



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

December 10, 1999

LICENSEE: Baltimore Gas and Electric Company

FACILITY: Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2

SUBJECT: SUMMARY OF THE NOVEMBER 15, 1999, MEETING REGARDING CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1 RE: EMERGENCY DIESEL GENERATOR (EDG) 1A MINIMUM LOAD ISSUE (TAC NO. MA6946)

On November 15, 1999, the Nuclear Regulatory Commission (NRC), and Baltimore Gas and Electric Company (BGE/licensee) held a meeting in One White Flint North, Rockville, Maryland, to discuss the Calvert Cliffs Nuclear Power Plant, Unit No. 1 EDG 1A minimum load issue. Enclosure 1 is a list of attendees. Enclosure 2 is a copy of the viewgraphs distributed at the meeting.

The licensee opened the meeting with a presentation on the background of EDG 1A. They presented the technical statistics of all of the site EDGs, their electrical line-ups, and the operating history of EDG 1A. EDG 1A is a unique EDG for the site, in that:

1. It is manufactured by a different vendor than the other EDG's (SACM vs. Fairbanks Morse)
2. It was installed in 1995 whereas the other three EDG's were installed during original plant construction.
3. It has a larger capacity than the other three EDG's (5400 kW vs. 3000 kW continuous rating).

Late in 1997 and early 1998, the licensee became aware that the vendor would not guarantee the long-term operation of EDG 1A at less than 30 percent of rated load capacity. The vendor has little documented experience of the effects of operating this type of EDG under "light load." Even though the licensee expects that EDG 1A will perform its safety function at less than 30 percent loading, they decided to ensure that it would not be lightly loaded until more information can be obtained validating its ability to operate under light loads.

The licensee discussed the actions taken since 1998 to ensure that EDG 1A would not be lightly loaded. These actions included installing a temporary load bank during the 1998 Unit 1 refueling outage, establishing a "load list" used by operators to verify adequate loads are available on a shiftly basis, and installing a temporary light load alarm in the control room to alert operators of a light load condition during EDG 1A operation.

The staff informed the licensee that the use of non-safety loads in the "load list" would constitute an unresolved safety question and that the use of non-safety loads for operability of the EDG 1A need prior staff approval.

The licensee then provided their risk assessment of the issue. They estimated that this issue presents a 3 E-9 to 5 E-8 increase in core damage frequency and a 3 E-10 to 6 E-9 increase in large early release frequency. Both of these increases were characterized as negligible.

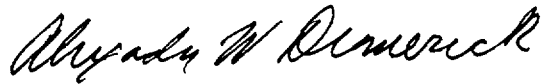
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NRC FILE REENTER END

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The licensee discussed how the issue was handled under the guidance of Generic Letter 91-18. They felt the issue was handled under the appropriate processes and plant safety was always maintained. The licensee provided a description of some of the options being pursued to permanently resolve this issue. One of the options includes running a similar EDG unloaded for a period of 7 days to demonstrate that no-load operations do not degrade the EDG.

The licensee indicated that this issue will be resolved by the spring 2000 refueling outage.



Alexander W. Dromerick, Sr. Project Manager, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-317

Enclosures: 1. List of Attendees
2. Meeting Handouts

cc w/encls: See next page

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Unit Nos. 1 and 2

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LIST OF ATTENDEES

BALTIMORE GAS AND ELECTRIC COMPANY

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1

NOVEMBER 15, 1999

NAME	ORGANIZATION
Alexander Dromerick	NRR/DLPM
Bruce Montgomery	BGE
Bruce Mrowca	BGE
Gary Detter	BGE
Kevin Cellers	BGE
Tom Sydnor	BGE
Craig Sly	BGE
Peter Katz	BGE
Mike Narvin	BGE
T. N. Pritchett	BGE
Steve Looper	BGE
Sheri Peterson	NRR/DLPM
Elinor Adensam	NRR/DLPM
Wayne Lanning	NRC/R-I
Dale Thatcher	NRR/EEIB
Om Chopra	NRR/EEIB
Jose Calvo	NRR/EEIB
Michael Modes	NRC/R-I
See-Meng Wong	NRR/SPSB
Peter Wilson	NRR/SPSB
Scott Stewart	NRC/SRI
Michele Evans	NRC/R-I
April Smith	NRC/R-I
Dan O'Neal	NRR/SPSB

MEETING AGENDA FOR EDG 1A MINIMUM LOADING

DATE/TIME: November 15, 1999; 1:30 – 4:00 pm
LOCATION: NRC Headquarters, White Flint

PURPOSE: Develop a common understanding of the issues surrounding the CCNPP EDG 1A Minimum Loading Issue

Desired Outcomes: *By the end of this meeting, we will have:*

- ◆ A Common Understanding of the EDG 1A Minimum Load Issue
 - Background and History of the EDG 1A Minimum Load Issue
 - Strategy for Resolving the EDG 1A Minimum Load Issue
 - Safety Significance of the EDG 1A Minimum Load Issue
 - Common Understanding of our Basis for Operability
- ◆ Awareness of Potential Licensing Actions to Resolve the EDG 1A Minimum Load Issue

AGENDA			
TOPIC (content)	PROCESS	WHO (leader)	TIME (minutes)
Meeting Introductions: • Opening	– Presentation	K. B. Cellars	5 min
Define the 1A EDG Minimum Load Issue (Desired Outcome)	– Presentation	T. L. Sydnor	20 min
Background/History/Strategy for Final Resolution (Desired Outcome)	– Presentation	T. L. Sydnor	20 min
Safety Significance	– Presentation	B. B. Mrowca	10 min
Basis for Operability	– Presentation	G. L. Detter	20 min
Questions & Answers	– Discussion	All	30 min
Wrap-up	– Discussion	K. B. Cellars	10 min

BGE
Presentation to
NRC

November 15, 1999

CCNPP Emergency Diesels

1B, 2A, 2B

- **Fairbanks, OP, 8 and 1/8**
- **3000 KW (Continuous)**
- **Opposed Piston**
- **12 Cylinder**
- **900 rpm**
- **4 gpm fuel**

CCNPP Emergency Diesels

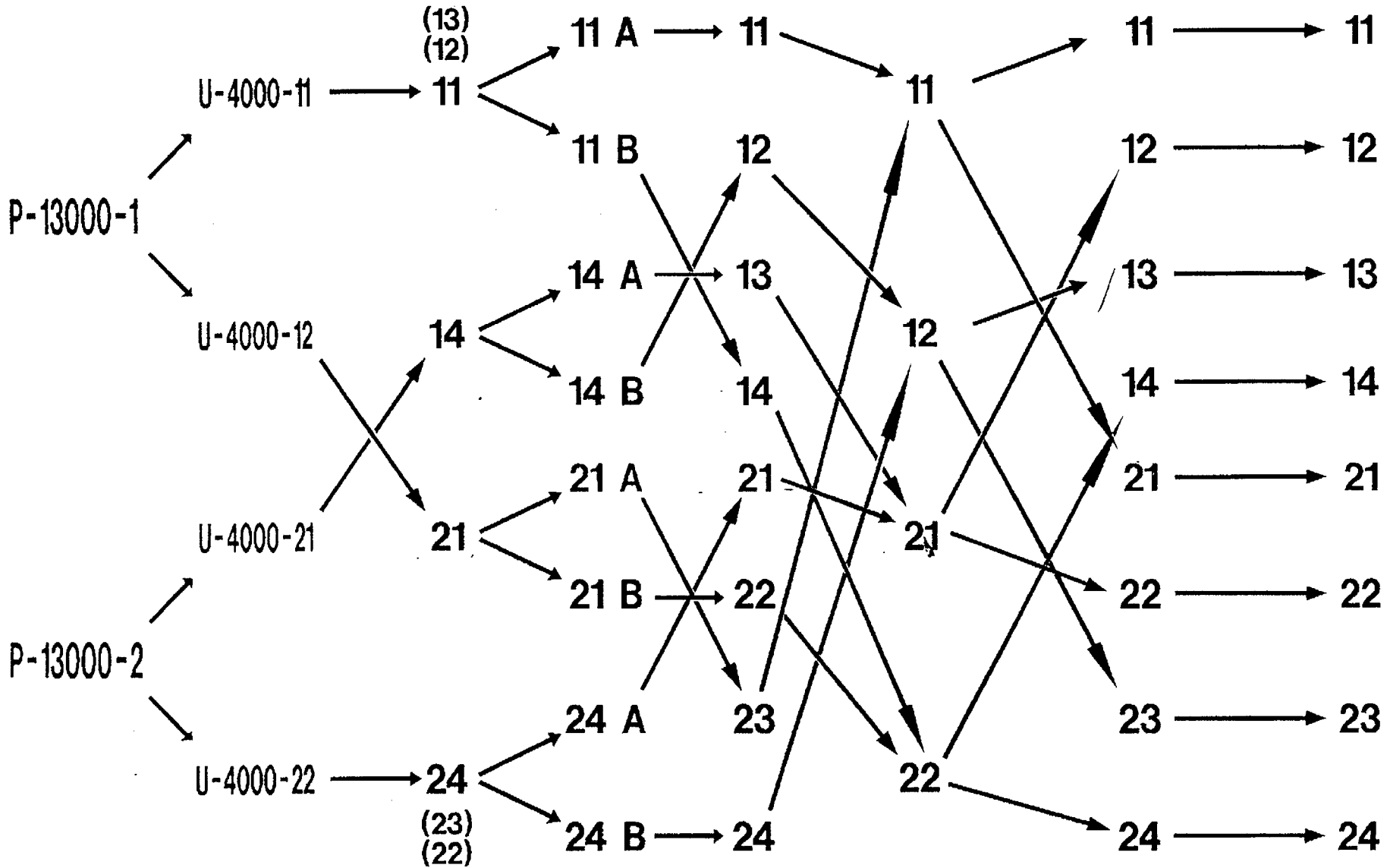
1A, OC

SACM UD 45 V-16

- **5400 KW**
- **TANDEM**
- **V-16 (2)**
- **1200 rpm**
- **6 gpm Fuel**

13 KV 4 KV 4 KV 480^V BAT 125^{VDC} INVERTER 120^{VAC}
 TRNSFMR CHGR

() = NSR



History

1995	OC	1st Bus Tie
1996	1A	Tied to 11 Bus
	OC	Tied to 2 Add'l Busses
1997	OC	Tie In To Final Bus
	2A	Upgraded to 3500 KW
1998	1A	Low Load Concern for RFO; Load Bank
	1B	Upgraded to 3500KW
1999	2B	EDG - Cooling Tower for SW/SRW H/X Installation
	1A	No Impact

FROM INSTALLATION

Precautions were placed

in Operating

Procedures To

MINIMIZE Unloaded

Operation

Minimum Load History

11/97 Asked for SACM input on low load operation during '98 RFO.

11/97 "... 30% of load is the minimum step of smart operation for this kind of engine."

Began load analysis

12/97 Determine meaning of "smart operation."

SACM: Long term operation at <30% load could affect engine reliability.

3/98 SACM . . . Minimum experience with light load operation.

98 RFO: Temporary Load Bank

Minimum Load History

- 5/98 **MPR hired to assist . . .**
- Capable of extended no load operation
 - Design changes to enhance tolerance
- 10/98 **Based on K-T decision analysis
install load bank.**
- 7/99 **Changed action plan to back feed
other busses.**
- 10/99 **Ready to proceed with back feed
project (ECD Spring 2000).**

Self Assessment

- **On-going from initial engine selection.**
- **System Manager only got restrictions after pressing SACM.**
- **Alternatives evaluated for addressing issue.**
 - Cost
 - Effectiveness
 - Timeliness
 - Safety Significance

Supervisory Involvement

- **Monthly Report Card Summary**
- **EDGs on “Top 10” List**
- **Operability Determination**

Risk Assessment

- **Low safety significance.**
- **Engines handled conservatively until success can be proven.**
- **MPR supports low load capability even with SACM uncertainty**
 - Cooper-Bessemer test
 - Industry experience
 - 2 vs. 4 Stroke Engine

Resolution

TEST - There are options!

Spare Engine

Off-Site

Low Load

No Load

Long Lead Time

OC Engine

Uncoupled vs. as installed

No Load

Short Lead Time

Pending 50.59 Screen; USQ?

Desired Outcome:

“Successful” Run + No Load Lists

Other Options

- **Continue backfeed mods (*License Action Required*).**
- **Outage sequencing alternatives.**
- **Other mods (long term).**
- **Continue with interim load list and Safety-Related load plan.**

Operability

During RFO - used NSR load bank via Temp Mod.

Initially used load lists (ie: NSR loads to maintain; SR loads preferred).

SR/NSR mix used ~ 1% of time.

Currently credit only Safety-Related loads for operability.

Summary

- **Engines expected to perform at low load.**
- **Low/No Load test is the proof.**
- **Safety-Related loads are available.**
- **NSR loads allow additional loading.**
- **Other Interim actions.**

Our Goal: No load list

SACM Diesel Generator Minimum Load

	CDF Increase	LERF Increase
Change given 1A EDG and 0C DGwith 8 hr limit.	1.3E-4	1.5E-5
Likelihood of insufficient load post trip (less than 1620kW)	0.2% to 0.4%	0.2% to 0.4%
Likelihood of light load condition failing the DGs	1 % to 10%	1 % to 10%

Total Change in Risk 3 E-9 to 5E-8 3 E-10 to 6E-9

Hypothetical Diesel Vulnerability

	CDF Increase	LERF Increase
Change given 1A EDG and 0C DG with 8 hour limit.	1.3E-4	1.5E-5

Key Points

- Assumes condition always exists.
- Addresses impact on Unit 1 at-power.
- Considers both internal and external events.
- Does not credit additional recoveries.
- Uses updated LOOP frequencies - latest EPRI Technical Report.

Light Load Exposure

Likelihood of light load following trip = 0.2% to 0.4%

Key Points

- NSR loads will likely be available.
- No initiating events cause the loss of SW post trip concurrent with a long duration LOOP.
- 0.3 % (Saltwater) + 0.1% (Post Trip) = 0.4 %
- Available load during SW header outage is over 60% Safety-Related.
- SW header outage will likely be recovered before 8 hours.

EDG Reliability

**Likelihood of light load condition failing
the DGs is 1% to 10%**

Key Points

**- Operating Experience: Similar designs have run
under light load.**

SACM Diesel Generator Minimum Load

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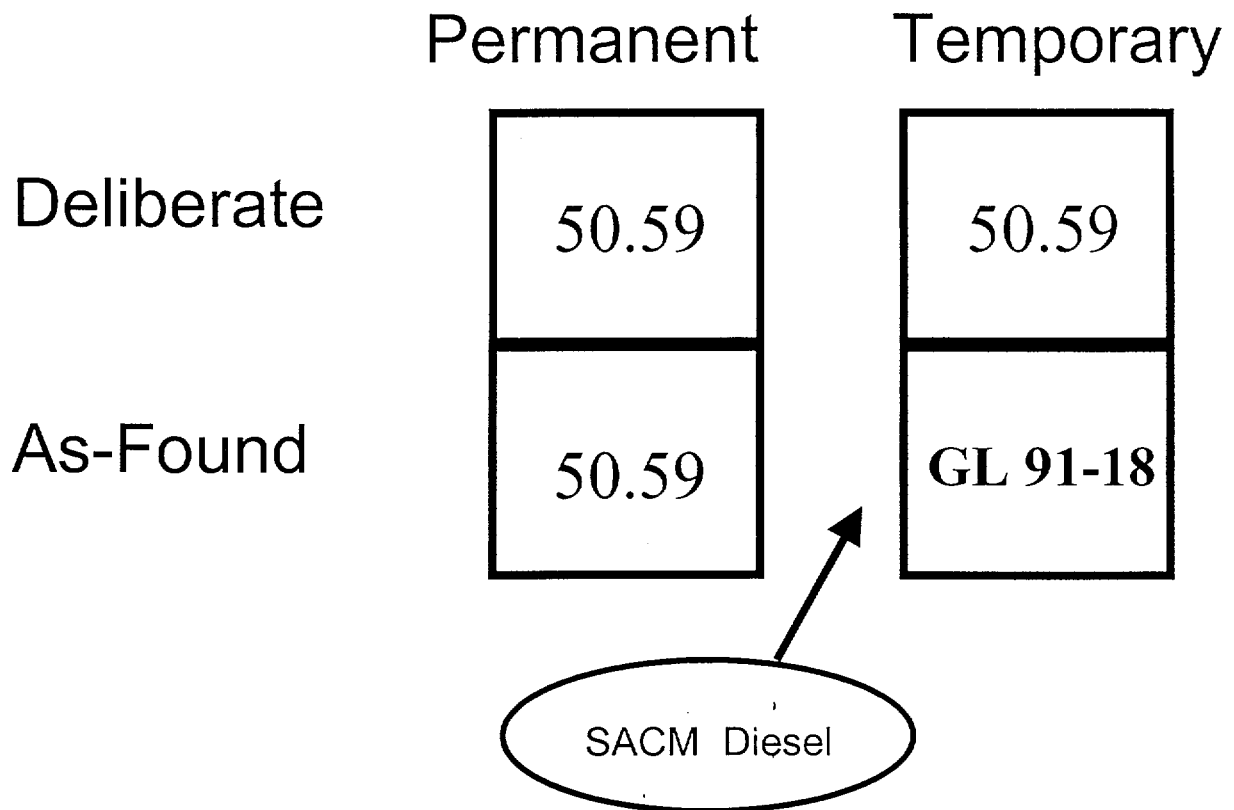
Total Change in Risk	3 E-9 to 5E-8	3 E-10 to 6E-9
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Design's Goal

For both Unit 1 shutdown and Unit 1 at power, find safe and legal approach to handle and resolve the issue

Assumed DG is susceptible...

10 CFR 50.59 vs. GL 91-18



- Condition is imposed, not proposed change, test or experiment
- Condition is temporary
 - Fix before next Unit 1 outage
 - Pursue aggressively. No discretionary delays

GL 91-18 Applies

- **Licensing basis: Assumes that SACM Diesel Generators can perform their safety functions without regard for light load.**
- **Actual: SACM might be susceptible**

-
- **Degraded condition per GL 91-18**
 - **Because of the difference, “Accept as-is” would be a USQ unless testing or vendor certifies the Diesel Generators are good.**

Condition is subject to Appendix B

- Actions commensurate with safety significance
 - CDF reviewed several times
 - “Top tier” CA category
- Major modification planned and funded but ...
 - Took longer than expected.
 - Changed approach as options were pursued.
 - Regulatory approval one factor in option selection

Compensatory Action

- **Required evaluation under 50.59**

“... Intent is to determine whether the compensatory action itself (not the degraded condition) impacts other aspects of the facility described in the SAR...” -- GL 91-18 Rev 1

SPECIFICALLY:

For NSR loads, few have SAR-described functions. If they would be operated in a way that caused other SAR-described equipment to fail (not the SACM EDG) then the comp action would be a USQ.

No other SAR-described functions were found to be affected

Conclusion

- Actions to resolve were pursued appropriately
- Interim actions were appropriately evaluated under 50.59 per GL 91-18. We found no USQ
- Provided reasonable assurance that the plant equipment performs its safety function.

We followed appropriate processes and maintained safety

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