the Swing Diesel

There are several references in the Technical Specifications, either directly or indirectly, to the use of a swing diesel by Units 1 and 2. The addition of No. 1A EDG will eliminate the use of a swing diesel and, therefore, it is necessary to eliminate those references.

Technical Specification 3.8.1.1, AC Sources - Operating, makes reference to a swing diesel in Limiting Condition for Operation (LCO) paragraph b. The current specification requires the operability of "Two separate and independent diesel generators (one of which may be a swing diesel generator capable of serving either Unit 1 or Unit 2)." The proposed change will eliminate the condition in the parenthesis so that the requirement will state, "Two separate and independent diesel generators." This change does not alter the intent of the LCO; specifically, that two separate and independent emergency power supplies shall be available to each operating unit.

In Reference (m), BGE requested a change to the EDG surveillance requirements to allow the periodic maintenance of the swing diesel with one unit in Modes 5 or 6 and the other unit operating. This maintenance required longer than the 72-hour Allowed Outage Time and would have necessitated a dual-unit shutdown. The surveillance change allowed the substitution of a temporary non-safety-related diesel for up to seven days for the purpose of performing the maintenance. It was stated that this change would only be needed until the new EDGs are installed. With the approval of these requested changes, this exception will be eliminated. The testing required on No. 1B (12) EDG is not being reduced.

In the current configuration, the swing diesel provides the level of redundancy necessary to withstand the failure of a single EDG on a site-wide basis; however, following the addition of the fourth EDG, the plant will continue to satisfy the single failure criteria by providing a back-up EDG for each unit. Therefore, the addition of a fourth EDG will reduce overall plant risk.

Changes to the EDG Surveillance Requirements Resulting from the Addition of No. 1A EDG

Number 1A EDG is physically very different from the existing Fairbanks Morse EDGs. The Fairbanks Morse EDGs are single engine-generator sets, while No. 1A EDG is a tandem engine-single generator set. Number 1A EDG has a greater electrical capability than the Fairbanks Morse EDGs. The building for No. 1A EDG contains a dedicated fuel oil system, while the three Fairbanks Morse EDGs share a common fuel oil system (described in more detail below). However, the safety functions of all four EDGs are the same — to provide a reliable source of electrical power to the safety-related busses to operate the necessary accident mitigation equipment, should offsite electrical power be lost. The operability of the EDGs is based upon the ability of the EDGs to perform their safety function. The existing Surveillance Requirements adequately demonstrate the operability of the EDGs. These Surveillance Requirements are based on demonstrating safety function and are not directly related to the physical details of the EDG. Therefore, the existing Surveillance Requirements are adequate to demonstrate the operability of No. 1A EDG. The only differences between the Surveillance Requirements of the existing EDGs and those for No. 1A EDG are those made necessary by: 1) load-handling capabilities of the EDG, and their electrical ratings; 2) the different accident loading on each electrical bus supplied by a particular EDG; and 3) the fuel consumption rates of the different EDGs.

Operationally, it is very desirable for the Surveillances of the new EDG be the same as those for the other three EDGs. Based on our past history of highly reliable EDG operation, we believe the periodic testing provisions set forth in the existing Technical Specifications provide an adequate basis for maintaining and demonstrating high in-service reliability of No. 1A EDG. Therefore, BGE has concluded that the application of the existing Surveillances to No. 1A EDG will demonstrate operability with only the changes described below:

- **Surveillance 4.8.1.1.2.a.5** currently requires that once per 31 days the generator be synchronized, loaded to 1250 kW, and operated at least 60 minutes. The load of 1250 kW (50% of the original rated capacity of the Fairbanks Morse EDGs) is based on balancing the need to demonstrate the ability of the EDGs to perform their safety function and avoiding the increased wear resulting from running the EDG at its full post-accident load. Baltimore Gas and Electric Company believes that a higher loading for the new EDG is appropriate for the monthly surveillance demonstration and proposes to perform the monthly test at a load greater than or equal to 4000 kW for No. 1A EDG. Surveillance 4.8.1.1.2.a.5 will demonstrate operability of No. 1A EDG without adversely affecting EDG reliability.

  The proposed loading of 4000 kW for No. 1A EDG is based on a net output of approximately 3400 kW, plus 566 kW for No. 1A EDG house loads (i.e., the loads necessary to support operation this EDG). Number 1A EDG, with a continuous rating of 5400 kW, is capable of providing considerably more power than the 4000 kW proposed minimum test loading. As the Surveillance Requirements are intended to demonstrate the operability of the EDGs by

ensuring that they are capable of providing a reliable source of power to mitigate the consequences of an accident, and shut down the unit following an accident, the acceptance criteria for the monthly surveillance for No. 1A EDG will be 4000 kW. However, testing will normally be performed between 90 and 100 percent of the EDG's continuous rating, but the EDG will not necessarily be considered inoperable per the Technical Specifications unless it fails to maintain 4000 kW, which would indicate that the EDG would not be capable of performing its safety function. Any degradation in the EDG's performance between the continuous rating (5400 kW) and the capacity needed to perform the safety function (4000 kW) will be evaluated under BGE's corrective action program, and corrected under the maintenance program, which incorporates trending capabilities.

- **Surveillance 4.8.1.1.2.d.4** requires that each EDG be operated at least once per refueling interval at greater than or equal to 2500 kW for at least 60 minutes. For the refueling interval surveillance, using an acceptance criteria which is greater than the accident loads for that EDG provides a better indication of the ability of that EDG to support post-accident loads when required. Baltimore Gas and Electric Company proposes adopting an acceptance criteria of 4000 kW for the refueling interval Surveillance Requirement for No. 1A EDG. This value is greater than the calculated accident loads (including No. 1A EDG house loads) and will demonstrate the ability of No. 1A EDG to perform its safety function.

- **Surveillance 4.8.1.1.2.d.5** requires the verification that the auto-connected loads do not exceed the 2000-hour rating of each diesel generator. The 2000-hour rating of No. 1B EDG is 2700 kW, and that of the upgraded Nos. 2A and 2B EDGs is 3300 kW. The manufacturer of No. 1A EDG, Societie Alsacienne De Constructions Mechaniques De Mulhouse (SACM), only designated a "continuous rating" for this EDG, so the term "2000-hour rating" does not apply to this EDG. Therefore, to provide consistent terminology for each of the four EDGs, Surveillance 4.8.1.1.2.d.5 will be revised to verify that the auto-connected loads do not exceed 4000 kW for No. 1A EDG, 2700 kW for No. 1B EDG, and 3300 kW for Nos. 2A and 2B EDGs. These Surveillances continue to provide an adequate level of assurance that automatic loading of the EDGs will not adversely affect the ability of the EDGs to perform their safety function.

- **Surveillance 4.8.1.1.2.d.3.c** - The existing Fairbanks Morse EDGs and No. 1A EDG have protective trips designed to prevent engine damage by automatically shutting down the EDG in the event of equipment malfunction. When the EDGs are called on for post-accident service, as indicated by the presence of a Safety Injection Actuation Signal (SIAS), the protective trips which do not generally indicate imminent engine damage are bypassed. Surveillance 4.8.1.1.2.d.3.c ensures the availability of the EDGs is maximized by verifying that the appropriate protective trips are bypassed on a SIAS.

  Currently, this Surveillance identifies the trips which are automatically bypassed on a SIAS. However, due to design differences between the Fairbanks Morse EDGs and No. 1A EDG, the protective trips which are bypassed on a SIAS are different. The proposed change will change this Surveillance to read, "Verify that automatically bypassed diesel trips are automatically bypassed on a Safety Injection Actuation Signal." The list of bypassed trips will be relocated to the Updated Final Safety Analysis Report (UFSAR), and controlled under the 50.59

process. By retaining the existing Technical Specification requirement to verify that the noncritical engine trips are bypassed on a SIAS, while relocating the list of trips to a document in which they will be adequately controlled by an established process, 10 CFR 50.59, this change is consistent with the intent of the Improved Technical Specifications, Reference (n).

In Reference (o), BGE requested the addition of the high-crankcase pressure trip to the list of trips bypassed on a SIAS. This request was approved in Reference (p). There was also a footnote allowing testing of this function to be delayed until after associated physical modifications to the EDGs are complete. With the relocation of bypassed trips to the UFSAR, this footnote will no longer be necessary. Any changes to the list of bypassed trips will be incorporated in the regular update of the UFSAR.

- **Surveillance 4.8.1.1.2.c** currently requires that the EDG starts and accelerates to at least 900 rpm in 10 seconds or less. For the existing Fairbanks Morse EDGs, 900 rpm equates to a generator frequency of 60 Hz. A frequency of 60 Hz on No. 1A EDG requires a diesel speed of 1200 rpm. We propose to revise the Surveillance to verify that the EDG starts and attains a generator frequency of at least 60 Hz in 10 seconds or less. The Surveillance Requirement will continue to verify that the EDGs reach their rated speed within 10 seconds of receiving a start signal; therefore, the intent of the original surveillance is maintained for each of the four EDGs.

Changes to the Fuel Oil System Configuration

The current fuel oil system for the existing three EDGs is a common system with two above-ground Fuel Oil Storage Tanks (FOSTs) (Nos. 11 and 21). Fuel oil is distributed to the EDGs through two independent and redundant headers. Each EDG can take suction from either storage tank through either header.

There are two principal design criteria for the FOSTs: (1) design basis accident [e.g., loss-of coolant accident (LOCA)] requirements; and (2) requirements for protection against external phenomena such as earthquakes and tornados.

The design of the EDG fuel oil system is currently based on a fuel oil capacity of seven days. Specifically, Institute of Electrical and Electronics Engineers (IEEE)-308 requires that, for multi-unit stations, sufficient fuel oil be available to run one EDG powering one unit under accident conditions and one EDG powering the opposite unit under normal shutdown conditions, for seven days (or the time to replenish fuel oil from an offsite source following a design basis event, whichever is longer). The two FOSTs contain a volume of fuel oil well in excess of that needed to satisfy this requirement. Each tank is sized to hold approximately 107,000 gallons of usable fuel oil. Normally, the volume of fuel maintained in each tank is between 90,000 and 107,000 gallons.

In the event of a design basis accident, both Seismic Category I FOSTs are assumed available with sufficient capacity to run one EDG powering one unit under accident conditions, and one EDG powering the opposite unit under normal shutdown conditions, for seven days. Number 21 FOST is protected from tornado-generated missiles by a Seismic Category I concrete enclosure. Under tornado conditions, only the No. 21 FOST is assumed available with sufficient capacity to run one EDG per unit carrying normal

shutdown loads for seven days. This design criteria is based on the assumption that a tornado and a simultaneous design basis accident is not credible. Administrative controls ensure that the minimum volume of fuel oil necessary to satisfy this criteria is maintained in the No. 21 FOST.

The addition of No. 1A EDG will result in changes in the way in which the fuel oil will be distributed to the EDGs. Number 1A EDG will take suction from its own separate, independent fuel oil storage and day tanks. Like No. 21 FOST, the fuel oil storage tank for No. 1A EDG will be protected from external hazards, such as tornados and seismic events. The two Unit 2 EDGs will continue to share the existing common fuel oil system with No. 1B EDG. Under this revised configuration, Nos. 1B and 2B EDGs will normally be aligned to No. 21 FOST, and No. 2A EDG will normally be aligned to No. 11 FOST. This configuration will ensure that both EDGs for each unit are assigned to a different FOST, and that at least one EDG from each unit is aligned to a tornado protected FOST, thereby maintaining the existing basis for the EDG fuel oil distribution system. Attachment (6) contains figures that depict the existing (pre-1996 outage) and proposed (post-1996 outage) fuel oil system configurations.

Unit 1 LCO 3.8.1.1.b.1 has been changed to require a minimum volume of 325 gallons of fuel oil be maintained in the fuel oil day tank for No. 1A EDG. This minimum fuel oil volume ensures that a sufficient volume of fuel oil is available to support at least one hour of No. 1A EDG operation at greater than 4000 kW without makeup to the associated fuel oil day tank. Additionally, Unit 1 LCO 3.8.1.1.b.2 has been changed to specify a minimum fuel oil volume of 49,500 gallons for No. 1A FOST, thereby ensuring that the No. 1A FOST has a sufficient volume of fuel oil to support at least 7 days of No. 1A EDG operation at greater than 4000 kW without makeup to the associated FOST. Therefore, the minimum fuel oil volume requirements for No. 1A EDG are the result of applying the licensing basis for the existing EDG fuel oil distribution system to the fuel oil distribution system of the new EDG.

UPGRADE OF THE EXISTING FAIRBANKS MORSE EDGS

Baltimore Gas and Electric is also modifying the existing EDGs to increase their electrical capacity. The modifications increase the electrical ratings of the affected EDGs, thereby providing additional margin for the electrical loading of the 4.16 kV ESF busses. The details of the modifications were evaluated by BGE in accordance with 10 CFR 50.59, and determined not to involve an unreviewed safety question. The qualification testing program for the EDG upgrades was submitted to the NRC in Reference (q), and approved by a Safety Evaluation Report in Reference (r). The upgrade modification was initiated on No. 11 EDG during the 1994 Unit 1 refueling outage, and will be completed in the 1996 Unit 1 refueling outage. The No. 21 EDG upgrade modifications were completed in the 1995 refueling outage and this EDG has been qualified to the upgraded ratings. The proposed changes revise the Technical Specifications to reflect these new electrical ratings and increased fuel consumption rates for the two EDGs on which the modifications have been completed. We plan to upgrade No. 12 (1B) EDG in a future refueling outage; therefore, the Technical Specification electrical ratings will not be changed for that EDG at this time. However, the fuel oil consumption rates forming the basis for the proposed Technical Specifications are based upon the conservative assumption that all three EDGs have been upgraded. Use of the increased fuel oil consumption rates will alleviate the necessity to revise this information after No. 12 (1B) EDG is upgraded. The EDG ratings following the 1996 Unit 1 Refueling Outage are indicated in Table 2, EDG Ratings and Surveillance Requirement Test Loads.

Table 2 -- EDG Ratings and Surveillance Requirement Test Loads

	EDG Ratings			Surveillance Test Loads	
EDG ID#	Continuous Rating	2000 hr.	200 hr.	Monthly	Refueling Interval
1A	5400 kW	N/A	N/A	≥ 4000 kW	≥ 4000 kW
1B	2500 kW	2700 kW	3000 kW	≥ 2250 kW	≥ 2700 kW
2A	3000 kW	3300 kW	3500 kW	≥ 2700 kW	≥ 3000 kW
2B	3000 kW	3300 kW	3500 kW	≥ 2700 kW	≥ 3000 kW

Changes to EDG Surveillance Requirements Resulting from EDG Upgrades

- **Surveillance 4.8.1.1.2.a.5** verifies that the EDGs are capable of synchronizing with the offsite electrical system and operating, for a period of greater than or equal to 60 minutes, with loads which do not exceed the EDG's continuous rating. Currently, this surveillance requires the EDGs to be loaded to greater than or equal to 1250 kW (50% of the continuous rating of the EDGs). The proposed change is to increase the required load for this Surveillance to greater than or equal to 90% of the EDG's continuous rating. For No. 1B EDG, the Surveillance will require the EDG be loaded to greater than or equal to 2250 kW, and for the upgraded Unit 2 EDGs, the required load will be greater than or equal to 2700 kW. Performing the monthly load-run test at greater than 90% of the EDG's continuous rating provides a clearer indication of the ability of the EDG to operate at its full continuous rating, and is consistent with Regulatory Position 2.2.2 of Regulatory Guide 1.9, Revision 3.

- **Surveillance 4.8.1.1.2.d.4** currently requires that each EDG be operated at least once per refueling interval at greater than or equal to 2500 kW for at least 60 minutes. For the refueling interval surveillance, using an acceptance criteria which is greater than the accident loads for each EDG provides a better indication of the operability of the EDGs. Therefore, BGE proposes changing the acceptance criteria for the refueling interval Surveillance Requirement to at least 2700 kW for No. 1B EDG and at least 3000 kW for Nos. 2A and 2B EDGs. These values are greater than the calculated accident loads and will more clearly demonstrate the ability of the EDGs to perform their safety function.

Table 2, EDG Ratings and Surveillance Requirement Test Loads, compares the design ratings of each EDG to the proposed Monthly (Surveillance Requirement 4.8.1.1.2.a.5) and Refueling Interval (Surveillance Requirement 4.8.1.1.2.d.4) acceptance criteria.

Changes to the Units 1 and 2 Fuel Oil Requirements

In Reference (s), BGE requested a license amendment to revise the minimum fuel oil volume required in the FOSTs and in the fuel oil day tanks. The basis for specifying a minimum volume of fuel oil to be maintained in each FOST is to meet the requirements of "IEEE Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations," IEEE-308, 1974. In accordance with IEEE-308, a minimum volume of fuel oil must be maintained in the FOSTs to run one EDG powering one unit under accident conditions, and one EDG powering the opposite unit under normal shutdown conditions, for seven days (or the time necessary to replenish fuel oil from an offsite source following a design basis event, whichever is longer). For the Unit 2 EDGs, operation at the upgraded ratings will result in an increased fuel oil consumption rate; therefore, the surveillances for fuel oil minimum volume requirements must be revised as follows:

- **LCO 3.8.1.1.b.1** - The minimum volume required for the fuel oil day tanks for the existing EDGs ensures that at least one hour of EDG operation is available without makeup to the day tanks, assuming the associated EDGs are loaded to 3250 kW. For the Fairbanks Morse EDGs, the basis for this specification has been revised to assume EDG loads of 3500 kW; however, there was enough margin in the minimum volume required by this specification that no change to the Technical Specifications is required.

- **LCO 3.8.1.1.b.2** - Currently, the Technical Specifications for Units 1 and 2 require a minimum volume of 74,000 gallons be maintained in No. 21 FOST, and 32,000 gallons in No. 11 FOST. The basis for this requirement is to ensure that at least seven days of fuel oil will be reserved below the standpipes for operation of one diesel generator on each unit, assuming one unit is under accident conditions with a diesel generator load of 3000 kW and the opposite unit is under normal shutdown conditions with a diesel generator load of 2500 kW. Additionally, the operability of No. 21 FOST ensures that in the event of a loss of offsite power, concurrent with a loss of No. 11 FOST (tornado/missile event), at least seven days of fuel oil will be available for operation of one diesel generator on each unit, assuming both diesel generators are loaded to 2500 kW.

  The minimum fuel oil volume for Nos. 11 and 21 FOSTs in the Units 1 and 2 Technical Specifications was recalculated based on EDG fuel oil consumption rates with diesel generator accident loads of 3500 kW, and normal shutdown loads of 3000 kW, consistent with the upgraded capacities of the Unit 2 EDGs. Since Nos. 11 and 21 FOSTs will continue to support Units 1 and 2, the requirements of IEEE-308 remain valid. Based upon these revised accident and shutdown loads, the total amount of fuel oil required to supply the accident loads for one unit and the shutdown loads for the other unit for 7 days is 83,900 gallons. Therefore, a combined minimum volume of approximately 85,000 gallons must be maintained in Nos. 11 and 21 FOSTs.

  Each of the two FOSTs was designed with an internal standpipe which reserves a minimum fuel oil volume below the standpipes for operation of the EDGs. A new calculation has been performed to determine the volume of usable fuel oil maintained below the standpipes in the tanks. Based on this calculation, the 7-day minimum fuel oil volume for design basis accidents is divided between the two tanks, such that approximately 2.8 days of fuel oil is maintained

below the standpipe in No. 11 FOST, and approximately 4.4 days of fuel oil is maintained below the standpipe in No. 21 FOST.

The fuel oil volume necessary to support the normal shutdown loads of both units for 7 days is 78,020 gallons. Of the two original fuel oil storage tanks, only No. 21 FOST is credited in the event of a tornado/missile event; therefore, at least 78,020 gallons must be maintained in this tank. However, in order to permit No. 11 FOST to be out-of-service for up to 7 days, the minimum volume of fuel oil required under design basis events, 85,000 gallons, will be maintained in the No. 21 FOST under LCO 3.8.1.1.b.2.c.

Unit 1 Specification 3.8.1.1.b.2.a will require a minimum volume of 49,500 gallons to be maintained in the tornado-protected No. 1A FOST. This volume is sufficient to support operation of No. 1A EDG at greater than 4000 kW for seven days.

These changes apply the upgraded capacities of the existing EDGs to the licensing basis for the current minimum fuel oil volumes of Nos. 11 and 21 FOSTs. Additionally, the proposed Technical Specifications for No. 1A FOST is consistent with the basis for the Technical Specifications.

- **Action Statements 3.8.1.1.f** and **3.8.1.1.g** - The proposed change to the Unit 1 Technical Specifications also considers the change to the Fuel Oil System configuration, as discussed above. The revised configuration, as depicted in Attachment (6), Figure 2, includes two completely independent fuel oil supplies for Nos. 1A and 1B EDGs. Number 1A FOST, which supplies fuel oil to No. 1A EDG, is located within the new Seismic Category I EDG Building, and is therefore protected from external events, including tornados. Normally, No. 1B EDG will be aligned to No. 21 FOST, which is also protected from tornados and tornado missiles; however, the capability exists to align this EDG to No. 11 FOST, which is not protected from the effects of tornados. The proposed Technical Specifications for the new Fuel Oil System configuration are based upon maintaining the licensing basis for the existing Technical Specifications, as discussed below:

  1. As the only source of fuel oil for No. 1A EDG is No. 1A FOST, the Action Statement for an inoperable No. 1A FOST (proposed Action Statement 3.8.1.1.f) was based upon the Action Statement for one inoperable diesel generator (Action Statement 3.8.1.1.b). This is a 72-hour Action Statement which also requires that the operability of the remaining AC sources be demonstrated within one hour and that the operability of the other EDG for that unit be demonstrated within 24 hours. Similarly, if Nos. 11 and 21 FOSTs are both declared inoperable, No. 1B EDG would be considered inoperable; therefore, proposed Action Statement 3.8.1.1.g is also based upon the Action Statement for one inoperable diesel generator. In both cases, verifying that the operable EDG is aligned to an operable tornado-proof FOST (either No. 21 FOST for No. 1B EDG, or No. 1A FOST for No. 1A EDG) ensures a sufficient volume of fuel oil is available to operate post-accident loads on Unit 1 for 7 days. The basis for comparing Action Statement 3.8.1.1.b with inoperable fuel oil supplies is that in both cases, Unit 1 will still be served by a fully operable EDG with a tornado-protected fuel oil supply.

2. Since two FOSTs are available to No. 1B EDG, this EDG will still be operable if either tank is lost. With at least 85,000 gallons of fuel oil in either No. 11 or No. 21 FOST, No. 1B EDG is capable of providing the emergency power necessary to shut down Unit 1 following a design basis event on Unit 1. Furthermore, the availability of Nos. 11 and 21 FOSTs has no effect on the operability of No. 1A EDG, which maintains its own tornado-protected fuel oil supply. Therefore, No. 1A EDG will still be available to shut down Unit 1 in either a tornado or design basis event. Based on the redundant EDGs and FOSTs available to Unit 1, Action Statement 3.8.1.1.h will be added to require that if either No. 11 or No. 21 FOST is inoperable, ensure that the other FOST is aligned to No. 1B EDG, and that a sufficient volume of fuel oil is maintained in the operable FOST to supply accident loads for one unit and normal shutdown loads for the other unit for 7 days (85,000 gallons).

- **Technical Specification 3/4.8.1.2** provides the requirements necessary to ensure that the minimum AC electrical power sources are available to a shutdown unit. Action Statements 3.8.1.2.c and d currently identify the required actions, if either No. 11 or No. 21 FOST is declared inoperable. Currently, with only No. 11 FOST inoperable, the operability of No. 21 FOST must be demonstrated, and with only No. 21 FOST inoperable, fuel handling operations must be suspended within 72 hours. For clarity, the Action Statement for No. 21 FOST inoperable will be expanded to delineate the actions required to verify the operability of No. 11 FOST. In this Action Statement, No. 11 FOST will be required to have a minimum volume of 85,000 gallons, and to be aligned to the operable EDG. Additionally, for Unit 1 only, Action 3.8.1.2.d will be added to immediately suspend fuel handling operations if No. 1A FOST is declared inoperable while No. 1A EDG is required to be operable. Immediate suspension of core alterations is appropriate when relying on No. 1B EDG and both No. 11 FOST and No. 21 FOST are inoperable or when relying on No. 1A EDG and No. 1A FOST is inoperable, because Unit 1 would be left without an operable fuel oil supply for any of its EDGs, and not have a fully operable EDG. In like fashion, immediate suspension of core alterations is appropriate when relying on No. 2A EDG or 2B EDG and both No. 11 FOST and No. 21 FOST are inoperable, because Unit 2 would be left without an operable fuel oil supply for either of its EDGs, and would not have a fully operable EDG.

CONCLUSION

We request that the NRC grant our proposed changes to the Unit 1 and Unit 2 Technical Specifications. These changes were prompted by two significant modifications to the plant: (1) the addition of No. 1A EDG, and (2) the upgrade of the electrical capacity of two of the three existing Fairbanks Morse EDGs. The addition of No. 1A EDG provides the plant with a greater degree of flexibility when an EDG is being overhauled or tested during refueling outages. The increased electrical capacity of the existing Fairbanks Morse EDGs will result in greater flexibility in the choice of discretionary loads for the mitigation of accidents. Based upon the ability of the Technical Specifications to adequately demonstrate the reliability of the EDGs in the past 20 years, and the understanding that the EDG upgrades will not significantly alter the method by which the EDGs operate, we believe that the proposed Technical Specifications will still provide an adequate demonstration of ability of the three existing EDGs to perform their safety function: to

provide a reliable source of electrical power to the safety related busses to operate the necessary accident mitigation equipment, should offsite power be lost. Furthermore, we have determined that these changes do not create an undue risk to the public health and safety.

REFERENCES

(a) Letter from Mr. R. E. Denton (BGE) to NRC Document Control Desk, dated May 7, 1993, Response to the Station Blackout Rule

(b) Letter from Mr. D. G. McDonald, Jr. (NRC) to Mr. R. E. Denton (BGE) , dated September 22, 1993, Supplemental Safety Evaluation of Response to the Station Blackout Rule, 10 CFR 50.63 - Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. M86999 and M87000)

(c) Letter from Mr. R. E. Denton (BGE) to NRC Document Control Desk, dated December 18, 1992, Emergency Diesel Generator Project - Civil Engineering Design Report

(d) Letter from Mr. R. E. Denton (BGE) to NRC Document Control Desk, dated April 7, 1993, Emergency Diesel Generator Project - Diesel Generator Qualification Report, Revision 1

(e) Letter from Mr. R. E. Denton (BGE) to NRC Document Control Desk, dated July 20, 1993, Emergency Diesel Generator Project - SACM Design Generator and Mechanical System Design Report

(f) Letter from Mr. R. E. Denton (BGE) to NRC Document Control Desk, dated July 26, 1993, Emergency Diesel Generator Project - Electrical Engineering Design Report

(g) Letter from Mr. R. E. Denton (BGE) to NRC Document Control Desk, dated August 25, 1993, Emergency Diesel Generator Project - Instrumentation and Control Systems Design Report

(h) Letter from Mr. D. G. McDonald, Jr. (NRC) to Mr. R. E. Denton (BGE), dated June 27, 1994, Emergency Diesel Generator Project - Civil Engineering Design Report on the Emergency Diesel Generator Project - Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. M85222 and M85223)

(i) Letter from Mr. D. G. McDonald, Jr. (NRC) to Mr. R. E. Denton (BGE), dated May 19, 1993, Class 1E Emergency Diesel Generator Qualification Report, Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. M85715 and M85716)

(j) Letter from Mr. D. G. McDonald, Jr. (NRC) to Mr. R. E. Denton (BGE), dated March 1, 1994, Emergency Diesel Generator Project - Societie Alsacienne De Constructions Mechaniques De Mulhouse (SACM) Diesel Generator and Mechanical System Report - Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. M87070 and M87071)

(k) Letter from Mr. D. G. McDonald, Jr. (NRC) to Mr. R. E. Denton (BGE), dated February 14, 1994, Emergency Diesel Generator Project - Electrical Engineering Design Report, Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. M87130 and M87131)

(l) Letter from Mr. D. G. McDonald, Jr. (NRC) to Mr. R. E. Denton (BGE), dated June 27, 1994, Emergency Diesel Generator Project - Instrumentation and Control Systems Design Report - Calvert Cliffs Nuclear Power Plant, Units Nos. 1 and 2 (TAC Nos. M87556 and M87557)

(m) Letter from Mr. G. C. Creel (BGE) to NRC Document Control Desk, dated September 5, 1991, Request for Amendment to Operating Licenses

(n) NUREG-1432, "Standard Technical Specifications - Combustion Engineering Plants," dated September 1992

(o) Letter from Mr. R. E. Denton (BGE) to NRC Document Control Desk, dated August 2, 1994, License Amendment Request; Emergency Diesel Generator Crankcase High Pressure Trip

(p) Letter from Mr. D. G. McDonald (NRC) to Mr. R. E. Denton (BGE), dated March 3, 1995, Issuance of Amendments for Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. M90122 and M90123)

(q) Letter from Mr. R. E. Denton (BGE) to NRC Document Control Desk, dated August 17, 1993, Emergency Diesel Generator Upgrade Project

(r) Letter from Mr. D. G. McDonald, Jr. (NRC) to Mr. R. E. Denton (BGE), dated February 10, 1994, Qualification Testing Program for Emergency Diesel Generator Upgrade Project - Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. M87249 and M87250)

(s) Letter from Mr. R. E. Denton (BGE) to NRC Document Control Desk, dated October 9, 1992, License Amendment Request; Diesel Fuel Oil Technical Specifications

ATTACHMENT (2)

DETERMINATION OF SIGNIFICANT HAZARDS

Baltimore Gas & Electric Company
Docket Nos. 50-317 and 50-318
November 1, 1995

ATTACHMENT (2)

DETERMINATION OF SIGNIFICANT HAZARDS

The proposed change has been evaluated against the standards in 10 CFR 50.92 and has been determined to not involve a significant hazards consideration, in that operation of the facility in accordance with the proposed amendments:

1. *Would not involve a significant increase in the probability or consequences of an accident previously evaluated.*

   The Engineered Safety Features (ESF) electrical system provides a reliable source of electrical power to the 4.16 kV ESF busses to operate the necessary accident mitigation equipment, should offsite power be lost. The proposed change to the Units 1 and 2 Technical Specifications was prompted by two significant modifications to this system — the addition of No. 1A Emergency Diesel Generator (EDG) and the upgrade of the electrical capacity of two of the three existing Fairbanks Morse EDGs. The addition of No. 1A EDG provides the plant with an ESF electrical system configuration consisting of two EDGs dedicated to each unit, thereby eliminating reliance upon a "swing" diesel capable of being aligned to either unit. The four-EDG configuration provides a greater degree of flexibility when an EDG is being overhauled or tested during refueling outages. The increased electrical capacity of the existing Fairbanks Morse EDGs will give the operators greater flexibility in the choice of discretionary loads for the mitigation of accidents. Both modifications necessitate changes to the Technical Specifications.

   The ESF electrical system, including the four EDGs, is used to mitigate the consequences of an accident. The design of the new No. 1A EDG is such that incorporation of this EDG into the existing ESF electrical system does not result in this system becoming an accident initiator. Furthermore, the modification to upgrade the capacity of the existing EDGs will enhance the plant operators' ability to mitigate accidents by allowing greater flexibility in the choice of discretionary loads, but will not change the configuration of the ESF electrical system or any support systems such that the EDGs would become an accident initiator. Therefore, the proposed change would not increase the probability of an accident previously evaluated.

   The addition of the safety-related No. 1A EDG to the ESF electrical system will enhance the ability to provide reliable electric power during all modes of operation and shutdown conditions of the plant. Number 1A EDG and its support systems are designed such that failure of a single component will not prevent the capability to safely shut down the plant and to maintain the plant in a safe shutdown condition. Furthermore, non-safety-related systems associated with No. 1A EDG are designed so that their failure will not result in the loss of function of any safety-related system. The proposed Technical Specifications will demonstrate the reliability and capability of No. 1A EDG and the upgraded Fairbanks Morse EDGs to perform their accident mitigation function. Implementation of the proposed Technical Specifications will not reduce the ability of the EDGs to perform their safety functions. The increased volume of fuel oil necessary to support operation of No. 1A EDG and the upgraded Fairbanks Morse EDGs will not adversely impact the ability of any systems to perform their safety functions. The auxiliary systems which required modification or analysis to support the upgraded ratings of the Fairbanks Morse EDGs will not adversely impact operation of any other plant systems necessary to mitigate the consequences of an accident. Therefore, the proposed change would not increase the consequences of an accident previously evaluated.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. *Would not create the possibility of a new or different type of accident from any accident previously evaluated.*

The proposed change adds Surveillance Requirements, Limiting Conditions for Operation, and Action Statements to reflect the addition of a new EDG to the ESF electrical system, and upgrades the electrical capacity of the existing Fairbanks Morse EDGs. This change does not add any new equipment, modify any interfaces with any existing equipment, or change the equipment's function, or the method of operating the equipment to be modified. The system will continue to operate in the same manner as before the capacity upgrades were implemented. The additional fuel oil required to support the capacity upgrades will be stored in the existing Seismic Category I Fuel Oil Storage Tanks. The modified EDGs will continue to serve a function as accident mitigators, and will not become an initiator of any accident.

The NRC has reviewed the design of the new EDG, its attendant support systems and the new EDG Building, and concurs with Baltimore Gas and Electric Company's determination that the design satisfies the design requirements for a safety-related EDG. Number 1A EDG is a tandem engine-single generator set, and is physically very different from the existing single engine-generator Fairbanks Morse EDGs. However, the 4.16 kV three-phase rated electrical output is the same as that provided by the Fairbanks Morse EDGs to the other ESF busses. The excess capacity of No. 1A EDG will allow the operators greater flexibility in choosing post-accident discretionary loads, but will not cause any detrimental effects to the ESF busses or the equipment served by those busses. Operation of No. 1A EDG in accordance with these proposed Technical Specifications will not jeopardize the operation of any other plant systems. Furthermore, locating No. 1A EDG and its fuel oil supply in a separate Category I building provides additional assurance that this equipment will not become an initiator of any accident.

Therefore, the proposed change does not create the possibility of a new or different type of accident from any accident previously evaluated.

3. *Would not involve a significant reduction in a margin of safety.*

The safety function of the EDGs and the ESF electrical system is to provide a reliable source of electrical power to the safety-related busses to operate the necessary accident mitigation equipment, should offsite power be lost. The margin of safety associated with this safety function is two-fold: (1) a level of redundancy must be designed into the EDGs and the ESF electrical system such that the single failure criteria is met; and (2) the power supplied to the ESF electrical system by the EDGs must be sufficient to power the necessary accident mitigation equipment, should offsite power be lost.

The addition of No. 1A EDG provides the plant with an ESF electrical system configuration consisting of two EDGs dedicated to each unit, thereby eliminating reliance upon a swing diesel capable of being aligned to either unit. In the current configuration, the facility meets the single failure criteria on a "per site" basis. However, as a result of the new four-EDG configuration, each unit will have redundant diesel generators to supply power to redundant safety-related equipment required for safe shutdown or accident mitigation. Therefore, the new four-EDG configuration may be considered an increase in the margin of safety.

At the completion of the modifications to increase the capacities of the Unit 2 EDGs and to install the new No. 1A EDG, we will have diesel generators with more available margin than currently exists. This will provide the operators with more flexibility during conditions where the diesel generators are providing onsite power. The higher electrical capacities will result in an increase in the margin between the EDGs' electrical capacities and the electrical power required to operate safety-related equipment required for safe shutdown or accident mitigation. Therefore, these modifications may be considered an increase in the margin of safety.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

ATTACHMENT (3)

UNIT 1

TECHNICAL SPECIFICATION

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