DRAFT

FaAA-85-2-12
PA10089/LAS

INVESTIGATION OF ENGINE BEARING DISTRESS IN FAIRBANKS-MORSE EMERGENCY DIESEL GENERATORS AT ENRICO FERMI II POWER PLANT PHASE I: INSPECTION AND PRELIMINARY CONCLUSIONS

Prepared by

Failure Analysis Associates
Palo Alto, California

Prepared for

Detroit Edison Company

February 1985

EXECUTIVE SUMMARY

As part of the Detroit Edison Company's problem identification and corrective action program for the engine bearings in the Enrico Fermi II Nuclear Power Plant Fairbanks-Morse emergency diesel generators, Failure Analysis Associates (FaAA) was requested to perform an inspection and appropriate ancillary analysis of the affected components.

The results of the investigation, which included physical inspection, analytical modeling, and a comparative analysis performed by Detroit Edison engineering personnel, all consistently indicate that the most probable cause for the bearing distress is marginal or insufficient lubrication of the upper crankshaft bearings during fast nuclear starts. Numerous other contributing factors were considered and eliminated, based on the consistent weight of all of the evidence.

Recommended actions to prevent a recurrence of the bearing distress are to adopt procedures to prelubricate the upper crankshaft and bearings prior to all scheduled starts, and to conduct inspections on a rational basis to detect this progressive degradation before it reaches the stage that compromises emergency diesel generator reliability.

Confirmatory analytical investigations, including a parametric Journal Orbit Analysis of the main bearings, and the results of a metallurgical investigation of one of the less severely distressed main bearings will be presented in a subsequent report.

Notice

This report is currently in DRAFT status, awaiting completion of the independent review of technical work required by Failure Analysis Associates Quality Assurance Procedures. This report is issued to the client for informational purposes prior to the completion of the required reviews. It is anticipated that both this report and the Phase II report will be issued in final, reviewed form by the week of March 11, 1985

1.0 INTRODUCTION

At the request of the Detroit Edison Company (DECO), Failure Analysis Associates (FaAA) was engaged to conduct an inspection and analysis of damaged components discovered following the trip of the No. 11 Fairbanks-Morse Emergency Diesel Generator at Enrico Fermi II Power Plant. Information from engineers at Fermi II indicated that two trips occurred almost simultaneously, 14 minutes into a standard surveillance run on January 10, 1985. While running a full rated load, 2850 KW, the engine tripped on low lubricating oil pressure, followed a few milliseconds later by a high crankcase pressure signal. Initial diagnosis revealed abnormally low differential pressure across the oil filter and abnormally high differential pressure across the oil strainer downstream from the oil filter. Subsequent inspection of the strainer revealed massive amounts of metallic debris blocking it. Upon disassembly of the engine, a number of components were discovered to be damaged, including ~~six~~ eight main bearing shells, ~~three~~ seven connecting rod bearing shells, three pistons, and three cylinder liners. As part of DECO's program to understand this event and prevent its recurrence, FaAA was asked to participate in the inspection and analysis.

2.0 INSPECTION AND OBSERVATIONS

On January 25, 1985, Lee A. Swanger of FaAA arrived at Fermi II for a briefing and inspection of EDG 11 and EDG 12. (Fermi II's four emergency diesel generators are designated EDG 11, EDG 12, EDG 13, and EDG 14.) The primary purpose of FaAA's involvement was to perform independent physical and metallurgical inspections with supporting analytical calculations as required. A secondary purpose was to contribute to the overall problem identification and correction program being conducted by DECO.

EDG 11:

Inspection of the components of the disassembled diesel revealed the following damage:

Upper crankshaft: deposited bearing alloy and scoring of crankpin journals #2, #3, and #4 by connecting rods.

Upper crankshaft main bearing shells: #1 through #7 and #13 (thrust bearing) showing various amounts of surface distress and axial deformation.

Upper crankshaft connecting rod bearing shells: #1 through #7, showing various amounts of surface distress and axial deformation, except #2, #3, and #4 which were completely destroyed.

Upper pistons #2, #3, and #4: fracture of the bottom land below the bottom oil control ring (bottom being farthest from the combustion bowl).

Connecting rods #2, #3, and #4: scoring of the big and inner diameter; heat-tint discoloration of big end.

Additional components were inspected and found to be undamaged. These included the remaining main and connecting rod bearing shells from the upper crankshaft, all the bearing shells from the lower crankshaft, the remaining pistons, all areas of pistons #2, #3, and #4 except for the fractured bottom land, all piston rings, wrist pin bushings, vertical drive gears, lower crankshaft, upper main bearing saddles and bearing caps, main and connecting rod bearing cap bolts, lubricating lines and fittings, fuel injector camshaft lobes, cylinder liners, and cylinder block. In particular, the undamaged bearing shells from the upper crankshaft were in excellent condition, showing the normal, expected patterns developed by a properly functioning bearing in a turbocharged diesel engine.

EDG 12:

Because metallic particles had been found in the oil filter, DECO had partially disassembled EDG 12 for inspection. Other than the presence of these particles, there were no other symptoms associated with the operation or maintenance of EDG 12. Distressed components were:

Upper crankshaft main bearing shells: #1, #2, #3, #7, and #8 showed various amounts of surface pullout on the top (loaded) bearing surface.

Upper crankshaft connecting rod bearing shells: one bearing shell showed initial signs of distress and loss of free spread (diametral measurement).

Other available components of EDG 12 were also inspected, including the upper crankshaft, remaining bearing shells, pistons, connecting rods, upper crank bearing saddles, and fuel injection camshaft lobes. All of these components were in the normal condition for a turbocharged diesel engine and showed no signs of any form of distress.

EDG 13:

EDG 13 was asymptomatic, including filter inspection, but the top main bearing shells of the upper crankshaft, #1 through #6, and the upper crankshaft connecting rod bearing shells #1 through #6 were removed for visual inspection. All of these bearing shells inspected by FaAA showed three zones on the inner diameter. Near the parting lines (the mating surfaces between pairs of bearing shells) the original machining marks are visible. Closer to the center of the bearing, there is a frosted appearance, in which the machining asperities have been removed. In the loaded zone, at the center of the bearing, is a highly polished region in which all remnants of the original machining have been eradicated. The condition of these bearings was normal, with no evidence of distress.

EDG 14:

This engine was also asymptomatic but was opened for inspection of upper main and connecting rod bearings #1 through #6. These bearings were in excellent condition. Compared to the bearings from EDG 13, they showed even less evidence of normal wear. The bearings from EDG 14 showed only two zones, the as-machined surface near the parting lines and the frosted appearance toward the center. There was no polishing of the loaded zone.

Photographs were taken to record the appearance of the components inspected. Copies of these photographs have been supplied to the office of the Plant Superintendent of Enrico Fermi II Power Plant and so are not duplicated here.

3.0 DISCUSSION OF PROBABLE CAUSE OF FAILURE

Identification of the most probable cause of bearing failure has been based on comparative performance as well as direct inspection of the physical evidence. Comparison of the upper and lower crankshafts in EDG 11 tends to rule out engine-wide causes such as contaminated oil, cavitating oil pump, or overload exceeding bearing capacity. Also, since the parts are interchangeable, lack of distress on the lower crankshaft bearings is a strong indication that manufacturing defects in the bearing shells did not contribute to the failure.

Comparison of the operating procedures at Fermi II with those at other nuclear power plants with Fairbanks-Morse opposed piston engines was done by DECO engineers. According to DECO, their survey shows that every plant except Fermi II prelubricates the entire engine for 30 seconds to 3 minutes before every planned start of a diesel.

Fermi II appears to be unique in relying on a keep-warm circulating pump to prelubricate the lower crankshaft, and a starting-air actuated oil-boost cylinder to deliver about 1 1/4 gallons of oil in the upper crankshaft during the first three seconds of the engine start sequence. The differences between Fermi II upper crankshaft performance in the two engines with the highest usage--EDG 11 and EDG 12--and all lower crankshafts and upper crankshafts at other nuclear plants, raise concern about the adequacy of the air-oil boost upper crankshaft system for the required fast starts in nuclear service.

As an indicator of the demand on the air-oil boost system, a calculation of the oil passage volume in the bearings, crankshaft, and connecting rods was done. The volumes considered were the 360° grooves in the main bearings and in the connecting rod bearings, the internal passages in the crankshaft connecting the main journals to the crankpin journals, the drillings in the connecting rods that supply oil to the wrist pin bushings, and the clearance volume between the crankshaft and the bearing shells. These volumes total 230 cubic inches, which is 0.996 gallons. The oil passage volume is always completely interconnected, due to the 360° grooves in both

the main and connecting rod bearings. There will be an additional, but less quantifiable, demand on the air-oil boost system due to voids in both the air-oil manifold and piping, and in the main oil supply header and piping. The total volume to be filled very likely exceeds the 1 1/4 gallon supply from the air-oil boost system--especially after drain-down periods exceeding a few hours--so that lubrication during a fast start is unpressurized, depending on leakage from the internal passage system.

The physical evidence also indicates that lubrication at some point in the engine operation cycle is marginal. Lubrication at steady-state, full load conditions appears to be completely adequate, based on the condition of the undistressed upper crankshaft bearings and the other lubricated components of the engine. Also, most of the distressed bearings were still performing their function of facilitating relative motion between the crankshaft and associated components, indicating both a considerable margin of safety in the bearing design and a surplus in the quantity of oil delivered to the bearings under steady-state, full load conditions. The inner surface of the distressed bearings showed typical signs of intermittent seizure to the crankshaft, resulting in the pullout of material from the surface. Some main bearings showed so much surface distress that a lack of effective surface area decreased oil film thickness, allowing contact between the crankshaft and the bearing. This raised the bearing temperature, decreased its yield strength, and resulted in plastic flow in the axial direction (parallel to the crankshaft) and loss of free spread because of the temperature gradient through the thickness of the bearing.

Other possible causes of bearing distress can be ruled out based on the inspection results. Contaminated oil was not a contributor, since the #10 main bearing in EDG 11 was not damaged. The #10 main bearing and #4 main bearing are the most highly loaded main bearings, due to the cylinders on either side of these two positions firing only 60° apart. Overload of the engine was also not a root cause, again because the highly stressed #10 main bearing was undamaged, and because the piston rings--which are especially load-sensitive components--also showed only normal wear patterns and no glazing or scuffing.

Misalignment of the crankshaft relative to the engine block was not a contributor because misalignment manifests itself either as damage to the middle main bearings in the engine, or as damage to the main bearings at both ends of the engine.

Installation errors upon initial assembly of the engine may be ruled out because such errors characteristically leave signatures on the bearing backs (outer diameters) or on the bearing parting lines. No such indicators of misassembly were observed during the inspection.

Cavitation also was not a contributor to the bearing distress in EDG 11 and EDG 12. Cavitation is a result of hydraulic resonances and flow interruptions, and results from the hydraulic configuration of an engine. As such, it appears in characteristic and repeatable patterns in all bearing positions and all engines of a design and class that are hydraulically similar. Since no occurrence of cavitation was observed anywhere in EDG 13 or EDG 14, or on any of the undamaged bearings in EDG 11 or EDG 12, it can be concluded with a high degree of confidence that cavitation did not initiate the bearing distress in EDG 11 or EDG 12.

Manufacturing flaws also are an unlikely contributor to the observed bearing distress. The #7 top main bearing from EDG 11 was returned to the FaAA laboratory in Palo Alto for destructive analysis. A chemical analysis showed that the alloy meets all the requirements of the vendor-specified alloy, SAE 770 (see Table I). Metallographic examination of the microstructure showed the expected reticulated tin distribution, and minimal porosity from the casting process.

Bearing system design as a possible cause of the distress was evaluated by the technique of Journal Orbit Analysis [1]. Preliminary results of this analysis--which solves the partial differential equations of hydrodynamic lubrication for reciprocating machinery--are that the oil film thicknesses are acceptable, greater than 100 microinches in the main bearings and greater than 200 microinches in the connecting rod bearings. Also, the peak oil film pressures are within the capability of the SAE 770 material, being less than 23,000 psi in all bearing positions.

All of the physical, analytical, and comparative evidence is consistent and points to the most probable cause of bearing distress in EDG 11 and EDG 12 as being marginal lubrication during fast nuclear starts without upper crankshaft prelubrication.

4.0 RECOMMENDATIONS FOR FURTHER ANALYSIS

Scanning electron microscopy of the distressed surface of main bearing #7 from EDG 11 has been undertaken to look for microscopic evidence of any mode of attack other than the postulated intermittent seizure due to marginal lubrication. In addition, energy dispersive X-ray analysis of features on the distressed surface is being used to determine if any foreign material embedded in the surface may have contributed to bearing distress. This analysis will be reported in Phase II of this work.

A parametric study of the influence of oil inlet pressure on the properties of the oil film in the main bearings is being conducted using the Journal Orbit Analysis technique. The early results at steady-state, full load conditions indicate that the main bearings are the more sensitive in the Fairbanks-Morse engine. This is because in general the tolerance of a bearing to anomalous conditions is proportional to the minimum hydrodynamic oil film thickness developed. Journal Orbit Analysis predicts that effects of marginal lubrication would occur first in the main bearings because the films in the connecting rod bearings are twice as thick as those in the main bearings. This is also consistent with the physical evidence at Fermi II, in that it appears that the main bearings began to shed particulates from their surfaces, which were then carried into the connecting rod bearings, inducing damage to them. The results of this parametric study will also be included in the Phase II report.

5.0 RECOMMENDATIONS FOR CORRECTIVE ACTION

The primary recommendation from this investigation is that adequate lubrication needs to be supplied to the upper crankshaft during fast nuclear starts. The engines have already demonstrated an ability to tolerate a substantial number (more than 100) of automatic starts without prelubrication.

Because the damage done by marginally lubricated fast starts is cumulative, the failure mode is progressive. Thus the occurrence of bearing distress is amenable to monitoring. A reliable point to monitor is the full-flow oil filter. A program could be adopted to inspect the filter for aluminum particles at regular intervals, or after a reasonable member of automatic (un-prelubricated) starts--e.g., 25 unscheduled fast starts would trigger a filter inspection. If any particles are detected, they will be larger than the 5 micron (200 microinch) filtration cutoff and would then trigger a bearing inspection.

The bearings removed from EDG 13 and EDG 14 showed no reasons for not being replaced in the engines for continued use.

REFERENCES

1. Ross, J. M. and Slaymaker, R. R., "Journal Center Orbits in Piston Engine Bearings," SAE Paper 690114, Society of Automotive Engineers, Warrendale, Pennsylvania, 1969.

Table I

	#7 Main Bearing EDG 11	SAE 770 Specifications
Cu	1.25	0.7 - 1.3
Fe	0.32	0.7 max
Mg	0.035	0.10 max
Mn	0.028	0.10 max
Ni	1.13	0.7 - 1.3
Si	0.096	0.7 max
Sn	5.56	5.5 - 7.0
Zn	0.021	0.05 max
Ti	not analyzed	0.2 max
Al	balance	balance

ATTACHMENT E

Letter, W. H. Jens to J. G. Keppler, February 12, 1985,
Final Report of 10CFR50.55(e) Item 146 "Failure of
Emergency Diesel Generators Nos. 11 and 12"

Wayne H. Jens
Vice President
Nuclear Operations

Detroit Edison

Fermi-2
6400 North Dixie Highway
Newport, Michigan 48166
(313) 586-4150

February 12, 1985
EF2-70382

Mr. James G. Keppler
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

Reference: (1) Fermi 2
NRC Docket No. 50-341

(2) Letter, W.F. Colbert to L. L. Kintner, USNRC
August 31, 1981, EF2-54624

Subject: Final Report of 10CFR50.55(e) Item 146
"Failure of Emergency Diesel Generator
Nos. 11 and 12"

On January 18, 1985, Detroit Edison's Mr. J. E. Conen, Engineer - Licensing, telephoned Mr. P. Pelke of NRC Region III to report the discovery of damage to Emergency Diesel Generator (EDG) No. 11. The damage was discovered during an inspection of EDG No. 11 following a diesel trip during a test run on January 10, 1984. On January 21, Mr. Pelke was informed that inspections of the other EDG's revealed that EDG No. 12 had indications of incipient damage. This deficiency is reportable under 10CFR50.55(e) and is being tracked as Item 146.

The standby AC power system for Fermi 2 consists of 4 EDG's (Nos. 11, 12, 13 and 14). These units were manufactured by the Fairbanks Morse Engine Division of Colt Industries. Each unit is a 12 cylinder, opposed piston diesel ıted for 3967 horsepower at 900 revolutions per minute.

Description of Deficiency

Approximately 14 minutes after being started for ; 24 hour surveillance test, EDG No. 11 tripped automatical] as a result of low lubricating oil pressure. The prel: nary investigation revealed metal flakes and filings i: he lube oil filter and strainer; therefore, a complete in: ction of the machine was made with the assistance of the v lor.

8502250[illegible]

The inspection of EDG No. 11 revealed that the following components in the upper crankline were damaged: the crankshaft and main bearings 1 through 7; connecting rod bearings 1 through 7; pistons 2, 3, and 4; and, the thrust bearing.

Although operating properly, EDG Nos. 12, 13 and 14 were also inspected for damage. The EDG No. 12 filter contained easily visible bearing material and a check of the main bearing to bearing cap clearances revealed that some of the upper crankshaft bearings had abnormally high clearances. The internal inspection of these bearings on EDG No. 12 revealed some damage. The lube oil filters and bearing clearances for EDG Nos. 13 and 14 showed no indications of bearing distress. The subsequent internal inspections of these bearings confirmed that they were satisfactory.

Cause: The apparent cause of EDG No. 11 bearing failure was inadequate lubrication during fast starts. Evaluation of the operating history, operating procedures, and the lube oil system, including the modifications to the system, failed to specifically determine when or why these bearings experienced inadequate lubrication. Based on extensive non-nuclear commercial success and experience at other nuclear power plants with Fairbanks Morse diesels of this design, the manufacturer concluded that the high number of fast starts without prelubrication was the cause of this failure. The results of the analysis of the data on the Fermi 2 diesels supports this conclusion. In particular, it was determined that the period of time that the bearings were allowed to drain before the EDG was restarted without prelubrication was typically longer for EDG Nos. 11 and 12 than for Nos. 13 and 14. Increasing the time a bearing is allowed to drain before the EDG is restarted without prelubrication will decrease the amount of oil in the bearings during the subsequent start.

Background: Detroit Edison, working with the ma facturer, has taken action to improve the reliability of t Fermi 2 diesel generators which are subjected to the fas starts associated with nuclear plant service. Prior to he modifications described in Reference 2, voids of bout 60 gallons would form in the lube oil system as the ube oil drained back to the sump when an EDG was shutdow A 20 gallon per minute prelube pump was used to re-fi the system and establish bearing oil flow prior to p nned starts. This procedure eliminated dry (unlubric ed) starts except for the relatively few emergency starts o the EDG's. This program of operation was consistent with th goals of

minimizing dry starts and preventing seepage of lube oil from the upper crankline into the cylinders while the engine is shut down.

The modification described in Reference 2 reduced the effects of fast starts without increasing the accumulation of lube oil in the cylinders. The lube oil keepwarm system was modified to supply lube oil to the lower crankline continuously without supplying the upper crankline. The supply pipe to the upper oil supply header was also modified to prevent the header from draining to the sump when the engine is shut down. These changes reduced the size of the voids formed when the engine is shut down to about 5 gallons. An oil booster/accumulator was also added which uses starting air to inject oil to the upper crankline during the starting cycle. These system changes help prevent dry starts even without the operation of the prelube pump.

A vendor recommendation deleted the requirement for prelubrication after the installation of the lube oil system modification. Subsequent to receiving this recommendation, Fermi 2 EDG's were sometimes started without prelubrication. Detroit Edison's investigation revealed that other facilities with Fairbanks Morse Diesels have continued to perform prelubrication prior to planned starts of the engines even after this modification was installed.

Analysis of Safety Implications

The Emergency Diesel Generators start automatically on loss of voltage to a vital bus, on low reactor water level, or on high drywell pressure. The EDG's are intended to ensure that power is available for emergency core cooling in the event that offsite power is lost. The failure of an EDG reduces the assurance of the availability of emergency power.

Corrective Action

Detroit Edison, Colt Industries and expert consul nts have concluded that prelubrication prior to all planne starts is the most significant action that can be taken to event bearing failures. Therefore, procedures are bein revised to require a prelubrication period of approximate 2 minutes prior to planned starts of the EDG's. To nsure maximum lubrication during starting, the diesel w l be started while the prelubrication pump is running. Only emergency and unplanned starts will occur without relubrication. Changes to the draft technical specificati s are being requested to enhance the reliability of the DG's based on the lessons learned.

The experience with EDG No. 12 indicated that the bearing deterioration is progressive and can be identified and corrected prior to bearing failure. Analysis indicates that complete bearing failure will be preceded by the accumulation of bearing material on the filter and an increase in the gap between the bearing and bearing cap. Therefore, Detroit Edison will perform a visual inspection of the oil filter once per calendar quarter. If bearing material is found in the filter, the bearing to bearing cap clearance will be checked on each of the crankshaft bearings. The bearing to bearing cap clearance will also be checked every 18 months or after 20 starts conducted without prelubrication if less than 18 months. These quarterly filter inspections and 18 month bearing clearance checks are at conservative intervals for identification and correction of bearing deterioration.

Repairs: EDG Nos. 11 and 12 have been completely inspected by Detroit Edison and the vendor and all damaged components are being replaced. EDG Nos. 13 and 14 have been inspected and no damage was found. The inspection of these machines placed special emphasis on the remote bearings of the upper crankline. It was this area where damage was found on EDG Nos. 11 and 12 and it is this area that is most susceptible to damage caused by inadequate lube oil flow during fast starts.

Testing: EDG Nos. 11 and 12 will be tested in accordance with the manufacturer's recommendations after the completion of repairs. To ensure operability after completion of the repairs, EDG Nos. 11 and 12 will also undergo the applicable Technical Specification Mode 5 Surveillance tests.

This is Detroit Edison's final report on Item 146. If you have questions concerning this matter, please contact Mr. Lewis Bregni, (313) 586-5083.

Sincerely,

Wayne's Jens

cc: P. M. Byron
R. C. DeYoung
R. C. Knop
M. D. Lynch (NRR-DOL)
F. A. Maura
E. Tomlinson (NRR-PSB)
A. R. Ungaro (NRR-PSB)
USNRC, Document Control Desk
Washington, D.C. 20555

ATTACHMENT F

Presentation Handout: Meeting between Detroit Edison and the NRC, February 6, 1985

DETROIT EDISON

FERMI 2

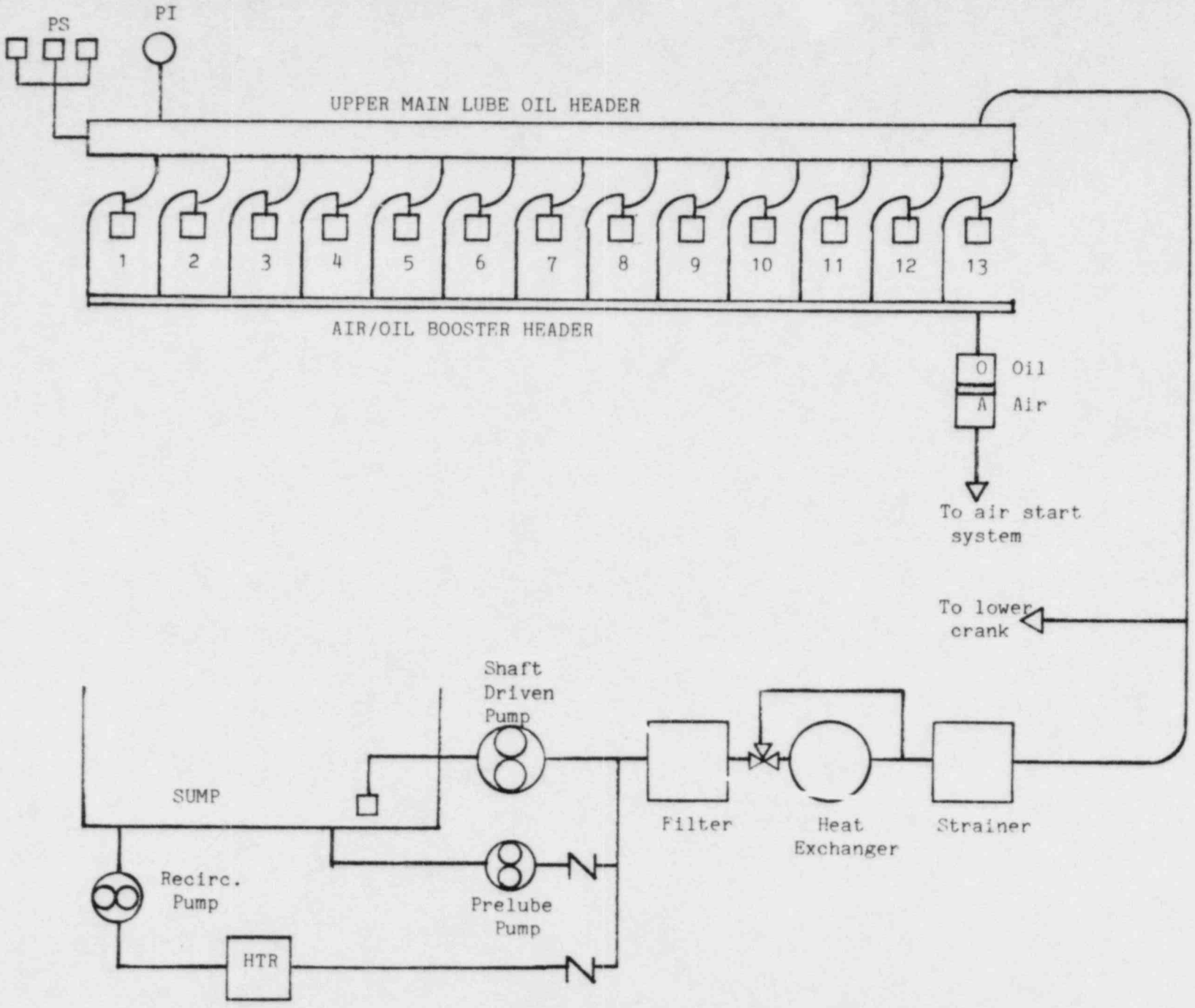
EMERGENCY DIESEL GENERATOR

BEARING FAILURE

NRC MEETING
2-6-85

PRELUDE

- Surveillance 24 hour run test
  - 10 seconds to 900 rpm
  - Manual loading
    - 3135 KW - 2 hours
    - 2850 KW - 22 hours
- Trip
- Inspection of EDG 11
- Damage
- Inspection of other EDG's
  - EDG 12



EDG LUBE OIL SYSTEM

CAUSE

- INADEQUATE LUBRICATION WITH FAST STARTS
- ANALYSIS
  - Fairbanks Morse
  - Failure Analysis - Consultant
  - Power & Energy International - Consultant
  - Detroit Edison
    - Plant
    - Technical Division - Production Department
    - Engineering Research Department

CAUSE:

- INADEQUATE LUBRICATION WITH
- FAST START SEQUENCE
- THE NUMBER OF FAST STARTS

FAILURE MODE IS PROGRESSIVE:

- EDG 12
- OTHER UTILITIES

ANALYSIS

- OPERATIONAL DATA
- OIL ANALYSIS
- LUBE OIL SYSTEM MODIFICATION
- START HISTOGRAM

OPERATIONAL DATA

EDG	11	12	13	14
• TOTAL ENGINE HOURS	346	292	214	270
• TOTAL STARTS (LOGS)	302	204	159	172
• TOTAL TRIPS	60	62	27	13

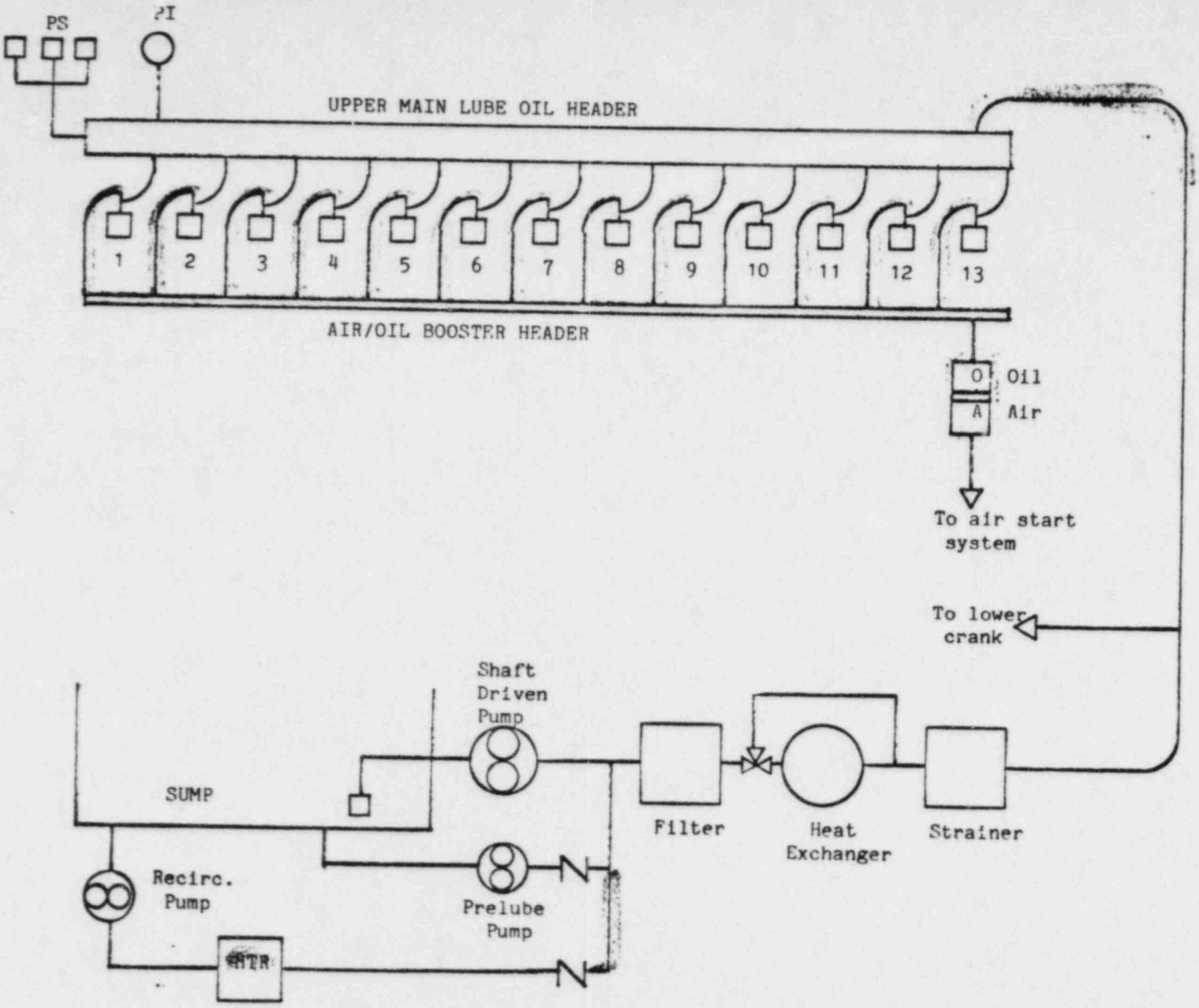
LUBE OIL SYSTEM MODIFICATION

EQUIPMENT CHANGES

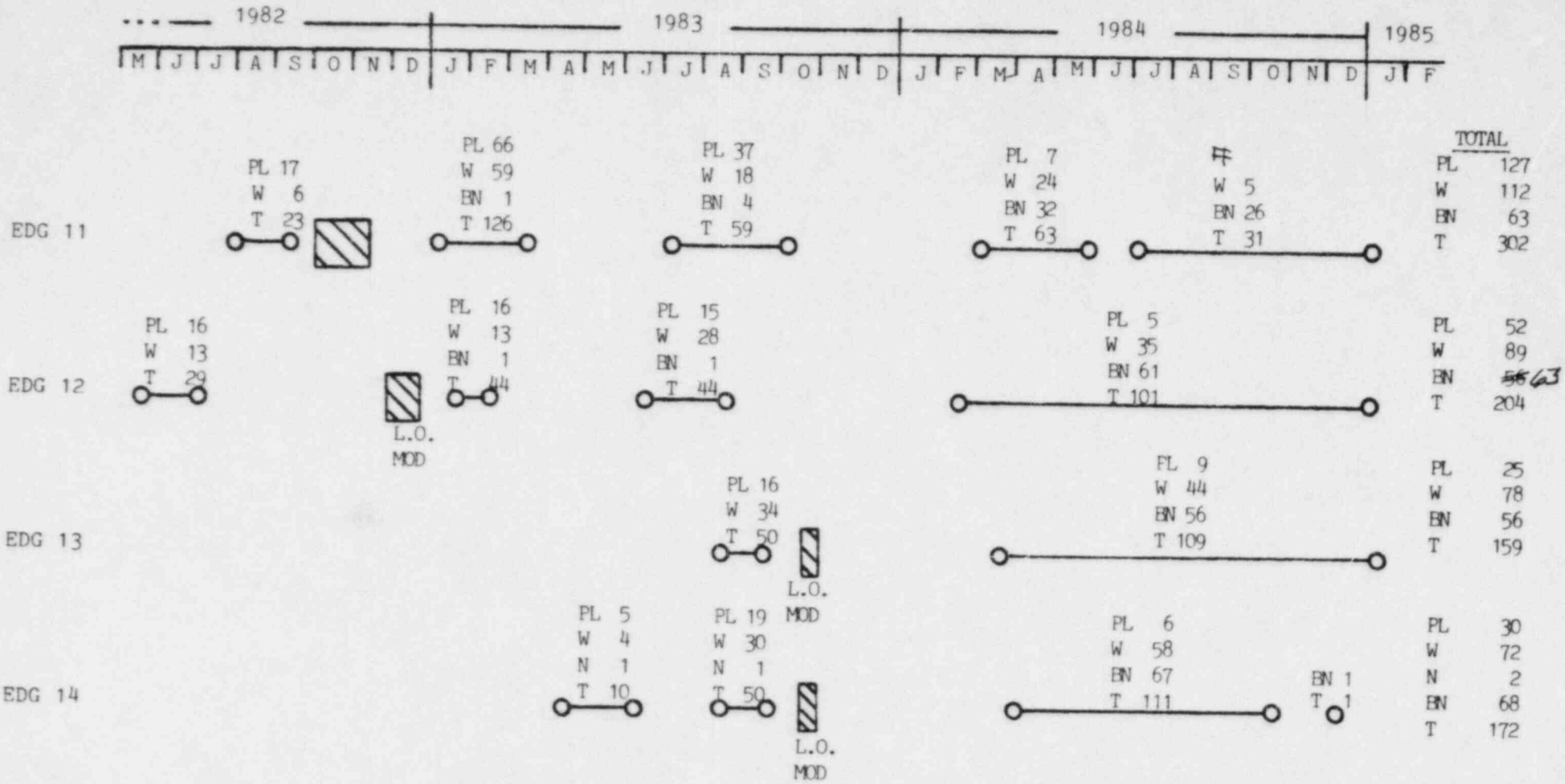
- REROUTE RECIRCULATION PUMP DISCHARGE
- INCREASED KEEPWARM HEATER (15KW)
- REARRANGED INTERNAL PIPING
- ADDED AIR/OIL BOOSTER

INSTALLATION

- EDG 11 — NOVEMBER 15, 1982
- EDG 12 — DECEMBER 17, 1982
- EDG 13 & 14 — NOVEMBER 10, 1983



EDG LUBE OIL SYSTEM



NOTE: PL = PRELUBE, W = WET, BN = BOOSTER - NO PRELUBE, N = NO PRELUBE, T = TOTAL

START HISTOGRAM

OTHER PLANTS WITH LUBE OIL MODIFICATION

	PRELUBE
DUANE ARNOLD	YES
FARLEY	YES
FERMI 2	NO*
HATCH	YES
NORTH ANNA	YES

*AFTER JANUARY, 1984

CORRECTIVE ACTION

EDG 11

- UPPER CRANKSHAFT
- UPPER MAIN BEARINGS
- UPPER CONNECTING ROD BEARINGS
- THREE PISTONS
- THREE CYLINDER LINERS (PRECAUTION)
- THREE CONNECTING RODS

EDG 12

- UPPER MAIN BEARINGS
- UPPER CONNECTING ROD BEARINGS

EDG 13

- ONE LOWER ROD BEARING (DENTED DURING INSPECTION)

EDG 14

- NO PARTS NEED REPLACING

CORRECTIVE ACTION TO PREVENT REOCCURRENCE (SHORT TERM)

- DETERMINE SPECIFIC PRELUBE TIME FOR EACH ENGINE
- REVISE ENGINE START & WARMUP SEQUENCE (PER VENDOR RECOMMENDATIONS)
  - ACCELERATION
  - LOADING
- REVISE PROCEDURES
  - INCORPORATE PRELUBE
  - REFLECT SPECIFIC PRELUBE TIMES
  - START & WARMUP SEQUENCE
- REVISE FSAR AND TECHNICAL SPECIFICATIONS
  - ALLOW TESTING AT LOAD EQUAL TO PLANT EMERGENCY LOAD LEVEL
  - OTHER REQUIRED CHANGES
- PRELUBE ALL PLANNED STARTS
- CONTINUE USE OF AIR/OIL BOOSTER
- VENDOR REVIEW OF APPLICABLE PROCEDURES.

CORRECTIVE ACTION TO

PREVENT REOCCURRENCE

(LONG TERM)

- INSPECT FILTERS & STRAINERS QUARTERLY
- CONDUCT BEARING INSPECTIONS
  - FEELER GAUGE

    20 FAST STARTS OR 18 MONTHS, WHICHEVER OCCURS FIRST.

SUPPORT PROGRAM

- CONDUCT JOURNAL ORBITAL ANALYSIS TO FURTHER CONFIRM FAILURE CAUSE
- CONDUCT INSPECTION OF CRITICAL BEARINGS IN OTHER EDG's
- CONDUCT FAILURE ANALYSIS OF BEARING METAL

SCHEDULE

EDG 13 & 14

• COMPLETE REASSEMBLY	FEB. 1, 1985
• PREPARE FOR OPERATION (HEATUP, PL TEST, PROCEDURES)	FEB. 2, 1985
• START ENGINE/INSPECT/EVALUATE	FEB. 5, 1985
• START SURVEILLANCE TESTS	FEB. 7, 1985
• OPERABLE	FEB. 15, 1985

EDG 12

• COMPLETE REASSEMBLY CLEAN, ALIGNMENT CHECK, CRANKSHAFT PISTONS, ETC.	FEB. 11, 1985
• PREPARE FOR OPERATION	FEB. 21, 1985
• START ENGINE/INSPECT/EVALUATE	MAR. 1, 1985

EDG 11

• COMPLETE REASSEMBLY	MAR. 4, 1985
• PREPARE FOR OPERATION (INCLUDES FLUSH)	MAR. 15, 1985
• START ENGINE/INSPECT/EVALUATE	MAR. 18, 1985

EDG 11 & 12

• COMPLETE SURVEILLANCE TESTS	MAR. 26, 1985
• OPERABLE	MAR. 26, 1985

SUMMARY

CAUSE:

- INADEQUATE LUBRICATION DURING FAST STARTS

FAILURE MODE

- PROGRESSIVE

SHORT TERM ACTION

- MINIMIZE BEARING DETERIORATION

LONG TERM ACTION

- DETECT INCIPIENT BEARING FROBLEMS

ENHANCED RELIABILITY

- OIL MODIFICATION
- REVISED STARTING SEQUENCE AND PROCEDURES
- MONITORING PROGRAM

ATTACHMENT G

Operating Histories: Emergency Diesel Generators Nos. 11, 12 13 and 14

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 1
NAME EDG # 11 DATE 7-3-85
RAD / RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T: TRIP N: NORMAL	REASON FOR TRIP	TYPE OF LOADING F: FAST S: SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
1	7-27-85	—	—	—	—	—	—	—	—	—	—	ADJ. SPEED SW.	T	SPEED SW.	—	—	—	
2	"	—	—	5	—	—	—	—	—	—	—	"	N	—	—	—	5	300 RPM
3	"	—	—	10	—	—	—	—	—	—	—	RUN IN	N	—	—	—	10	500 RPM
4	7-30	—	—	20	—	—	—	—	—	—	—	"	N	—	—	—	20	700 RPM
5	"	—	—	30	—	—	—	—	—	—	—	"	N	—	—	—	30	900 RPM - REPLACED SP. SW.
6	8-4	—	—	19	—	—	—	—	—	—	—	"	N	—	—	—	19	Set Governor Lower 30%, M.S. 347RPM
7	8-5	—	—	22	—	—	—	—	—	—	—	"	N	—	—	—	22	ADJ. VOLT. REG.
8	"	—	—	—	—	—	—	—	—	—	—	CAIO 7-4.1	T	TEST O.S.T.	—	—	—	
9	"	—	—	—	—	—	—	—	—	—	—	"	T	TEST O.S.T	—	—	—	
10	"	—	—	—	—	—	—	—	—	—	—	"	T	TEST O.S.T	—	—	—	
11	8-6	—	—	90	—	—	—	—	—	—	—	CAIO INST Check	N	—	—	—	90	Replaced Rect. Diode Test (CBT)
12	"	—	—	35	—	—	—	—	—	—	—	CAIO	N	—	—	—	35	Volt. Reg Test
13	8-10	—	—	10	—	20	—	—	—	—	—	"	N	—	S	—	30	
14	8-11	—	—	10	—	10	30	—	—	—	—	"	N	—	S	—	50	
15	8-12	—	—	20	—	—	—	—	—	—	—	"	N	—	—	—	20	
16	8-13	—	—	30	—	—	—	—	—	—	—	"	N	—	—	—	30	
17	8-17	—	—	10	—	—	—	60	—	—	—	"	N	—	S	—	70	
18	8-25	—	—	15	—	—	—	—	—	—	—	"	N	—	—	—	15	
19	8-27	—	—	20	—	—	—	—	—	—	—	"	N	—	—	—	20	
20	8-27	—	—	15	—	—	—	—	—	—	—	"	N	—	—	—	15	
21	8-28	—	—	10	—	—	—	150	—	—	—	"	N	—	S	—	160	
22	9-1	—	—	10	—	—	10	—	60	—	—	"	N	—	S	—	80	
23	9-2	—	—	10	—	—	10	—	—	160	—	"	N	—	S	—	180	
24	1-11-83	1405	1405	—	—	—	—	—	—	—	—	AIR ROLL	N	—	—	—	—	
25	"	1417	1417	5	—	—	—	—	—	—	—	RUN IN	N	—	—	0.1	5	CB. Out. L.O. MOD.
26	"	1440	1440	—	—	—	—	—	—	—	—	"	T	L.O.T.M.	—	0.2	—	L.O.T. SW Vibrated
27	1-12	0940	0940	—	—	—	—	—	—	—	—	"	T	C.C.P. H+J C.P.L	—	17.	—	T3A Relay Time Delay Wrong
28	"	0958	0958	—	—	—	—	—	—	—	—	"	T	C.C.P.M	—	0.2	—	WITH C.P.L.A JUMPERED
29	"	1005	1005	—	—	—	—	—	—	—	—	"	T	C.C.P.M	—	0.3	—	T3A I.D. set @ 17 sec from 6sec
30	"	1011	1014	3	—	—	—	—	—	—	—	"	N	—	—	0.1	3	INCR. C.S. DROOP SLOPE.
31	"	1025	1033	8	—	—	—	—	—	—	—	"	N	—	—	0.2	8	HIGH DP ON L.O.S. MAINT CLEANED
32	"	1311	1321	10	—	—	—	—	—	—	—	"	N	—	—	2.7	16	C.P.L.A JUMPERED REMOVED
33	"	1358	1400	2	—	—	—	—	—	—	—	"	N	—	—	0.6	2	Test. CPLA OK
34	1-13	0915	0917	2	—	—	—	—	—	—	—	"	T	TRY TO SYN (F.F.)	—	17.3	2	
35	"	0920	0937	3	—	—	—	—	—	—	—	"						

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT MICHIGAN

PROBLEM NO _____ SHEET NO. 2
NAME EDG # 11 DATE 3-3 85
RAD/RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE of S/D T=TRIP N=NORMAL	REASON FOR TRIP	TYPE OF LOADING F:FAST S:SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
36	1-17-85	0927	0930	3	-	-	-	-	-	-	-	RUN IN	T	metrus/volt. Reg.	-	0.1	3	D.C. Volt and Amp Ragged High
37	"	1002	1005	3	-	-	-	-	-	-	-	Volt. Reg Testing	T	F.F.	-	0.5	3	
38	"	1015	1021	6	-	-	-	-	-	-	-	"	N		-	0.2	6	D.C. Volts & Amp Ragged High
39	1-14	0926	0943	17	-	-	-	-	-	-	-	Volt Reg Testing	N		-	23.1	17	Stopped to Add L.O.
40	"	1102	1110	6	-	-	2	-	-	-	-	Syn Testing	N		-	25.3	8	Voltage changed C.C. CRISTINA
41	"	1136	1152	10	-	-	6	-	-	-	-	"	N		-	0.4	16	Voltage to 8. in normal INTP.
42	"	1403	1457	15	-	-	21	15	3	-	-	RUN IN	T	Test load wiring	-	2.2	54	
43	"	1515	1515	-	-	-	-	-	-	-	-	"	N		-	0.3	-	No Field
44	"	1547	1547	-	-	-	-	-	-	-	-	"	N		-	0.5	-	"
45	"	1550	1550	-	-	-	-	-	-	-	-	"	N		-	0.1	-	"
46	"	1608	1608	-	-	-	-	-	-	-	-	"	N		-	0.3	-	"
47	"	1616	1618	2	-	-	-	-	-	-	-	"	N		-	0.2	2	ON MAN VOLT. REG (CRI BAD)
48	"	1916	1953	18	-	-	10	9	-	-	-	"	N		-	2.0	37	CRI HAD BEEN REPLACED
49	"	2035	2036	1	-	-	-	-	-	-	-	"	T	J.C.P.L.	-	0.7	1	FOUND NO PROBLEM
50	"	2043	2043	-	-	-	-	-	-	-	-	"	T	J.C.P.L.	-	0.1	-	
51	"	2055	2140	9	-	-	-	11	20	5	-	"	N		-	0.2	45	(WITH CRI JUMPERED)
52	"	2219	2226	3	-	-	4	-	-	-	-	"	N		F	0.7	7	
53	1-18	0933	0933	-	-	-	-	-	-	-	-	"	N		-	83.1	-	
54	"	0936	0950	14	-	-	-	-	-	-	-	"	T	Op. Error	-	0.1	14	
55	"	0955	1002	7	-	-	-	-	-	-	-	"	N		-	0.1	7	Q.C. Hold NCR-83-076
56	1-19	0843	1353	17	-	-	11	10	10	262	-	"	N		S	22.8	310	
57	2-9	1436	1436	-	-	-	-	-	-	-	-	PMET R3000.001 Rev 0	N		-	485.9	-	AIR ROLL
58	"	1440	1444	4	-	-	-	-	-	-	-	"	T	Gov Pit. Sw Prob	-	0.1	4	
59	2-10	0903	0903	-	-	-	-	-	-	-	-	"	N		-	18.3	-	No Pot. Fuses, INTERLOCK No freq. INDICATION
60	"	0914	0919	5	-	-	-	-	-	-	-		N		-	0.2	5	Volt. Reg. Prob. NCR-83-093
61	2-11	0943	1106	6	-	-	-	77	-	-	-	"	N		F	24.4	83	
62	"	1114	1117	3	-	-	-	-	-	-	-	"	N		-	0.1	3	
63	"	1120	1123	3	-	-	-	-	-	-	-	"	N		-	0.1	3	
64	"	1124	1127	3	-	-	-	-	-	-	-	"	N		-	0.1	3	
65	"	1127	1130	3	-	-	-	-	-	-	-	"	N		-	0.1	3	
66	"	1132	1300	12	-	-	-	86	-	-	-	"	N		F	0.1	98	
67	2-14	0922	0923	1	-	-	-	-	-	-	-	"	N		-	69.4	1	
68	"	0924	0956	3	-	-	-	-	29	-	-	"	T	O.S.T. Test	F	0.0	32	
69	"	1003	1003	-	-	-	-	-	-	-	-	"	T	Start Failure	-	0.1	-	Rec. Air Pressure Low
70	"	1038	1104	11	-	-	-	-	-	-	-	"						

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 3
NAME EDG #11 DATE 3-3-85
RAD/RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE of S/D T: TRIP N: NORM	REASON FOR TRIP	TYPE OF LOADING F: FAST S: SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
71	2-15-85	0720	0935	15	—	—	—	—	—	—	—	PRETRIP TEST AND	N		—	22.3	15	PLANT TESTING CONFLICT
72	"	1205	1325	3	—	—	—	17	—	—	—	"	T	F.F. when adj.	F	2.5	20	Put V.R. Reg to Manual
73	"	1330	1440	5	—	—	—	—	—	65	—	"	N		F	0.1	70	
74	"	1450	145[illegible]	—	—	—	—	—	—	—	—	"	N		—	0.2	—	Air Blow
75	"	1500	1500	—	—	—	—	—	—	—	—	"	N		—	0.2	—	Air Blow
76	2-16	0838	0838	—	—	—	—	—	—	—	—	"	N		—	17.6	—	Air Blow
77	"	0840	0845	5	—	—	—	—	—	—	—	"	N		—	0.1	5	
78	"	0850	0853	3	—	—	—	—	—	—	—	"	N		—	0.1	3	
79	"	0901	0906	5	—	—	—	—	—	—	—	"	N		—	0.1	5	
80	"	0917	0919	2	—	—	—	—	—	—	—	"	N		—	0.2	2	
81	"	0932	0935	5	—	—	—	—	—	—	—	"	N		—	0.2	5	
82	"	0940	0940	—	—	—	—	—	—	—	—	"	N		—	0.1	—	UNSCH. LOCA. START
83	"	104	1048	1	—	—	—	—	—	—	—	"	T	Volt Control (F.F.)	—	1.1	1	
84	"	1055	1055	—	—	—	—	—	—	—	—	"	T	St. Fail.	—	0.1	—	Start Air Isolated
85	"	1058	1131	18	—	—	—	—	15	—	—	"	T	F.F. - Op. Error	F	0.1	33	Op. Pushed Exciter Trip
86	"	1135	1136	1	—	—	—	—	—	—	—	"	T	O.S.T. Test	—	0.1	1	
87	"	1305	1438	22	—	—	—	—	—	71	—	"	N		F	1.5	93	
88	2-17	1301	1352	10	—	5	5	5	5	1331	130	"	N		S	22.4	1491	24 HR. RUN
89	2-22	0830	0830	—	—	—	—	—	—	—	—	"	T	St Fail	—	90.6	—	LR relay failed
90	"	1109	123[illegible]	15	—	—	—	—	74	—	—	"	N		F	2.6	89	
91	"	1635	1752	7	—	—	—	—	70	—	—	"	N		F	4.0	77	
92	"	2053	2209	6	—	—	—	—	70	—	—	"	N		F	3.0	76	
93	2-23	0115	0273	7	—	—	—	—	71	—	—	"	N		F	7.1	78	
94	"	0606	0721	7	—	—	—	—	68	—	—	"	N		F	7.5	75	
95	"	0955	0955	—	—	—	—	—	—	—	—	"	T	St. Fail.	—	2.5	—	Signal Generator Failure
96	2-24	0641	0752	6	—	—	—	—	—	65	—	"	N		F	8.8	71	
97	"	1020	1023	3	—	—	—	—	—	—	—	"	N		—	2.5	3	St Time excessive
98	"	1033	1036	3	—	—	—	—	—	—	—	"	N		—	0.2	3	St. Time excessive
99	"	1116	1119	3	—	—	—	—	—	—	—	"	N		—	0.7	3	" " Replaced Signal Gen.
100	"	1706	1423	8	—	—	—	—	—	70	—	"	N		F	1.6	78	
101	"	1713	1717	4	—	—	—	—	—	—	—	"	T	TRY TO SYN OP ERR	—	2.8	4	
102	"	1722	1835	4	—	—	—	—	—	69	—	"	N		F	0.1	73	
103	"	2105	2208	0	—	—	—	—	63	—	—	"	N		F	2.5	63	
104	2-25	0020	0130	5	—	—	—	—	65	—	—	"	N		F	2.2	70	
105	"	0340	0450	5	—	—	—	—	65	—	—	"	"		F	[illegible]	[illegible]	

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 4
NAME EDG # 11 DATE 3-3-85
RAD/RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T: TRIP N: NORMAL	REASON FOR TRIP	TYPE OF LOADING F: FAST S: SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
106	2-25-83	1635	0748	8	—	—	—	—	65	—	—	PREPARATION FOR RUN NO. 0	N		F	1.8	73	
107	"	0942	0944	2	—	—	—	—	—	—	—	"	T	OP. ERROR	—	1.9	2	EXCITER WAS NOT RESET
108	"	0946	1056	5	—	—	—	—	—	65	—	"	N		F	0.0	70	
109	"	1324	1436	6	—	—	—	—	—	66	—	"	N		F	2.5	72	
110	"	1638	1755	7	—	—	—	—	—	70	—	"	N		F	2.0	77	
111	"	2019	2019	—	—	—	—	—	—	—	—	"	T	St. Fail.	—	2.4	—	L.O.P. LOW
112	2-26	0824	0824	—	—	—	—	—	—	—	—	"	N		—	12.1	—	L.O.P. VERIFIED OK PER R.L.
113	"	0828	0830	2	—	—	—	—	—	—	—	"	N		—	0.1	2	L.O.P VERIFIED
114	"	0845	0850	5	—	—	—	—	—	—	—	"	N		—	0.3	5	L.O.P VERIFIED
115	2-28	0645	0757	7	—	—	—	—	—	65	—	"	N		F	46.0	72	
116	"	1025	1143	10	—	—	—	—	—	68	—	"	N		F	2.5	78	
117	"	1405	1520	8	—	—	—	—	—	67	—	"	N		F	2.4	75	
118	"	1803	1910	3	—	—	—	—	—	64	—	"	N		F	2.7	67	
119	"	2130	2235	2	—	—	—	—	63	—	—	"	N		F	2.3	65	
120	3-2	1408	1408	—	—	—	—	—	—	—	—	"	T	NO FUEL OIL PRESS.	—	39.5	—	RETURN TO F.O. SYS ON 3-1-83
121	"	1414	1414	—	—	—	—	—	—	—	—	"	T	"	—	0.1	—	" & RUN F.O. SYS TO CONTINUE
122	"	1420	1423	3	—	—	—	—	—	—	—	"	T	OP ERROR	—	0.1	3	
123	"	1427	1430	3	—	—	—	—	—	—	—	"	N		—	0.1	3	F.O. SYS PROB. (EXCESSIVE PRESSURE)
124	"	1436	1545	4	—	—	—	65	—	—	—	"	N		F	0.1	69	BURN OUT RUN
125	3-7	1645	2105	13	—	—	—	—	—	247	—	"	N		F	121.0	260	
126	3-9	2255	0012	8	—	—	—	—	—	69	—	"	N		F	49.8	77	
127	3-10	1204	1326	12	—	—	—	—	70	—	—	"	N		F	11.9	82	
128	"	1653	1806	8	—	—	—	—	65	—	—	"	N		F	3.5	73	
129	"	2323	0034	6	—	—	—	—	65	—	—	"	N		F	5.3	71	
130	3-11	0658	0820	10	—	—	—	—	72	—	—	"	N		F	6.4	82	
131	"	1336	1454	11	—	—	—	—	67	—	—	"	N		F	5.3	78	
132	"	1845	2000	10	—	—	—	—	—	65	—	"	N		F	3.9	75	
133	"	2352	0108	9	—	—	—	—	—	67	—	"	N		F	3.9	76	
134	3-12	0714	0833	11	—	—	—	—	68	—	—	"	N		F	6.1	79	
135	"	1238	1357	12	—	—	—	—	67	—	—	"	N		F	4.1	79	
136	"	1701	1815	9	—	—	—	—	—	65	—	"	N		F	4.1	74	
137	"	2132	2250	10	—	—	—	—	—	68	—	"	N		F	3.6	78	
138	3-14	0634	0746	7	—	—	—	—	—	65	—	"	N		F	31.7	72	
139	"	1144	1150	6	—	—	—	—	—	—	—	"	T	OP. ERROR	—	4.0	6	SYNCH. (CONTROL ROOM IND. WRONG)
140	"	1156	1159	3	—	—	—	—	—	—	—	"	T		—			

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 5
NAME EDG #11 DATE 3-3-85
RAD/RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE of S/D T-TRIP N-NORMAL	REASON FOR TRIP	TYPE OF LOADING F-FAST S-SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
141	3-14-85	1506	1647	34	-	-	-	-	-	67	-	PREV R3400.001 Rev 0	N		F	3.1	101	
142	3-15	0627	0748	11	-	-	-	-	-	70	-	"	N		F	13.7	81	
143	"	1148	1305	10	-	-	-	-	-	67	-	"	N		F	4.0	77	
144	"	1659	1806	3	-	-	-	-	-	64	-	"	N		F	3.9	67	
145	3-16	0632	0750	10	-	-	-	-	68	-	-	"	N		F	12.4	78	
146	"	1145	1259	8	-	-	-	-	-	66	-	"	N		F	3.9	74	
147	"	1600	1718	10	-	-	-	-	-	68	-	"	N		F	3.0	78	
148	3-17	0634	0750	8	-	-	-	-	-	68	-	"	N		F	13.7	76	
149	"	1139	1300	13	-	-	-	-	-	69	-	"	N		F	3.8	81	
150	"	1608	1719	7	-	-	-	-	64	-	-	"	N		F	3.1	71	
151	7-6	1032	1032	-	-	-	-	-	-	-	-	SOE R3000.10	N		-	2658.	-	AIR ROLL (VIBRATION TEST) GEN.
152	"	1039	1059	20	-	-	-	-	-	-	-	"	T	O.S.T. Test	-	0.1	20	"
153	7-8	1301	1301	-	-	-	-	-	-	-	-	SOE R3000.11	N		-	50.0	-	AIR ROLL (VIB TEST GEN)
154	"	1304	1434	13	-	-	6	6	-	65	-	"	N		S	0.1	90	"
155	8-1	1409	1409	-	-	-	-	-	-	-	-	SOE R3000.13	N		-	575.6	-	AIR ROLL (Volt Reg. Test)
156	"	1415	1730	65	-	10	3	10	92	10	5	"	N		S	0.1	195	
157	8-11	1337	1337	-	-	-	-	-	-	-	-	SOE R3000.17	T	OVERVOLTAGE	-	2.1	-	NEW VOLT. REG CIRCUIT WAS INSTALLED
158	"	1412	1412	-	-	-	-	-	-	-	-	"	N	TRIPPED BY OP.	-	0.6	-	HIGH VOLTAGE
159	8-15	1135	1136	1	-	-	-	-	-	-	-	"	T	F.F.	-	93.4	1	Volt. Reg in MANUAL (LOW VOLTS)
160	"	1145	1146	1	-	-	-	-	-	-	-	"	T	F.F	-	0.2	1	"
161	"	1149	1154	5	-	-	-	-	-	-	-	"	N		-	0.1	5	
162	"	1328	1339	11	-	-	-	-	-	-	-	"	T		-	1.6	11	TRIED TO ADJ VOLT. REG.
163	"	1358	1448	50	-	-	-	-	-	-	-	"	N		-	0.3	50	V.R. IN AUTO
164	8-18	1327	1327	-	-	-	-	-	-	-	-	"	N		-	70.3	-	AIR ROLL
165	"	1330	1357	27	-	-	-	-	-	-	-	"	N		-	0.1	27	
166	8-19	1308	1308	-	-	-	-	-	-	-	-	"	N		-	23.2	-	AIR ROLL
167	"	1313	1313	-	-	-	-	-	-	-	-	"	T	F.O.P.L	-	0.3	-	F.O.P INST. isolated (T&C)
168	"	1325	1358	22	-	6	3	2	2	4	-	"	N		S	0.2	39	Smoke in test Equip.
169	"	1410	1438	10	-	-	-	-	-	18	-	"	N		S	0.2	28	
170	8-26	0951	0957	6	-	-	-	-	-	-	-	"	T	F.F.	-	1638	6	C.S. Fp A Smart - Volts dropped
171	"	1028	1030	2	-	-	-	-	-	-	-	"	N		-	0.5	2	Volt. Reg. hunting
172	8-27	0858	0858	-	-	-	-	-	-	-	-	"	T	F.F	-	22.5	-	Volt Reg hunting
173	"	1259	1300	1	-	-	-	-	-	-	-	"	T	Cab Door Bumped	-	40	1	Tripped Field Relay
174	"	1314	1340	17	-	9	-	-	-	-	-	"	N		S	0.2	26	
175	"	1345	1401	6	3	3	3	3	3	-	-	"	T					

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 6
NAME EDG #11 DATE 9-3-85
RAD/RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE of S/D T: TRIP N: NORMAL	REASON FOR TRIP	TYPE OF LOADING F: FAST S: SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
176	8-27-83	1422	1530	6	–	–	–	–	–	62	–	SOE R3000-17	N		F	0.3	68	
177	9-7-83	1354	1354	–	–	–	–	–	–	–	–	SOE R3000-13	N		–	262.5	–	AIR ROLL
178	"	1408	1434	14	–	12	–	–	–	–	–	"	T	J.C.L.L	S	0.2	26	J.C.L. NORMAL (SW. CHATTER)
179	9-8-83	0948	1122	15	–	–	–	79	–	–	–	"	N		F	18.2	94	
180	9-12-83	1333	1337	–	–	–	–	–	–	–	–	PRET R3000-001 Rev 1	N		–	122.1	–	AIR ROLL
181	"	1347	1348	1	–	–	–	–	–	–	–	"	N		–	0.3	1	
182	"	1358	1359	1	–	–	–	–	–	–	–	"	N		–	0.2	1	
183	"	1405	1406	1	–	–	–	–	–	–	–	"	N		–	0.1	1	
184	"	1409	1410	1	–	–	–	–	–	–	–	"	N		–	0.3	1	
185	"	1426	1430	4	–	–	–	–	–	–	–	"	N		–	0.1	4	
186	"	1432	1435	3	–	–	–	–	–	–	–	"	N		–	0.6	3	
187	"	1512	1512	–	–	–	–	–	–	–	–	"	N		–	0.1	–	
188	"	1516	1516	–	–	–	–	–	–	–	–	"	N		–	0.1	–	
189	"	1520	1520	–	–	–	–	–	–	–	–	"	N		–	0.1	–	
190	"	1524	1525	1	–	–	–	–	–	–	–	"	N		–	0.1	1	
191	"	1533	1540	7	–	–	–	–	–	–	–	"	N		–	0.1	7	
192	"	1547	1651	19	–	–	–	45	–	–	–	"	N		S	0.1	64	
193	9-14	1056	1119	5	–	–	–	18	–	–	–	SOE 3000-21	N		F	18.1	23	(SURGE SUPP/VOLT REG)
194	"	1121	1315	9	–	–	–	–	32	73	–	"	N		F	0.1	114	
195	9-15	1415	1416	1	–	–	–	–	–	–	–	PRET R3000-001 Rev 1	N		–	25.0	1	
196	"	1421	1457	6	–	–	–	–	–	30	–	"	N		S	0.1	36	
197	9-18	1527	1643	9	–	4	13	–	–	50		SOE R3000-21	N		S	0.5	76	
198	9-20	2337	2340	3	–	–	–	–	–	–	–	PRET R3000-001 Rev 1	N		–	55.1	3	
199	"	2742	2745	3	–	–	–	–	–	–	–	"	N		–	0.1	3	
200	"	2752	2755	3	–	–	–	–	–	–	–	"	N		–	0.1	3	
201	"	2756	2759	3	–	–	–	–	–	–	–	"	N		–	0.0	3	
202	9-21	1009	1028	19	–	–	–	–	–	–	–	"	T	O.S.T. Test	–	10.1	19	
203	9-29	1216	1310	4	–	–	–	–	–	15	35	"	N		F	194.7	54	CRB WAS melting
204	10-6	1531	1600	29	–	–	–	–	–	–	–	SOE R3000-25	T	F.F.	–	176.3	29	Adj Volt. Reg.
205	"	1625	1626	1	–	–	–	–	–	–	–	"	T	F.F.	–	0.4	1	"
206	"	1632	1750	12	–	17	12	12	9	9	7	"	N		S	0.1	78	"
207	"	1805	1856	8	–	9	7	5	10	6	6	"	N		S	0.3	51	"
208	3-4-84	1013	1013	–	–	–	–	–	–	–	–	SOE R3000-27	N		–	∞	–	AIR ROLL
209	"	1026	1027	1	–	–	–	–	–	–	–	"	N	L.O. P.L. Alarm	–	0.2	1	WIRE IN SPLZ PREPARED CONDIT
210	"	1140	1201	21	–	–	–	–	–	–	–							

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 7
NAME EDG # 11 DATE 3-3-85
RAD/RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T=TRIP N=NORMAL	REASON FOR TRIP	TYPE OF LOADING F=FAST S=SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
211	3-4-84	1353	1441	48	—	—	—	—	—	—	—	SOE R3000-27	T	E.F.	—	1.9	48	Techs making adj (Singe Sys)
212	"	1459	1424	25	—	—	—	—	—	—	—	"	N		—	0.3	25	
213	"	1555	1645	21	1	7	21	—	—	—	—	"	N		S	1.5	50	
214	3-5	0949	0949	—	—	—	—	—	—	—	—	"	N		—	17.1	—	AIR ROLL
215	"	0959	1055	6	—	13	10	17	10	—	—	"	T	J.C.L.L	S	0.2	56	J.C. EXP. TR NORMAL
216	"	1524	1655	10	—	—	5	—	10	66	—	"	N		S	4.5	91	
217	3-23	1502	1504	2	—	—	—	—	—	—	—	PRET R3000-04 Rev 2	N		—	430.1	2	
218	"	1511	1511	—	—	—	—	—	—	—	—	"	N		—	0.0	—	
219	"	1522	1523	1	—	—	—	—	—	—	—	"	N		—	0.1	1	
220	"	1527	1530	3	—	—	—	—	—	—	—	"	N		—	0.1	3	
221	"	1710	1711	1	—	—	—	—	—	—	—	"	N		—	1.7	1	
223	"	1718	1720	2	—	—	—	—	—	—	—	"	N		—	0.1	2	
223	"	1725	1727	2	—	—	—	—	—	—	—	"	N		—	0.1	2	
224	"	1840	1841	1	—	—	—	—	—	—	—	"	N		—	1.2	1	
225	"	1847	1847	—	—	—	—	—	—	—	—	"	N		—	0.1	—	
226	"	1852	1853	1	—	—	—	—	—	—	—	"	N		—	0.1	1	
227	"	1903	1903	—	—	—	—	—	—	—	—	"	N		—	0.2	—	
228	"	1912	1915	3	—	—	—	—	—	—	—	"	N		—	0.2	3	
229	"	1828	2035	5	—	—	—	—	60	—	—	"	N		S	0.2	65	
230	3-24	1100	1102	2	—	—	—	—	—	—	—	"	N		—	.4	2	
231	"	1117	1118	1	—	—	—	—	—	—	—	"	N		—	0.3	1	
232	"	1545	1607	2	—	—	—	—	—	20	—	"	N		S	4.5	22	
233	"	1613	1631	2	—	—	—	16	—	—	—	"	N		S	0.1	18	
234	3-25	1459	1520	21	—	—	—	—	—	—	—	"	N		—	22.5	21	
235	"	1523	1525	2	—	—	—	—	—	—	—	"	N		—	0.1	2	
236	"	1527	1528	1	—	—	—	—	—	—	—	"	N		—	0.0	1	
237	"	1532	1533	1	—	—	—	—	—	—	—	"	N		—	0.1	1	
238	"	1534	1535	1	—	—	—	—	—	—	—	"	N		—	0.0	1	
239	"	1539	1719	8	—	—	—	—	92	—	—	"	N		S	0.1	100	
240	3-26	1521	1610	19	—	—	—	—	—	1340	130	"	N		S	22.0	1489	24HR RUN.
241	3-28	1632	1635	3	—	—	—	—	—	—	—		N		—	3	3	
242	3-29	1009	1148	17	—	—	—	—	82	—	—	"	N		F	176	99	
243	"	1453	1628	15	—	—	—	—	80	—	—	"	N		F	3.1	95	
244	"	1851	2025	16	—	—	—	—	78	—	—	"	N		F	2.4	94	
245	3-30	0855	1021	1.2	—	—	—	—	74	—	—	"	"		F			

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 8
NAME EDG # 11 DATE 3-7-85
RAD/RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE of S/D T-TRIP N-NORM	REASON FOR TRIP	TYPE OF LOADING F-FAST S-SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
246	3-30-84	1318	1435	6	—	—	—	—	71	—	—	PRET-R3000 001 ONLY	N		F	3.0	77	
247	"	1648	1807	7	—	—	—	—	72	—	—	"	N		F	2.2	79	
248	"	2036	2157	9	—	—	—	—	72	—	—	"	N		F	2.5	81	
249	3-31	0702	0829	12	—	—	—	—	75	—	—	"	N		F	9.1	87	
250	"	1030	1030	—	—	—	—	—	—	—	—	"	N		—	2.0	—	
251	"	1033	1156	8	—	—	—	—	75	—	—	"	N		F	0.1	83	
252	"	1405	1529	8	—	—	—	—	76	—	—	"	N		F	2.2	84	
253	4-1	0722	0845	8	—	—	—	—	75	—	—	"	N		F	15.5	83	
254	"	1039	1205	10	—	—	—	—	76	—	—	"	N		F	1.9	86	
255	"	1358	1520	8	—	—	—	—	74	—	—	"	N		F	1.8	82	
256	"	1735	1902	8	—	—	—	—	79	—	—	"	N		F	2.3	87	
257	4-2	0720	0840	7	—	—	—	—	—	73	—	"	N		F	12.3	80	
258	"	1042	1202	7	—	—	—	—	—	73	—	"	N		F	2.0	80	
259	"	1423	1545	8	—	—	—	—	74	—	—	"	N		F	2.3	82	
260	"	1752	1918	10	—	—	—	—	77	—	—	"	N		F	2.1	87	
261	4-3	0739	0902	8	—	—	—	—	75	—	—	"	N		F	12.3	83	
262	"	1163	1230	10	—	—	—	—	77	—	—	"	N		F	2.0	87	
263	"	1422	1544	7	—	—	—	—	75	—	—	"	N		F	1.9	82	
264	4-4	0853	1018	9	—	—	—	—	76	—	—	"	N		F	16.1	85	
265	"	1255	1416	7	—	—	—	—	74	—	—	"	N		F	2.6	81	
266	3-24	1036	1036	—	—	—	—	—	—	—	—	"	N		—	14.0	—	
267	3-28	1612	1612	—	—	—	—	—	—	—	—	"	T	PRET WARMD	—	24.0	—	Corrected to complete step
268	8-11-83	1018	1133	14	—	—	—	61	—	—	—	SOE R3000-17	N		S	232.8	75	
269	5-1-84	1500	1610	6	—	—	—	—	—	64	—	24.307.14	N		F	6247	70	
270	5-2-84	1200	1310	6	—	—	—	—	—	64	—	"	N		F	15.8	70	
271	5-2-84	1010	1127	6	—	—	—	—	—	61	—	"	N		F	645.0	67	
272	7-2	1054	1059	5	—	—	—	—	—	—	—	"	T	Op. Error	—	815.5	5	
273	7-2	1101	1910	10	—	—	—	—	—	479	—	"	N		F	0.0	489	
274	7-24	1721	729	8	—	—	—	—	—	—	—	24.307.10	N		—	524.3	8	
275	7-24	1950	2120	15	—	—	—	—	—	75	—	"	N		S	2.3	90	
276	7-25	1336	1705	10	—	—	—	199	—	—	—	24.307.26	N		S	15.9	209	
277	7-25	2121	2203	4	—	—	—	—	—	14	24	24.307.30	N		S	4.3	42	CR8 Prob on EDG #2
278	7-26	2104	0145	7	—	—	—	—	24	129	121	SOE R3000.38	N		S	23.9	281	
279	7-27	1345	1705	10	—	—	—	190	—	—	—	24.307.26	N		S	12.0	200	
280	7-28	1038	1058	20	—	—	—	—	—	—	—	24.307.30	T	NO LOAD	S	41	20	

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO.
NAME EDG # 11
SHEET NO. 9
DATE 3-3-85
RAD/RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T=TRIP N=NORMAL	REASON FOR TRIP	TYPE OF LOADING F=FAST S=SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
281	7-28-84	1148	1227	39	–	–	–	–	–	–	–	24.307.30	T	OP. ERROR	–	0.8	39	
282	7-28	1414	1729	22	–	–	–	–	–	1490	123	24.307.30	N		F	1.8	1635	
283	7-29	2009	2145	6	–	–	–	–	90	–	–	24.307.01	N		F	2.7	96	
284	8-5	0345	0410	5	–	–	–	–	–	20	–	24.307.14	N		F	162	25	
285	8-13	1855	1920	14	–	–	–	11	–	–	–	SOE R3000-40	N		S	206.9	25	TERMINATED DUE TO HIGH [illegible]
286	8-14	1445	1615	5	–	–	–	–	85	–	–	24.307.01	N		F	18.8	90	TEST AFTER EMR S-7441
287	8-17	1543	1616	21	–	–	–	12	–	–	–	SOE R3000-42	N		S	71.5	33	Test Volt. Reg.
288	8-18	0500	0612	10	–	–	–	–	–	62	–	24.307.14	N		F	127	72	
289	9-16	1212	1220	7	–	–	–	–	–	–	1	"	N		F	702.0	8	Failure - CT knife sw open
290	9-18	2312	2317	5	–	–	–	–	–	–	–	"	N		–	58.9	5	Op failed to get start time
291	"	2317	0031	10	–	–	–	–	–	64	–	"	N		F	0.0	74	
292	9-25	2036	2213	10	–	–	–	–	117	–	–	PMET ABIED .001	N		F	164.1	127	
293	9-26	1317	1455	10	–	–	–	–	88	–	–	"	N		F	15.1	98	
294	9-27	2352	0450	10	–	–	–	–	348	–	–	"	N		F	8.0	358	
295	9-30	1529	1639	10	–	–	–	–	60	–	–	"	N		F	58.7	70	
296	10-16	1834	1945	8	–	–	–	–	–	63	–	24.307.14	N		F	385.9	71	
297	11-18	1928	2206	8	–	–	–	–	–	150	–	"	T	L.F.O.P.	F	791.8	158	F.O. Consumption Run Proced.
298	11-21	2015	0112	12	–	–	–	–	–	285	–	"	N		F	72.1	297	F.O. Consumption p/so
299	12-16	0943	0943	–	–	–	–	–	–	–	–	"	T	J.C.L. Low	–	572	–	Exp. Tk was normal
300	"	1000	1114	14	–	–	–	–	–	60	–	"	N				74	
301	1-2-85	1313	1426	9	–	–	–	–	–	64	–	"	N				73	
302	1-10	1550	1604	5	–	–	–	–	–	9	–	24.307.30	T	L.O. Plow [illegible]			14	
TOTALS	(Pgs 1-9)	(in HRS)		39.3	0	2.1	3.2	19.8	69.0	147.2	9.7						290.3	

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 1
NAME EDG "12" DATE 3/2/85
RAD/RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T=TRIP N=NORM	REASON FOR TRIP	TYPE OF LOADING F=FAST S=SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
1	5-15-85	–	–	–	–	–	–	–	–	–	–	RUN IN	T	Start Failure	–	–	–	Air Start Valve Problem
2	"	–	–	–	–	–	–	–	–	–	–	"	T	"	–	–	–	"
3	"	–	–	–	–	–	–	–	–	–	–	"	T	"	–	–	–	"
4	"	–	–	1	–	–	–	–	–	–	–	"	N		–	–	1	
5	5-16	–	–	3	–	–	–	–	–	–	–	"	N		–	–	3	
6	5-17	–	–	10	–	–	–	–	–	–	–	"	N		–	–	10	
7	"	–	–	10	–	–	–	–	–	–	–	"	N		–	–	10	
8	5-18	–	–	3	–	–	–	–	–	–	–	"	N		–	–	3	
9	5-19	–	–	–	–	–	–	–	–	–	–	"	T	Start Failure	–	–	–	F.O. Injection Prob
10	"	–	–	–	–	–	–	–	–	–	–	"	T	"	–	–	–	"
11	"	–	–	–	–	–	–	–	–	–	–	"	T	"	–	–	–	"
12	5-26	–	–	20	–	–	–	–	–	–	–	"	N		–	–	20	Clean L.O. Strn. High L.O. ΔP
13	6-2	–	–	20	–	–	–	–	–	–	–	"	N		–	–	20	
14	6-3	–	–	5	–	–	–	–	–	–	–	"	T	O.S.T. Test	–	–	5	Set @ 1057
15	"	–	–	5	–	–	–	–	–	–	–	"	T	"	–	–	5	
16	"	–	–	5	–	–	–	–	–	–	–	"	T	"	–	–	5	
17	"	–	–	5	–	–	–	–	–	–	–	"	T	Droop/Load Prob	–	–	5	OVER VOLTAGE + OVER CURRENT
18	"	–	–	5	–	–	–	–	–	–	–	"	T	"	–	–	5	"
19	"	–	–	5	–	–	–	–	–	–	–	"	T	"	–	–	5	"
20	"	–	–	5	–	–	–	–	–	–	–	"	T	"	–	–	5	"
21	6-9	–	–	15	–	–	–	–	–	–	–	"	N		–	–	15	
22	"	–	–	5	–	–	–	–	–	–	–	"	T	Droop/Load Prob	–	–	5	
23	"	–	–	5	–	–	–	–	–	–	–	"	T	"	–	–	5	
24	"	–	–	5	–	–	–	–	–	–	–	"	T	"	–	–	5	
25	6-15	–	–	3	–	–	2	–	–	–	–	"	N		–	–	5	Droop Sw. Jumpers
26	6-16	–	–	5	–	20	–	–	–	–	–	"	N		–	–	25	
27	6-17	–	–	10	–	10	15	10	10	10	–	"	N		S	–	60	CLEANED L.O. STR + INSP ENG
28	6-30	–	–	5	–	15	15	–	–	–	–	"	N		S	–	35	
29	7-1	–	–	5	–	–	–	–	35	–	–	"	N		S	–	30	
30	1-18-83	–	–	–	–	–	–	–	–	–	–	"	N		–	–	–	AIR ROLL/INT. ENG. INSP.
31	"	–	–	5	–	–	–	–	–	–	–	"	N		–	–	5	
32	"	–	–	–	–	–	–	–	–	–	–	"	N		–	–	–	AIR Roll
33	"	–	–	–	–	–	–	–	–	–	–	"	T	J.C. P. Low	–	–	–	J.C. Pressure OK Reset Sw
34	1-20	–	–	–	–	–	–	–	–	–	–	"	T	Start Failure	–	–	–	Loose fuse clips
35	"	–	–	1	–	–	–	–	–	–	–	"			–	–		

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 2
NAME EDG # 12 DATE 3-3-85
RAD / Rx

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE of S/D T: TRIP N: NORM	REASON FOR TRIP	TYPE OF LOADING F: FAST S: SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
36	1-21-83	0937	0938	1	–	–	–	–	–	–	–	Run In	N		–	–	1	No Voltage
37	"	1054	1055	1	–	–	–	–	–	–	–	"	N		–	0.3	1	"
38	1-22	1106	1143	37	–	–	–	–	–	–	–	"	N		–	24.2	37	BKR. would not close
39	1-26	0934	0943	9	–	–	–	–	–	–	–	"	T	F.F.	–	95.8	9	
40	"	0947	0953	6	–	–	–	–	–	–	–	"	T	"	–	0.1	6	
41	"	0958	1002	4	–	–	–	–	–	–	–	"	T	"	–	0.1	4	
42	"	1038	1142	14	–	–	50	–	–	–	–	"	N		S	0.6	64	Bkr. Prob. NCR-83-059
43	1-28	1057	1121	24	–	–	–	–	–	–	–	"	N		–	47.8	24	
44	1-29	0930	1038	68	–	–	–	–	–	–	–	"	N		–	22.1	68	Metrek pegged w/ SYN
45	1-31	0903	0904	1	–	–	–	–	–	–	–	"	N		–	22.4	1	
46	"	0910	1003	53	–	–	–	–	–	–	–	"	N		–	0.1	53	A.V.R. not working
47	"	1355	1430	35	–	–	–	–	–	–	–	"	N		–	3.7	35	"
48	"	1440	1500	13	–	–	7	–	–	–	–	"	N		–	0.2	20	" Exercise
49	2-8	1106	1143	37	–	–	–	–	–	–	–	"	N		–	188.9	37	
50	"	1529	1558	29	–	–	–	–	–	–	–	"	N		–	2.2	29	
51	2-9	0905	0912	4	–	–	3	–	–	–	–	"	N		S	15.1	7	
52	"	0917	0930	13	–	–	–	–	–	–	–	"	N		–	.1	13	
53	"	0955	1038	43	–	–	–	–	–	–	–	"	N		–	.4	43	
54	"	1443	1603	16			17	24	16	7	–	"	N		S	4.1	80	
55	2-10	0951	1510	11			10	15	15	268		"	N	–	S	17.9	319	
56	2-11	0845	0955	62	–	–	8	–	–	–	–	"	N	–	S	12.6	70	
57	"	1258	1332	29	–	–	5	–	–	–	–	"	N		S	3.1	34	
58	"	1420	1549	40	–	–	7	–	42	–	–	"	N		S	.4	89	
59	2-15	0853	1012	10			9		16	44		"	N		S	89	79	
60	6-15	1705	1705	–	–	–	–	–	–	–	–	SOE-R3000-05	N		–	28843	–	Fire Roll
61	"	1708	1708	–	–	–	–	–	–	–	–	"	T	C.C. Power/Test	–	4	–	
62	"	1724	1724	–	–	–	–	–	–	–	–	"	T	C.C.P. Hz	–	.3	–	
63	"	1857	1857	–	–	–	–	–	–	–	–	"	T	C.C.P. Hz	–	1.5	–	
64	"	2004	2018	14	–	–	–	–	–	–	–	"	T	O.S.	–	1.1	14	Fuel oil Test
65	6-16	1333	1383	–	–	–	–	–	–	–	–	"	N		–	17.3	–	Air Roll
66	"	1336	1352	6	–	–	10	–	–	–	–	"	T	Test Hz	S	.1	10	No Sea Water Flow
67	"	1410	1421	4	–	–	3	–	4	–	–	"	N		S	.3	15	Smoke from Exhaust Cub
68	"	1421	1425	4	–	–	–	–	–	–	–	"	T	Emer Stop PB	–	0	4	Engine restricted on Const.
69	6-24	1235	1235	–	–	–	–	–	–	–	–	SOE R3000-06	N		–	190.	–	Air Roll
70	"	1238	1311	33	–	–	–	–	–	–	–							

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 3
NAME EDG # 12 DATE 7-3-85
RMD/RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE of S/D T: TRIP N: NORM	REASON FOR TRIP	TYPE OF LOADING F: FAST S: SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
71	6-28	1330	1331	1	–	–	–	–	–	–	–	SOE R3000.06	N		–	0.3	1	ARCING IN PANEL
72	"	1427	1601	9	–	18	–	67	–	–	–	"	N		S	10	94	
73	6-30	1352	1352	–	–	–	–	–	–	–	–	SOE R3400.07	T		–	141.9	–	Serv. Wtr. Too Cold?
74	"	1431	1431	–	–	–	–	–	–	–	–	"	T		–	0.6	–	
75	7-1	1310	1310	–	–	–	–	–	–	–	–	SOE R3610.08	N		–	23.7	–	Air Roll
76	"	1312	1336	15	–	8	–	1	–	–	–	"	N		S	0.0	24	
77	7-6	1326	1326	–	–	–	–	–	–	–	–	SOE R3400.09	N		–	120.0	–	Air Roll
78	"	1328	1502	18	–	–	6	–	–	70	–	"	N		S	0.0	94	
79	7-20	1058	1058	–	–	–	–	–	–	–	–	SOE R3000-23	N		–	340.	–	Air Roll
80	"	1103	1103	–	–	–	–	–	–	–	–	"	T	S+ Fail	–	0.1	–	SA bkr not de-energized
81	"	1108	1111	3	–	–	–	–	–	–	–	"	T	J.C.L.L.	–	0.1	3	J.C. EMS. was being worked
82	"	1116	1145	16	–	–	8	–	3	62	–	"	T	O.S.T. Test	S	0.1	99	Trip @ 1175 MCR 83-
83	8-4	1415	1415	–	–	–	–	–	–	–	–	SOE R3700.14	N		–	361.5	–	Air Roll
84	"	1419	1419	–	–	–	–	–	–	–	–	"	T	S+ Fail	–	0.1	–	Scaffolding in way of fuel racks
85	"	1492	1500	8	–	–	–	–	–	20	–	"	T	O.S.T. Test	S	0.2	28	Trip @ 1080 rpm
86	8-10	1035	1035	–	–	–	–	–	–	–	–	SOE R3000.16	N		–	139.3	–	Air Roll
87	"	1030	1050	20	–	–	–	–	–	–	–	"	T	O.S.T. Test	–	0.1	20	990 rpm
88	8-11	0542	0542	–	–	–	–	–	–	–	–	SOE R3400.18	N		–	27.8	–	Air Roll
89	"	0944	0944	–	–	–	–	–	–	–	–	"	T	O.S.T.	–	0.0	–	
90	"	0946	0946	–	–	–	–	–	–	–	–	"	T	S+ Fail	–	0.1	–	ENG not Fast (Excitation)
91	"	0949	0949	–	–	–	–	–	–	–	–	"	T	"	–	0.1	–	Low Air Pressure
92	"	1022	1037	15	–	–	–	–	–	–	–	"	T	O.S.T. Test	–	0.4	15	1020 rpm
93	8-12	0929	0929	–	–	–	–	–	–	–	–	"	N		–	22.9	–	Air Roll
94	"	0932	0947	15	–	–	–	–	–	–	–	"	T	O.S.T. Test	–	0.1	15	1005 rpm
95	"	0953	1000	7	–	–	–	–	–	–	–	"	T	O.S.T. Test	–	0.1	7	990 rpm
96	8-15	1000	1000	–	–	–	–	–	–	–	–	"	N		–	72.0	–	Air Roll
97	"	1011	1028	17	–	–	–	–	–	–	–	"	T	O.S.T. Test	–	0.2	17	1005 rpm
98	"	1037	1037	–	–	–	–	–	–	–	–	"	T	S+ Fail	–	0.1	–	Exciter not reset
99	"	1042	1055	13	–	–	–	–	–	–	–	"	T	O.S.T. Test	–	0.1	13	990 rpm
100	8-17	0528	0528	–	–	–	–	–	–	–	–	"	N		–	23.5	–	Air Roll
101	"	0532	0947	15	–	–	–	–	–	–	–	"	T	O.S.T. Test	–	0.1	15	1057 rpm
102	"	0959	1003	4	–	–	–	–	–	–	–	"	T	O.S.T. Test	–	0.2	4	1060 "
103	"	1012	1052	40	–	–	–	–	–	–	–	"	T	O.S.T. Test	–	0.1	40	1052 "
104	2-18-84	1310	1310	–	–	–	–	–	–	–	–	SOE R3000.28	N		–	∞	–	Air Roll
105	"	1322	1323	1	–	–	–	–	–	–	–	"	T					

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 4
NAME EDG # 12 DATE 3-7-85
RAD / RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE of S/D T: TRIP N: NORM	REASON FOR TRIP	TYPE OF LOADING F: FAST S: SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
106	2-18-84	1331	1344	13	–	–	–	–	–	–	–	SEE R300.28	T	Undervoltage	–	0.1	13	Adj man volt. reg
107	"	1412	1413	1	–	–	–	–	–	–	–	"	T	F.F.	–	0.5	1	"
108	"	1433	1434	1	–	–	–	–	–	–	–	"	T	"	–	0.3	1	"
109	2-22-84	0953	0953	–	–	–	–	–	–	–	–	"	N		–	115.5	–	Air Roll
110	"	0956	0957	1	–	–	–	–	–	–	–	"	T	F.F.	–	0.1	1	Amps Volts Jogged AVR man.
111	"	1300	1300	–	–	–	–	–	–	–	–	"	T	"	–	3.0	–	"
112	3-1	1159	1159	–	–	–	–	–	–	–	–	"	N		–	119.0	–	Air Roll
113	"	1204	1204	–	–	–	–	–	–	–	–	"	T	F.F.	–	0.1	–	AVR set to high
114	"	1221	1234	11	–	–	–	–	–	–	–	"	T	"	–	0.2	11	Auto to man
115	"	1302	1325	23	–	–	–	–	–	–	–	"	N		–	0.5	23	V.R. in man.
116	"	1344	1616	41	6	–	105	–	–	–	–	"	N		S	6.3	152	
117	3-2	1002	1019	17	–	–	–	–	–	–	–	"	N		–	17.8	17	
118	"	1038	1636	18	2	27	12	19	16	142	122	"	N		S	0.3	358	
119	"	1715	1816	10	–	21	8	10	4	11	7	"	N		S	0.7	61	
120	3-24	1013	1016	3	–	–	–	–	–	–	–	PREV R300.001&2	N		–	520.0	3	
121	"	1023	1026	3	–	–	–	–	–	–	–	"	N		–	0.1	3	
122	"	1027	1028	1	–	–	–	–	–	–	–	"	N		–	0.0	1	
123	"	1043	1046	3	–	–	–	–	–	–	–	"	N		–	0.2	3	
124	"	1048	1049	1	–	–	–	–	–	–	–	"	N		–	0.0	1	
125	"	1345	1347	2	–	–	–	–	–	–	–	"	N		–	3.0	2	
126	"	1358	1437	9	–	–	–	–	–	30	–	"	N		S	0.2	39	
127	"	1454	1510	6	–	–	–	10	–	–	–	"	N		S	0.3	16	
128	"	1653	1654	1	–	–	–	–	–	–	–	"	N		–	1.7	1	
129	"	1701	1703	2	–	–	–	–	–	–	–	"	N		–	0.1	2	
130	"	1708	1708	–	–	–	–	–	–	–	–	"	N		–	0.1	–	
131	"	1712	1713	1	–	–	–	–	–	–	–	"	N		–	0.1	1	
132	"	1718	1834	10	–	–	–	–	66	–	–	"	N		S	0.1	76	
133	3-25	1931	1951	20	–	–	–	–	–	–	–	"	N		–	1.0	2	
134	"	2035	2037	2	–	–	–	–	–	–	–	"	N		–	0.6	2	
135	"	2029	2029	–	–	–	–	–	–	–	–	"	N		–	0.0	–	
136	"	2033	2035	2	–	–	–	–	–	–	–	"	N		–	0.1	2	
137	"	2038	2038	–	–	–	–	–	–	–	–	"	N		–	0.1	–	
138	"	2044	2203	9	–	–	–	–	70	–	–	"	N		S	0.1	79	
139	3-26	1937	2010	21	–	–	–	–	–	1330	122	"	N		S	22.5	1473	24 HR RUN
140	3-28	1705	1707	2	–	–	–	–	–	–	–	"	T	[illegible]				

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 5
NAME EDG # 12 DATE 7-3-85
RAD / RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T=TRIP N=NORMAL	REASON FOR TRIP	TYPE OF LOADING F=FAST S=SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
141	3-29-84	1045	1207	7	–	–	–	–	75	–	–	PERF R3000 - OUTPUT	N		F	175	82	
142	"	1522	1643	5	–	–	–	–	76	–	–	"	N		F	7.3	81	
143	"	1909	2025	6	–	–	–	–	70	–	–	"	N		F	2.4	76	
144	3-30	0913	1035	8	–	–	–	–	74	–	–	"	N		F	12.8	82	
145	"	1254	1416	8	–	–	–	–	74	–	–	"	N		F	2.3	82	
146	"	1630	1758	8	–	–	–	–	72	–	–	"	N		F	2.2	80	
147	"	2022	2143	8	–	–	–	–	73	–	–	"	N		F	2.5	81	
148	3-31	0713	0834	8	–	–	–	–	73	–	–	"	N		F	9.5	81	
149	"	1048	1207	9	–	–	–	–	70	–	–	"	N		F	2.2	79	
150	"	1422	1541	7	–	–	–	–	72	–	–	"	N		F	2.3	79	
151	4-1	0730	0838	7	–	–	–	–	73	–	–	"	N		F	15.8	80	
152	"	1049	1207	5	–	–	–	–	72	–	–	"	N		F	2.0	78	
153	"	1406	1524	7	–	–	–	–	71	–	–	"	N		F	2.0	78	
154	"	1743	1907	9	–	–	–	–	75	–	–	"	N		F	2.3	84	
155	4-2	0728	0846	7	–	–	–	–	71	–	–	"	N		F	12.4	78	
156	"	1051	1209	7	–	–	–	–	–	71	–	"	N		F	2.1	78	
157	"	1430	1547	7	–	–	–	–	70	–	–	"	N		F	2.2	78	
158	"	1803	1922	8	–	–	–	–	71	–	–	"	N		F	2.2	77	
159	4-3	0746	0907	7	–	–	–	–	74	–	–	"	N		F	12.4	79	
160	"	1114	1231	7	–	–	–	–	69	–	–	"	N		F	2.2	81	
161	"	1436	1553	7	–	–	–	–	70	–	–	"	N		F	2.1	76	
162	4-4	0803	0903	–	–	–	–	–	–	–	–	"	N		–	17.2	77	
165	4-4	0907	0908	1	–	–	–	–	–	–	–	"	T	L.O.T.H	–	0.1	–	No countdown from C.R.
164	"	0916	1037	8	–	–	–	–	73	–	–	"	N		F	0.1	1	L.O.T.H SW VIBRATION PROB
165	"	1305	1421	6	–	–	–	–	70	–	–	"	N		F	2.5	81	
166	4-30	1026	1136	6	–	–	–	–	–	64	–	24.307.15	N		F	620.1	76	
167	5-1	1330	1440	6	–	–	–	–	–	64	–	"	N		F	25.8	70	
168	5-2	1352	1502	6	–	–	–	–	–	64	–	"	N		F	23.2	70	
169	5-31	1327	1332	5	–	–	–	–	–	–	–	"	T		–	694.4	5	MAIN GEN. POTS OUT
170	"	1401	1407	6	–	–	–	–	–	–	–	"	T	OP ERROR	–	0.5	6	
171	"	1415	1540	12	–	–	–	–	–	73	–	"	T	FF	F	0.1	85	Changed from AVR to MAN. V.R.
172	"	1544	1551	7	–	–	–	–	–	–	–	"	T	F.F.	–	0.1	7	Tech. ERROR
173	6-2	1038	1038	4	–	–	–	–	–	–	–	"	N		–	42.7	4	
174	6-29	1105	1215	8	–	–	–	–	–	62	–	"	N		F	694.4	70	
175	"	1456	1710	14	–	–	–	–	–	120	–	"	N		F	2.7	134	

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 6
NAME EDG # 12 DATE 7-3-85
RAD/RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T: TRIP N: NORM	REASON FOR TRIP	TYPE OF LOADING F: FAST S: SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
176	7-2-84	1239	0100	21	—	—	—	—	—	720	—	24.307.15	N		F	67.5	741	
177	7-24	1721	1724	8	—	—	—	—	—	—	—	24.307.11	N		—	520.4	.8	VISICORDER WIRED WRONG
178	"	1950	2120	10	—	—	—	—	—	80	—	"	N		F	0.5	90	
179	7-25	1336	1705	10	—	—	—	199	—	—	—	24.307.27	N		S	163	209	
180	"	2121	2150	5	—	—	—	—	—	10	14	24.307.31	N		F	4.3	29	CRB smoking
181	7-27	1345	1435	5	—	—	—	45	—	—	—	24.307.27	N		S	39.9	50	
182	"	1907	0003	8	—	—	20	4	15	68	121	SOE R3000-39	N		S	4.5	236	
183	7-28	0107	0144	15	—	6	—	16	—	—	—	"	N		S	1.0	37	
184	"	1038	1730	12	—	—	—	—	—	399	121	24.307.31	N		F	8.9	532	
185	7-29	2009	2145	10	—	—	—	—	86	—	—	24.307.02	N		F	26.7	96	
186	8-13	2040	2103	11	—	—	—	12	—	—	—	SOE R3000-41	N		S	359.1	23	
187	8-14	1454	1615	10	—	—	—	—	71	—	—	24.307.02	N		F	17.8	81	
188	"	2135	2300	10	—	—	—	—	75	—	—	"	N		F	5.3	85	
189	8-17	1132	1159	18	—	—	—	8	—	—	—	SOE R3000-43	N		S	60.6	26	
190	"	1407	1449	23	—	—	—	19	—	—	—	"	N		S	2.2	42	
191	8-23	1910	2024	10	—	—	—	—	—	64	—	24.307.15	N		F	149.3	74	
192	9-16	2111	2212	5	—	—	—	—	—	61	—	"	N		F	576.8	66	
193	9-25	2036	2214	10	—	—	—	—	88	—	—	TEST ABLOO OC1	N		F	214.4	98	
194	9-26	1317	1455	10	—	—	—	—	88	—	—	"	N		F	15.1	98	
195	9-27	2252	0454	10	—	—	—	—	352	—	—	"	N		F	32.0	362	
196	9-30	1529	1639	8	—	—	—	—	62	—	—	"	N		F	57.5	70	
197	10-16	2021	2125	10	—	—	—	—	—	64	—	24.307.15	N		F	387.7	74	
198	11-15	1806	2317	19	—	—	—	—	—	292	—	"	N		F	716.5	311	
199	11-17	1739	1742	3	—	—	—	—	—	—	—	"	T	Volts too low	—	42.4	3	EDG Tripped when EB3 closed
200	"	1749	1750	1	—	—	—	—	—	—	—	"	T	"	—	0.1	1	"
201	"	1941	2057	12	—	—	—	—	—	64	—	"	N		F	1.9	76	
202	11-18	1348	1505	10	—	—	—	—	—	67	—	"	N		F	16.7	77	
203	12-11	0926	1645	19	—	—	—	—	—	60	—	"	N		F	546.4	79	
204	12-14	1705	1822	10	—	—	—	—	—	67	—	"	N		F	78.3	77	
205	1-8	1327	1439	10	—	—	—	—	—	62	—	"	N		F	571.1	72	
Totals (HRS)				30.0	0.1	2.1	5.3	6.8	45.4	76.5	8.4						174.6	

GENERAL REPORT
OE 363 1204 (PN 751)

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO _____ SHEET NO. 1
NAME EDG # 13 DATE _____
JEF/RL/RAD

RUN #	DATE	START TIME	END TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T=TRIP N=NORMAL	REASON FOR TRIP	TYPE OF LOADING F=FAST S=SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
1	8-15-83	1501	1501	—	—	—	—	—	—	—	—	RUN IN	N	—	—	—	—	AIR ROLL
2	8-15-83	1524	1529	5	—	—	—	—	—	—	—	"	N	—	—	.1	5	900 RPM - INTERNAL INSPECTION
3	8-18-83	0848	0848	—	—	—	—	—	—	—	—	RUN IN	N	—	—	65.2	—	AIR ROLL
4	"	0854	0904	10	—	—	—	—	—	—	—	RUN IN	N	—	—	.1	10	500 RPM - ENGINE INSPECTION
5	"	0927	0949	22	—	—	—	—	—	—	—	"	N	—	—	.3	22	500 RPM - ENGINE INSPECTION
6	"	1024	1041	17	—	—	—	—	—	—	—	"	N	—	—	.6	17	900 RPM - ENGINE INSPECTION
7	8-22-83	1318	13	—	—	—	—	—	—	—	—	"	N	—	—	98.6	—	AIR ROLL
8	8-22-83	1322	1348	26	—	—	—	—	—	—	—	"	N	—	—	.1		GOV. HUNT - HIGH 904/LOW 450
9	8-24-83	0924	0924	—	—	—	—	—	—	—	—	"	N	—	—	41.0	—	AIR ROLL
10	8-24-83	0928	0928	—	—	—	—	—	—	—	—	"	T	START FAILURE	—	.1	—	ONLY ONE AIR HEADER
11	8-24-83	0942	0942	—	—	—	—	—	—	—	—	"	T	START FAILURE	—	.2	—	ONLY ONE AIR HEADER
12	"	1000	1000	—	—	—	—	—	—	—	—	"	T	"		.3	—	"
13	"	1016	1018	2	—	—	—	—	—	—	—	"	T	TRIPPED WHEN RECONNECT GOV.	—	.3	2	ELECT. GOV. WAS DISCONNECTED
14	8-25-83	0914	0914	—	—	—	—	—	—	—	—	"	N	—	—	23.0	—	AIR ROLL
15	"	0924	0924	—	—	—	—	—	—	—	—	"	T	START FAILURE	—	.2	—	EXCESSIVE CRANKING
16	"	0929	1012	43	—	—	—	—	—	—	—	"	N	—	—	.1	43	— —
17	"	1027	1031	4	—	—	—	—	—	—	—	"	N	—	—	.2	4	— —
18	"	1037	1059	22	—	—	—	—	—	—	—	"	T	OVER VOLTAGE	—	.1	22	ADJUSTING VOLT. REG.
19	"	1107	1110	3	—	—	—	—	—	—	—	"	T	FIELD FAILURE	—	.1	3	" "
20	"	1113	1115	2	—	—	—	—	—	—	—	"	T	—	—	.1	2	NO ALARM - LOOSE WIRE IN CONTROL CAB.
21	"	1118	1121	3	—	—	—	—	—	—	—	"	T	FIELD FAILURE	—	.1	3	ADJUST VOLT REG.
22	8-26-83	1338	1338	—	—	—	—	—	—	—	—	"	T	—	—	26.1	—	AIR ROLL
23	"	1339	1345	6	—	—	—	—	—	—	—	"	T	LUBE OIL TEMP HIGH	—	.1	6	OIL TEMP 125°F - JUMPER
24	"	1358	1407	9	—	—	—	—	—	—	—	"	N	—	—	.1	9	— —
25	"	1423	1444	21	—	—	—	—	—	—	—	"	N	—	—	.2	21	— —
26	8-29-83	1344	1344	—	—	—	—	—	—	—	—	"	N	—	—	21.0	—	AIR ROLL
27	"	1346	1346	—	—	—	—	—	—	—	—	"	T	START FAILURE	—	1	—	FUEL # 4 NOT CUT IN AFTER AIR ROLL
28	"	1349	1356	6	1?	—	—	—	—	—	—	"	N	—	—	.1	7	NO KW INDICATION
29	8-31-83	0935	1025	14	7	29	—	—	—	—	—	"	N	—	S	19.5	50	NO KW INDIC.
30	"	1419	1424	5	—	—	—	—	—	—	—	"	T	FIELD FAILURE	—	3.8	5	OPERATOR ERROR - DIDN'T WATCH VOLTAGES
31	"	1427	1500	8	2	23	—	—	—	—	—	"	N	—	S	.1	33	—
32	9-1-83	1039	1039	—	—	—	—	—	—	—	—	"	N	—	—	19.6	—	AIR ROLL
33	"	1041	1140	18	1	1	21	18	—	—	—	"	N	—	S	.1	59	—
34	9-6-83	1405	1405	—	—	—	—	—	—	—	—	"	N	—	—	2.4	—	AIR ROLL
35	9-6-83	1408	1408	—	—	—	—	—	—	—	—	"	T	FIELD FAILURE	—	.1	—	"40" Relay too sensitive
SUB-TOTAL				307	13	54	21	17										

GENERAL REPORT
DE 963 1264 (PN 75)

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. ____ SHEET NO. 2
NAME EDG #13 DATE JTF/RL/RAD

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T: TRIP N: NORMAL	REASON FOR TRIP	TYPE OF LOADING F: FAST S: SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
36	9-6-83	1421	1421	–	–	–	–	–	–	–	–	RUN IN	T	FIELD FAILURE	–	.2	–	"40" RELAY TOO SENSITIVE
37	"	1433	1455	22	–	–	–	–	–	–	–	"	N	–	–	.2	22	RECAL OF "40" RELAY
38	9-8-83	2010	2010	–	–	–	–	–	–	–	–	"	N	–	–	51.3	–	AIR ROLL
39	9-8-83	2020	2255	29	–	–	17	17	17	75	–	"	N	–	S	.1	155	–
40	9-14-83	1308	1308	–	–	–	–	–	–	–	–	SOE R3000-22	N	–	–	134.1	–	AIR ROLL
41	"	1317	1318	1	–	–	–	–	–	–	–	"	N	–	–	.1	1	VOLTAGE UNBALANCE
42	"	1353	1355	2	–	–	–	–	–	–	–	"	N	–	–	.4	25	SMOKE FROM C.T.
43	9-15-83	1132	1132	–	–	–	–	–	–	–	–	"	N	–	–	21.5	–	AIR ROLL
44	"	1134	1145	11	–	–	–	–	–	–	–	"	T	MECH. OVERSPEED FOR TEST	–	.1	11	–
45	"	1312	1314	2	–	–	–	–	–	–	–	"	T	OIL TEMP HIGH	–	1.4	2	TEMP 139°F – VIBRATION OF [illegible]
46	"	1430	1559	8	–	–	5	–	9	67	–	"	N	–	S	1.3	89	–
47	9-16-83	1352	1352	–	–	–	–	–	–	–	–	"	N	–	–	22.0	–	AIR ROLL
48	"	1355	1512	10	–	–	5	–	8	54	–	"	N	–	S	.1	77	–
49	9-19-83	0849	0849	–	–	–	–	–	–	–	–	"	N	–	–	65.5	–	AIR ROLL
50	"	0857	1004	10	–	–	11	–	–	52	–	"	N	–	S	.1	73	–
51	3-20-84	1109	1109	–	–	–	–	–	–	–	–	SOE R3000-29	N	–	–	4393	–	AIR ROLL
52	"	1126	1126	–	–	–	–	–	–	–	–	"	T	OTH	–	.3	–	TEMP OF OIL 123°F – VIBRATION OF SWITCH
53	"	1338	1338	–	–	–	–	–	–	–	–	"	T	OVERVOLTAGE	–	2.1	–	VOLTAGE 5000V
54	"	1351	1352	–	–	–	–	–	–	–	–	"	T	FIELD FAILURE	–	.2	1	DISABLED 40 RELAY
55	"	1423	1615	108	–	–	–	–	–	–	–	"	N	–	–	.5	108	ADJUSTING VOLT. REG.
56	"	1630	1716	18	–	7	21	–	–	–	–	"	N	–	S	.3	46	–
57	"	1724	2246	7	–	18	9	21	10	134	123	"	N	–	S	.1	322	–
58	"	2304	0001	6	–	11	9	5	12	6	8	"	N	–	S	.3	57	–
59	3-22-84	1352	1352	–	–	–	–	–	–	–	–	CAL 000.014	N	–	–	37.9	–	AIR ROLL
60	"	1404	1539	22	–	2	2	4	65	–	–	"	T	O.S.T TEST	S	.2	95	TRIP @ 1005 RPM
61	"	1544	1551	7	–	–	–	–	–	–	–	"	T	O.S.T. TEST	–	.2	7	TRIP @ 990 RPM
62	3-23-84	0946	0946	–	–	–	–	–	–	–	–	"	N	–	–	18.2	–	AIR ROLL
63	"	0958	0959	1	–	–	–	–	–	–	–	"	T	OTH	–	.2	1	LO TEMP SWITCH PROBLEM
64	"	1333	1545	49	–	3	–	66	2	14	–	"	N	–	S	2.5	133	–
65	"	1655	1911	72	–	2	–	2	–	60	–	"	N	–	S	1.2	136	–
66	3-28-84	1315	1315	–	–	–	–	–	–	–	–	"	N	–	–	114	–	AIR ROLL
67	"	1323	1323	–	–	–	–	–	–	–	–	"	T	OTH	–	.1	–	INSTALL TEMP MOD TO JUMPER OUT OIL TEMP HI TRIP
68	"	1611	1735	13	–	–	–	71	–	–	–	"	T	OVERSPEED – TEST	F	2.8	84	TRIPPED AT 1038 RPM
69	"	1738	1742	4	–	–	–	–	–	–	–	"	T	"	–	.1	4	TRIPPED AT 1033 RPM
70	4-3-84	1004	1004	–	–	–	–	–	–	–	–	"	N	–	–	136.4	–	AIR ROLL
SUB TOTAL				401	–	43	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]							

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 3
NAME EDG # 13 DATE JEF/RL/RAD

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T=TRIP N=NORMAL	REASON FOR TRIP	TYPE OF LOADING F=FAST S=SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
71	4-3-84	1010	1011	1	—	—	—	—	—	—	—	CATO. 000.04	T	OTH	—	.1	1	TEMP 138°F - INSTALLED NEW TEMP SWIT
72	"	1019	1040	7	—	—	—	—	—	14	—	"	N	—	F	.2	21	—
73	"	1056	1205	8	—	—	—	—	—	61	—	"	N	—	F	.2	69	—
74	4-4-84	0849	0853	4	—	—	—	—	—	—	—	"	N	—	—	28.9	4	MONITORING OETH
75	"	0856	0900	4	—	—	—	—	—	—	—	"	N	—	—	.1	4	"
76	"	0904	0905	1	—	—	—	—	—	—	—	"	T	OTH	—	.1	1	WIRING FROM PANEL TO SWITCH LOOSE
77	"	1323	1323	—	—	—	—	—	—	—	—	"	T	START FAILURE	—	4.2	—	FAILED TO RESET ENGINE - HUMAN ERROR
78	"	1348	1354	6	—	—	—	—	—	—	—	"	N	—	—	.4	6	—
79	"	1358	1400	2	—	—	—	—	—	—	—	"	N	—	—	.1	2	INSTALL TIME DELAY RELAY FOR OTH
80	4-11-84	1201	1213	12	—	—	—	—	—	—	—	"	N	—	—	166	12	ADJUST EGA CALIB GOV'S BOX
81	"	1215	1350	27	—	—	—	—	45	23	—	"	N	—	F	.1	95	—
82	"	1355	1842	35	—	—	—	—	—	252	—	"	N	—	F	.1	287	—
83	"	1845	1848	2	—	—	—	1	—	—	—	"	N	—	F	.1	3	—
84	5-4-84	1932	1933	1	—	—	—	—	—	—	—	PRET. R3000.01 REV-2	N	—	—	480.8	1	—
85	"	1942	1943	1	—	—	—	—	—	—	—	"	N	—	—	.1	1	—
86	"	2004	2005	1	—	—	—	—	—	—	—	"	N	—	—	.4	1	—
87	"	2010	2011	1	—	—	—	—	—	—	—	"	N	—	—	.1	1	—
88	"	2038	2039	1	—	—	—	—	—	—	—	"	N	—	—	.5	1	—
89	"	2048	2049	1	—	—	—	—	—	—	—	"	N	—	—	.1	1	—
90	"	2053	2054	1	—	—	—	—	—	—	—	"	N	—	—	.1	1	—
91	"	2057	2058	1	—	—	—	—	—	—	—	"	N	—	—	.1	1	—
92	"	2103	2217	10	—	—	—	—	64	—	—	"	N	—	E	.1	74	—
93	5-5-84	1409	1411	2	—	—	—	—	—	—	—	"	N	—	—	15.9	2	—
94	"	1416	1433	6	—	—	—	11	—	—	—	"	N	—	F	.1	17	—
95	"	1435	1446	5	—	—	—	—	—	6	—	"	N	—	F	.1	11	—
96	"	1452	1456	4	—	—	—	—	—	—	—	"	N	—	—	.1	4	—
97	"	1504	1506	2	—	—	—	—	—	—	—	"	N	—	—	.1	2	—
98	"	1617	1618	1	—	—	—	—	—	—	—	"	N	—	—	.3	1	—
99	5-3-84	1921	1935	14	—	—	—	—	—	—	—	"	N	—	—	27	14	—
100	"	1940	1943	3	—	—	—	—	—	—	—	"	N	—	—	.1	3	—
101	"	1946	1947	1	—	—	—	—	—	—	—	"	N	—	—	.1	1	—
102	"	1957	1953	2	—	—	—	—	—	—	—	"	N	—	—	.1	2	—
103	"	2113	2114	1	—	—	—	—	—	—	—	"	N	—	—	1.4	1	—
104	"	2116	2250	11	—	—	—	—	83	—	—	"	N	—	F	.1	94	—
105	5-4-84	0044	0150	5	—	—	—	—	—	—	61	"	N	—	F	1.9	66	SMOKE FROM CR8
	SUB TOTAL			194	—	—	—	12	194	321	61							

GENERAL REPORT
DE 563 1264 (PN 751)

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 4
NAME EDG # 13 DATE _____
JEF/RL/RAD

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T: TRIP N: NORMAL	REASON FOR TRIP	TYPE OF LOADING F: FAST S: SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
106	5-4-84	0210	0228	3	—	—	—	—	—	—	15	PRET R3000.04 REV. 2	N	—	F	.3	18	VERIFIED CR8 PROBLEM
107	5-10-84	0957	1449	8			17		21	125	121	SOE R3000-36	N	—	F	151.5	292	TEST CR8 (NEW)
108	5-13-84	1250	1355	20	—	—	—	—	—	1345	140	PRET R3000.04 REV. 2	N	—	F	70.0	1505	24 HR RUN
109	5-15-84	1338	1512	11	—				75	—	—	"	N	—	F	23.7	94	23 Starts
110	"	1850	2011	11	—	—	—	—	70	—	—	"	N	—	F	3.6	81	"
111	5-16-84	0949	1106	12	—	—	—	—	65	—	—	"	N	—	F	13.6	77	"
112	"	1408	1525	13	—	—	—	—	64	—	—	"	N	—	F	3.0	77	"
113	"	1817	1932	9	—	—	—	—	66	—	—	"	N	—	F	2.9	75	"
114	5-17-84	0819	0936	10	—	—	—	—	67	—	—	"	N	—	F	12.8	77	"
115	"	1256	1411	9	—	—	—		66	—	—	"	N	—	F	3.3	75	"
116	"	1744	1901	10	—	—	—	—	67	—	—	"	N	—	F	3.6	77	"
117	5-18-84	0826	0949	11	—	—	—	—	72	—	—	"	N	—	F	13.4	83	"
118	"	1311	1427	10	—	—	—	—	64	—	—	"	N	—	F	3.4	74	"
119	"	1803	1918	10	—	—	—	—	65	—	—	"	N	—	F	3.6	75	"
120	"	2149	2308	12	—	—	—	—	67	—	—	"	N	—	F	2.5	79	"
121	5-20-84	0854	1010	7	—	—	—	—	69	—	—	"	N	—	F	34.8	76	"
122	"	1300	1418	8	—	—	—	—	70	—	—	"	N	—	F	2.8	78	"
123	"	1708	1825	7	—	—	—	—	70	—	—	"	N	—	F	2.8	77	"
124	"	2117	2230	8	—	—	—	—	70	—	—	"	N	—	F	2.8	78	"
125	5-21-84	0844	1001	7	—	—	—	—	70	—	—	"	N	—	F	9.2	77	"
126	"	1312	1436	9	—	—	—	—	75	—	—	"	N	—	F	3.2	84	"
127	"	1807	1923	7	—	—	—	—	69	—	—	"	N	—	F	3.5	76	"
128	"	2200	2315	7	—	—	—	—	68	—	—	"	N	—	F	2.6	75	"
129	5-22-84	0822	0938	7	—	—	—	—	69	—	—	"	N	—	F	9.1	76	"
130	"	1256	1257	1	—	—	—	—	—	—	—	"	N	—	—	3.3	1	"
131	"	1305	1423	8	—	—	—	—	70	—	—	"	N	—	F	.1	78	"
132	"	1746	1803	7	—	—	—	—	70	—	—	"	N	—	F	3.4	77	"
133	6-28-84	1424	1627	10	—	—	—	—	—	110	—	SURV. 24.307.16	N	—	F	884.4	120	ERD OBTAIN VIB. DATA
134	7-2-84	0845	1651	19	—	—	—	—	—	470	—	—	N	—	F	88.4	487	—
135	7-3-84	0914	1132	8	—	—	—	—	—	120	—	SURV. 24.307.12	N	—	F	688.7	138	PRET. R3000.003
136	"	1545	1600	15	—	—	—	—	—	—	—	SURV. 24.307.28	N	—	—	9.2	15	"
137	"	1745	1900	9	—	—	—	—	—	66	—	SURV 24.307.12	N	—	F	1.8	75	"
138	"	1930	0200	15	—	—	—	—	—	375	—	SURV 24.307.03	N	—	F	.5	390	"
139	8-1-84	0338	1458	15	—	—	—	—	—	665	—	SURV. 24.307.16	N	—	F	1.6	680	"
140	8-6-84	0510	0615	6	—	—	—	—	—	59	—	"	N	—	F	110.2	65	"
SUBTOTAL				330	—	—	17	—	1590	3225	371						5690	

GENERAL REPORT

THE DETROIT EDISON CO.

DETROIT, MICHIGAN

PROBLEM NO. ____ SHEET NO. 5

NAME EDG # 13 DATE

JFF/RL/RAD

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T: TRIP N: NORMAL	REASON FOR TRIP	TYPE OF LOADING F: FAST S: SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
141	8-17-84	1625	1637	12	—	—	—	—	—	—	—	SEE R3000-44	T	FIELD FAILURE	—	276.2	12	VOLT ON GEN NOT HIGH ENOUGH
142	"	1650	1900	8	—	—	7	—	5	108	—	"	T	FIELD FAILURE	S	.2	131	ATTEMPT. OVERSPEED TRIP BUT TRIPPED ON FIELD FAIL. FIRST
143	"	1906	1910	4	—	—	—	—	—	—	—	"	T	OVERSPEED TEST	—	.1	4	TEST OVERSPEED TRIP
144	8-18-84	1342	1606	10			10		10	114	—	"	N	—	S	18.4	144	—
145	8-19-84	1035	8-20-84 1225	10	—	30	—	—	—	1390	120	SURV. 24.307.32	N	—	F	17.4	1550	PRET. R3000.003
146	8-20-84	1226	1331	5	—	—	—	—	—	60	—	SURV. 24.307.	N	—	F	24.0	65	"
147	8-23-84	2108	2220	9	—	—	—	—	—	63	—	SURV. 24.307.16	N	—	F	79.7	72	—
148	8-27-84	2101	2345	9	—	—	—	—	—	155	—	SURV. 24.307.32	N	—	F	94.7	164	PRET. R3000.003
149	9-17-84	0327	0440	9	—	—	—	—	—	64	—	SURV. 24.307.16	N	—	F	483.7	73	—
150	9-24-84	0941	1059	10	—	—	—	—	—	68	—	SURV. 24.307.16	N	—	F	173.0	78	—
151	9-25-84	2036	2215	9	—	—	—	—	90	—	—	PRET. A8100.001 REUR	N	—	F	33.7	99	ECCS INTEG. TEST
152	9-26-84	1317	1505	8	—	—	—	—	100	—	—	"	N	—	F	15.3	108	"
153	9-28-84	2145	2343	10	—	—	—	—	108	—	—	"	N	—	F	54.7	118	"
154	9-29-84	0308	0418	8	—	—	—	—	62	—	—	"	N	—	F	3.4	70	"
155	10-18-84	2034	2156	12	—	—	—	—	—	70	—	SURV. 24.307.16	N	—	F	472.3	82	—
156	11-24-84	1246	1252	6	—	—	—	—	—	—	—	—	N	—	—	879.2	6	INADVERTANT START
157	11-24-84	1501	1934	22	—	—	—	—	—	251	—	SURV 24.307.16	N	—	F	2.2	273	FUEL OIL CONSUMPTION TEST
158	12-28-84	0955	1111	10	—	—	—	—	—	66	—	SURV. 24.307.36	N	—	F	662.5	76	—
159	1-11-85	1348	1439	17	—	—	—	—	7	—	27	SURV. 24.307.32	N	—	F	338.6	51	START 24 HR RUN SHUTDOWN CONCERN OVER FUEL CRANKCASE
SUB TOTAL				188	—	30	17	—	385	2409	147						3252	
GRAND TOTAL (MINUTES)				1349	10	125	350	216	2299	6562	615						11413	
GRAND TOTAL (HOURS)				22.5	.2	2.1	5.8	3.6	38.3	109.3	10.2						190.2	

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 1
NAME EDG # 14 DATE _____
RAD/PL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE of S/D T=TRIP N=NORM	REASON FOR TRIP	TYPE OF LOADING F=FAST S=SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
1	4/14/83	1013	1017	4	—	—	—	—	—	—	—	RUN IN	N		—	—	4	300 RPM INT. INSP
2	"	1045	1056	11	—	—	—	—	—	—	—	"	N		—	0.5	11	450 " "
3	"	1301	1312	11	—	—	—	—	—	—	—	"	N		—	2.1	11	600 " "
4	"	1412	1422	10	—	—	—	—	—	—	—	"	N		—	1.0	10	670 " 11 "
5	4-15-83	1423	1428	5	—	—	—	—	—	—	—	"	N		—	24.0	5	INT. INSP & CLEAN STA.
6	4-16	0948	1028	40	—	—	—	—	—	—	—	"	N		—	19.3	40	Exc. Vib - Gen. Wedges Loose
7	5-24	1447	1552	65	—	—	—	—	—	—	—	SOE R3000-02	N		—	960.0	65	Vib. Test
8	6-8	0958	0958	—	—	—	—	—	—	—	—	SOE R3000-04	N		—	3300	—	Air Roll
9	"	1006	1050	44	—	—	—	—	—	—	—	"	T	O.S.T. Test	—	0.1	44	1035 RPM - All Wedges Replaced
10	8-9	1432	1432	—	—	—	—	—	—	—	—	RUN IN +	N		—	1450	—	Air Roll
11	"	1438	1453	15	—	—	—	—	—	—	—	CAL 0.000.014	N		—	0.3	15	
12	8/10	1344	1344	—	—	—	—	—	—	—	—	"	N		—	22.9	—	Air Roll
13	"	1357	1400	3	—	—	—	—	—	—	—	"	N		—	0.2	3	All Annun. Alarmed
14	8-11	1105	1105	—	—	—	—	—	—	—	—	"	N		—	21.1	—	Air Roll
15	"	1114	1144	30	—	—	—	—	—	—	—	"	N		—	24.1	30	Governor Settings
16	8-16	1358	1358	—	—	—	—	—	—	—	—	"	N		—	121.2	—	Air Roll
17	"	1402	1402	—	—	—	—	—	—	—	—	"	T	F.F.	—	0.1	—	No Voltage or Frequency
18	"	1417	1417	—	—	—	—	—	—	—	—	"	T	"	—	0.1	—	"
19	"	1422	1422	—	—	—	—	—	—	—	—	"	T	"	—	0.1	—	"
20	"	1427	1427	—	—	—	—	—	—	—	—	"	T	"	—	0.1	—	"
21	8-22	1044	1103	19	—	—	—	—	—	—	—	"	N		—	140.2	19	
22	"	1110	1120	10	—	—	—	—	—	—	—	"	N		—	0.1	10	Verified High Gov. Settings
23	8-23	0918	0918	—	—	—	—	—	—	—	—	"	N		—	220	—	Air Roll
24	"	0938	0941	3	—	—	—	—	—	—	—	"	T	(HER-82-344)	—	0.3	3	Exciter Source in Gen. Panel. Exciter was purposely tripped
25	8-25	1320	1320	—	—	—	—	—	—	—	—	"	N		—	51.7	—	Air Roll
26	"	1325	1331	6	—	—	—	—	—	—	—	"	N		—	0.1	6	Volt Reg Adj.
27	"	1419	1431	12	—	—	—	—	—	—	—	"	N		—	0.8	12	"
28	8-26	1102	1102	—	—	—	—	—	—	—	—	"	N		—	22.5	—	Air Roll
29	"	1105	1118	13	—	—	—	—	—	—	—	"	N		—	0.1	13	Verified Volt Reg checked
30	8-29	1432	1432	—	—	—	—	—	—	—	—	"	N		—	51.3	—	Air Roll
31	"	1435	1438	3	—	—	—	—	—	—	—	"	N		—	0.1	3	Reg. Oscill.
32	8-30	0926	0926	—	—	—	—	—	—	—	—	"	N		—	18.9	—	Air Roll
33	"	0930	0952	22	—	—	—	—	—	—	—	"	N		—	0.1	22	
34	"	1027	1040	13	—	—	—	—	—	—	—	"	N		—	0.6	13	
35	"	1115	1117	2	—	—	—	—	—	—	—	"	N		—			

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 2
NAME EDG # 14 DATE _____
EAD/EC

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T=TRIP N=NORMAL	REASON FOR TRIP	TYPE OF LOADING F=FAST S=SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
36	8-30-83	1120	1123	3	—	—	—	—	—	—	—	CA10-000-014	T	Emer Stop	—	0.1	3	ESA + ESB picked up
37	8-31-83	1120	1120	—	—	—	—	—	—	—	—	"	N		—	24.0	—	Air Roll
38	"	1123	1123	—	—	—	—	—	—	—	—	"	T	St. Fail	—	0.1	—	Fuel Rack set at min.
39	"	1125	1125	—	—	—	—	—	—	—	—	"	T	"	—	0.0	—	Low Air Pressure (140#)
40	"	1312	1313	1	—	—	—	—	—	—	—	"	T	Overvoltage	—	1.7	1	Test Leads wrong
41	"	1341	1431	50	—	—	—	—	—	—	—	"	N		—	0.5	50	Volt Reg IC chip replaced
42	9-1	0756	1019	23	—	—	—	—	—	—	—	"	T	O.S.T. Test	—	18.5	22	
43	"	1395	1425	28	—	22	—	—	—	—	—	"	N		S	3.3	50	
44	9-2	0730	0930	—	—	—	—	—	—	—	—	"	N		—	19.1	—	Air Roll
45	"	0932	1001	11	—	18	—	—	—	—	—	"	N		S	0.0	29	
46	"	1057	1117	9	—	11	—	—	—	—	—	"	N		S	0.9	20	
47	9-9	1917	1917	—	—	—	—	—	—	—	—	"	N		—	170.0	—	Air Roll
48	"	1920	2018	37	—	—	21	—	—	—	—	"	N		S	0.1	58	
49	9-10	0955	0955	—	—	—	—	—	—	—	—	"	N		—	13.8	—	Air Roll
50	"	0958	1057	29	—	3	27	—	—	—	—	"	N		S	0.1	59	
51	9-13	0858	0858	—	—	—	—	—	—	—	—	"	N		—	70.0	—	Air Roll
52	"	0901	0946	45	—	—	—	—	—	—	—	"	N		—	0.1	45	
53	9-16	1020	1020	—	—	—	—	—	—	—	—	"	N		—	72.6	—	Air Roll
54	"	1023	1023	—	—	—	—	—	—	—	—	"	N		—	0.1	—	V.R. Prob.
55	9-20	0933	0933	—	—	—	—	—	—	—	—	"	N		—	95.2	—	Air Roll
56	"	0935	1125	22	—	—	11	35	19	23	—	"	N		S	0.0	110	
57	"	1328	1442	33	—	—	—	41	—	—	—	"	N		S	3.0	74	
58	9-21	1056	1056	—	—	—	—	—	—	—	—	"	N		—	19.3	—	Air Roll
59	"	1059	1325	4	—	—	2	10	60	70	—	"	T	I.C.T.H.	S	0.1	146	I.C.T. = 152°F (in panel)
60	3-29-84	1342	1343	1	—	—	—	—	—	—	—	SEE R3000-34	T	VOLTAGE HIGH	—	∞	1	
61	"	1389	1441	52	—	—	—	—	—	—	—	"	N		—	0.1	52	
62	3-31-84	0938	0938	—	—	—	—	—	—	—	—	"	N		—	67.8	—	Air Roll
63	"	0953	1112	79	—	—	—	—	—	—	—	"	N		—	0.3	79	
64	"	1128	1216	47	—	1	—	—	—	—	—	"	N		—	0.3	48	Problems closing breakers
65	"	1404	1630	85	—	—	1	60	—	—	—	"	N		S	3.9	146	
66	"	1852	1857	4	1	—	—	—	—	—	—	RUN IN	N		—	2.3	5	
67	4-1	0905	0905	—	—	—	—	—	—	—	—	SEE R3000-34	N		—	14.1	—	Air Roll
68	"	0910	1354	45	—	35	11	12	35	145	1	"	N		S	0.1	284	
69	"	1609	1718	9	—	5	5	7	18	18	8	"	N		S	2.3	67	
70	4-2	1337	1512	15	—	—	10	—	9	61	—	SEE R3000-35	N		S	21.3	95	

GENERAL REPORT

DE-963 1264 (PN 75)

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 3

NAME EDG # 14 DATE _____

RAD/RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D T=TRIP N=NORMAL	REASON FOR TRIP	TYPE OF LOADING F=FAST S=SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
71	4-9-84	1501	1615	14	—	—	—	—	16	44	—	RUN IN	N		S	167.8	74	
72	4-10	0907	1047	32	—	—	6	—	16	46	—	"	N		S	16.3	100	
73	4-19	1022	1022	—	—	—	—	—	—	—	—	SEE R3000-35	N		—	315.5	—	All Rail
74	"	1026	1026	—	—	—	—	—	—	—	—	"	T	J.C.P.&L	—	0.1	—	V.b Pmb.
75	"	1223	1223	—	—	—	—	—	—	—	—	"	T	OP ERROR	—	2.0	—	
76	"	1230	1233	3	—	—	—	—	—	—	—	"	N		—	0.1	3	
77	"	1235	1240	5	—	—	—	—	—	—	—	"	N		—	0.0	5	
78	"	1246	1259	13	—	—	—	—	—	—	—	"	N		—	0.1	13	Gov. shutting
79	"	1700	1715	15	—	—	—	—	—	—	—	"	N		—	4.0	15	Adj Gov.
80	"	1730	1734	4	—	—	—	—	—	—	—	"	N		—	0.2	4	
81	"	1738	1745	7	—	—	—	—	—	—	—	"	N		—	0.1	7	Change EGA Control Unit
82	"	2046	2142	22	—	—	34	—	—	—	—	"	N		S	3.0	56	
83	"	2200	2228	18	—	—	14	—	19	1417	—	"	N		S	0.3	1468	
84	4-21	1450	1450	—	—	—	—	—	—	—	—	RUN IN	T	FF	—	16.3	—	170 VDC Fuse Blown 2nd
85	"	1455	2111	12	—	—	—	—	—	364	—	"	N		F	0.1	376	
86	4-23	1028	1339	35	—	—	—	—	—	156	—	"	N		F	37.3	191	
87	"	1350	1411	11	—	—	—	10	—	—	—	"	N		S	0.2	21	
88	"	1425	1502	23	—	—	14	—	—	—	—	"	N		S	0.2	37	
89	5-1	1832	1835	3	—	—	—	—	—	—	—	PRET R3000-01 Rm 2	N		—	145.5	3	
90	"	1841	1843	2	—	—	—	—	—	—	—	"	N		—	0.1	2	
91	"	1858	1900	2	—	—	—	—	—	—	—	"	N		—	0.1	2	
92	"	1912	1915	3	—	—	—	—	—	—	—	"	N		—	0.1	3	
93	"	2132	2135	3	—	—	—	—	—	—	—	"	N		—	0.1	3	
94	"	2127	2128	1	—	—	—	—	—	—	—	"	N		—	0.1	2	
95	"	2143	2144	1	—	—	—	—	—	—	—	"	N		—	2.3	1	
96	"	2146	2147	1	—	—	—	—	—	—	—	"	N		—	0.1	1	
97	"	2300	2302	2	—	—	—	—	—	—	—	"	N		—	0.1	1	
98	"	2306	2307	1	—	—	—	—	—	—	—	"	N		—	61	2	
99	"	2309	2310	1	—	—	—	—	—	—	—	"	N		—	0.2	1	
100	"	2313	2314	1	—	—	—	—	—	—	—	"	N		—	0.1	1	
101	"	2317	0030	10	—	—	—	—	63	—	—	"	N		F	0.1	73	
102	5-2	1239	1240	—	—	—	—	—	—	—	—	"	N		—	12.1	—	
103	"	1245	1313	5	—	—	—	23	—	—	—	"	N		F	0.1	28	
104	"	1317	1337	5	—	—	—	—	—	13	—	"	N		F	0.1	19	
105	5-3	1931	1935	14	—	—	—	—	—	—	—	"	N		—	19.9	14	

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO. _____ SHEET NO. 4
NAME EDG # 14 DATE _____
EAD/EL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MW)	PURPOSE FOR RUN	TYPE of S/D T-TRIP N-NORMAL	REASON FOR TRIP	TYPE OF LOADING F:FAST S-SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
106	5-3-84	1938	1940	2	—	—	—	—	—	—	—		N		—	0.1	2	
107	"	1945	1947	2	—	—	—	—	—	—	—	PRET P3000-004 Rod 2	N		—	0.1	2	
108	"	1951	1953	2	—	—	—	—	—	—	—	"	N		—	0.1	2	
109	"	2113	2114	1	—	—	—	—	—	—	—	"	N		—	1.3	1	
110	"	2116	2248	10	—	—	22	—	—	—	—	"	N		S	0.0	92	
111	5-4	0033	0940	10	—	—	—	—	—	415	122	"	N		F	1.8	547	
112	6-5	1036	1036	—	—	—	—	—		—	—	SOE P3000-35	N		—	8170	—	Air R-11
113	"	1048	1753	26	—	—	117	—	155	127	—	"	N		S	0.2	425	
114	6-9	1545	1655	10	—	—	—	—	—	10	50	PRET P3000-[illegible]	N		F	22.8	70	
115	6-12	1717	1717	—	—	—	—	—	—	—	—	SOE P3000-37	N		—	72.4	—	CR8 installed backwards
116	"	1745	1914	5	—	—	20	—	22	42	—	"	N		S	0.5	89	S/D DUE TO HIGH GEN MAINS
117	6-13	1154	1425	11	—	—	12	—	—	8	120	"	N		S	16.3	151	"
118	6-18	1058	1735	25	—	—	5	—	17	340	—	SOE P3000-35437	N		S	116.5	387	
119	6-19	1319	1332	8	—	—	—	—	—	1323	122	"	N		F	19.9	1457	
120	6-21	1408	1410	2	—	—	—	—	—	—	—	"	N		—	346	2	
121	"	1413	1522	10	—	—	—	—	69	—	—	"	N		F	0.1	79	
122	"	1831	1949	10	—	—	—	—	—	68	—	"	N		F	3.0	78	
123	"	2230	2230	—	—	—	—	—	—	—	—	"	N		—	2.7	—	
124	"	2334	2350	8	—	—	—	—	—	68	—	"	N		F	0.8	76	
125	6-22	0637	0758	10	—	—	—	—	—	71	—	"	N		F	2.5	81	
126	"	1030	1147	10	—	—	—	—	—	67	—	"	N		F	2.6	77	
127	"	1425	1554	10	—	—	—	—	—	79	—	"	N		F	2.4	89	
128	"	1819	1935	8	—	—	—	—	—	68	—	"	N		F	2.2	76	
129	"	2118	2263	8	—	—	—	—	—	67	—	"	N		F	2.4	75	
130	6-23	0129	0243	6	—	—	—	—	—	68	—	"	N		F	2.2	74	
131	"	0644	0807	10	—	—	—	—	—	70	—	"	N		F	2.4	80	
132	"	1458	1615	9	—	—	—	—	—	68	—	"	N		F	4.0	77	
133	"	1845	2006	10	—	—	—	—	—	71	—	"	N		F	2.4	81	
134	"	2230	2346	8	—	—	—	—	—	68	—	"	N		F	2.3	76	
135	6-24	0205	0322	8	—	—	—	—	—	69	—	"	N		F	2.3	77	
136	"	0638	0753	8	—	—	—	—	—	67	—	"	N		F	2.3	75	
137	"	1033	1148	8	—	—	—	—	—	67	—	"	N		F	2.5	75	
138	"	1430	1535	8	—	—	—	—		67	—	"	N		F	2.4	75	
139	"	1757	1912	7	—	—	—	—	—	68	—	"	N		F	2.4	75	
140	"	2156	2311	7	—	—	—	—	—	68	—	"	N		F	2.7	75	

GENERAL REPORT

THE DETROIT EDISON CO.
DETROIT, MICHIGAN

PROBLEM NO ____ SHEET NO 5

NAME EDG # 14 DATE ____

KAD/RL

RUN #	DATE	START TIME	S/D TIME	NO LOAD (MIN)	LOAD 0-499 (MIN)	LOAD 500-999 (MIN)	LOAD 1000-1499 (MIN)	LOAD 1500-1999 (MIN)	LOAD 2000-2499 (MIN)	LOAD 2500-2999 (MIN)	LOAD ≥3000 (MIN)	PURPOSE FOR RUN	TYPE OF S/D F-TRIP N-NORMAL	REASON FOR TRIP	TYPE OF LOADING F-FAST S-SLOW	TIME SINCE LAST S/D (HR)	TOTAL RUN TIME (MIN)	NOTES
141	6-25-84	0218	0334	8	—	—	—	—	—	68	—	PREP R3000-04 thru 7	N		F	3.1	76	
142	"	0811	0927	8	—	—	—	—	—	68	—	"	N		F	4.6	76	
143	"	1146	1302	8	—	—	—	—	—	68	—	"	N		F	2.4	76	
144	"	1530	1644	7	—	—	—	—	—	67	—	"	N		F	2.5	74	
145	7-3	0857	1706	9	—	—	—	—	—	480	—	24.307-17	N		F	160.2	489	
146	7-7	1010	1137	7	—	—	—	—	—	80	—	"	N		F	112.9	87	
147	7-31	0914	1132	13	—	—	—	—	—	125	—	24.307-13	N		F	577.5	138	
148	"	1545	1600	—	15	—	—	—	—	—	—	24.307-09	N		S	4.6	15	
149	"	1800	1900	10	—	—	—	—	—	50	—	24.307-13	N		F	2.0	60	
150	"	2035	0200	10	—	—	—	—	195	—	—	24.307-04	N		F	1.6	205	
151	8-1	0234	0334	—	—	—	—	—	—	—	—	24.307-17	N		—	1.6	—	Petcock open - S/D
152	"	0338	1140	10	—	—	—	—	—	473	—	"	N		F	0.1	482	S/D - High exc. V.b.
153	8-10	1137	1671	31			18		9	185		See R3000-35	N		S	216.0	243	
154	8-11	1259	1624	14	—	—	11	—	19	161	—	"	N		S	21.5	205	
155	8-16	1205	1333	18	—	—	4	—	—	174	—	"	N		S	1135	208	
156	"	1344	1622	8	—	—	—	—	—	150	—	"	N		F	0.2	158	
157	"	1705	1705	—	—	—	—	—	—	—	—	"	T	Excitation not reset	—	0.7	—	
158	"	1714	1800	7	—	—	—	—	—	43	—	"	N		F	0.1	50	
159	8-18	1342	1712	10	—	—	—	—	—	300	—	24.307-17	N		F	4.37	210	
160	8-19	1035	1225	10	—	—	—	—	—	1420	120	24.307.33	N		F	174	155	
161	8-20	1326	1226	—	—	—	—	—	—	—	—	24.307.04	N		—	00	—	Shaft failure >1 sec.
162	8-21	1402	1506	3	—	—	—	—	—	61	—	See R3000-45	N		F	25.5	64	
163	"	1509	1521	2	—	—	—	—	—	10	—	"	N		F	0.1	12	
164	"	1524	1536	2	—	—	—	—	—	10	—	"	N		F	0.1	12	
165	"	1539	1543	5	—	—	—	—	—	—	—	"	N		—	0.0	5	
166	8-27	2101	2345	5	—	—	—	—	—	159	—	24.307.33	N		F	120.3	164	
167	9-19	1035	1320	25	—	—	7		18	125	—	See R3000-46	N		S	514.3	175	
168	"	1946	2010	10	—	—	—	—	—	64	—	24.307.17	N		F	5.8	74	
169	9-25	2036	2220	10	—	—	—	—	94	—	—	PREP R3000-00	N		F	168.3	104	
170	9-26	1317	1526	10	—	—	—	—	99	—	—	"	N		F	15.0	107	
171	9-28	2145	2316	10	—	—	—	—	111	—	—	"	N		F	51.1	121	
172	9-29	0303	1712	10	—	—	—	—	934	—	—	"	N		F	3.4	944	
173	10-1	2307	0033	16	—	—	—	—	—	20	—	24.307.17	N		F	461.9	86	
174	10-6	1525	2035	29	—	—	—	—	—	274	—	"	N		F	117	307	
Total (145)				20.6	0.3	1.6	6.2	2.3	21.6	1744	9.0						3570	

ATTACHMENT H

Summary of Factory Test Data: Fairbanks-Morse
Emergency Diesel Generators

REPORT SHEET
DE 953-0764 (MS 14)

PROBLEM NO. _____ SHEET NO. _____

NAME V NYQUIST DATE 3-3-85

EDG 11 FACTORY TEST DATA REF FM PRODUCTION TEST LOG

TIME	DATE	L.O. PRESS	L.O. TEMP FROM ENGINE	FILTER ΔP (PSID)	STRAINER ΔP (PSID)		HIGH LOAD (KW)					
0745	5-14-75	—	—	—	—		2871					
0845		33	184	1.5	2		2880					
0915		33	186	2	3		2888					
0945		32.5	186	1	3		2884					
1015		32	188	1	3		2880					
1045	↓	32	188	1.5	3		2884					
1915	5-14-75	35	179	2	2		1415					
1945		35	179	2	2		1420					
2045		34	180	1	2		2144					
2115		34	181	1	2		2156					
2215		33.6	182	1.5	2		2872					
2245		33.5	182	1.5	2		2872					
2320		31.5	185	1	2		3162					
2340	↓	31.4	185	1.3	2		3176					
1130	5-15-75	34	182	1	2		2877					
1200	↓	34	183	1	2		2885					
~~to~~												
1030	5-16-75	31.5	190	2	2		3303					
1100		31.5	190	2	2		3292					
1130		31.5	189	2	2		3292					
1200	↓	31.5	189	2	2		3292					

REPORT SHEET
DE 353-0764 (MS 14)

PROBLEM NO. _____ SHEET NO. _____

NAME J. NYQUIST DATE 3-3-85

EDG 12 FACTORY TEST DATA

REF FM PRODUCTION TEST LOG

DATE	TIME	L.O. PRESS	L.O. TEMP	FILTER ΔP (1)	STRAINER ΔP		HIGH LOAD (KW)					
~~1300~~												
6-10-75	1300	34.4	190	19.5	3		2888					
	1330	34.4	190	19.5	3		2889					
	1400	34.4	190	19.5	3		2881					
	1430	34.5	190	19.5	3		2881					
	1500	34.3	191	20	3		2885					
6-10-75	1545	34.5	190	20	2.5		2880					
	1615	34.8	189	20.3	2.4		2882					
	1745	37.4	181	17.8	4.5		1413					
	1815	37.5	181	15	3.2		1413					
	1915	36.8	184	16.5	3		2151					
	1945	36.8	183	16.4	2.8		2147					
	2045	34.8	190	20	2.5		3171					
	2115	34.2	190	19.5	3		3176					
6-12-75	1100	36.8	185	19.5	3		2895					
	1130	36.4	186	20	3		2889					
	1215	33.4	193	20	2.5		3277					
	1245	33.2	194	20.1	2.5		3277					
	1315	33	195	19.7	3		3282					
	1345	33	195	19.5	3		3282					

(1) THIS DATA PROBABLY INCLUDES AN ESTIMATED 3-4 PSI Δ DROP ACROSS THE LUBE OIL COOLER.

REPORT SHEET
DE 963-0764 (MS 14)

PROBLEM NO. _____ SHEET NO. _____

NAME J. NIQUIST DATE 3-3-85

EDG 13 FACTORY TEST DATA

REF FM PRODUCTION TEST LOG

DATE	TIME	L.O. PRESS	L.O. TEMP	FILTER ΔP ①	STRAINER ΔP		HIGH LOAD (KW)
6-18-75	1020	32.3	193	20.3	4.5		2885
	1050	32	194	20	4.5		2889
	1120	32	194.5	20	4.5		2873
	1150	32	195	20.5	4.5		2873
	1220	32	196.5	20.5	4.5		2873
6-18-75	1545	36	182	16	5		1421
	1615	36	182	16	5		1417
	1715	35.8	184	17.5	6		2143
	1745	35.8	184	19.5	4.5		2143
	1845	34.2	190	21	4		2873
	1915	34.5	189	21.5	4		2875
	2015	33.2	192	21.5	4.5		3162
	2045	33.1	194	21.5	4.5		3176
6-20-75	0910	35.5	187	20.8	4.5		2074
	0940	35	189	20.7	4.5		2074
	1025	31.4	198.5	20.5	4.5		2074
	1055	31.2	200	20	4.5		2074
	1125	31	200.5	20.5	4.5		2074
	1155	31	201	20.5	4.5		2074

① DATA PROBABLY INCLUDES PRESSURE DROP ACROSS LUBE OIL COOLER

REPORT SHEET
OE 963-0764 (MS 14)

PROBLEM NO. _____ SHEET NO. _____

NAME J. NYQUIST DATE 3-3-85

EDG 14 FACTORY TEST DATA PER PM PRODUCTION TEST LOG

DATE	TIME	LO. PRESS	L.O. TEMP	FILTER ΔP	STRAINER ΔP		HIGH LOAD (KW)					
5-18-77	—	35	174	10.5	10.5		2867					
	—	35	173	10	10		2867					
	—	35	175	9.5	10.5		3276					
	—	35	176	9.5	10.5		3282					
	—	35	176	9.5	10.5		3276					
	—	35	176	9.5	10.5		3288					
5-16-77	—	35	173	10	10		3281					
	—	35	172	10	10		3281					
	—	36	175	10	10		3281					
	—	37	175	10	10		3288					
	—	36	174	10	10		3168					
	—	36	174	10	10		3168					
	—	36	170	10	10		2881					
	—	36	170	10	10		2867					
	—	36	172	10	10		2144					
	—	36	171	10	10		2142					
	—	35.5	171	9	10		1404					
	—	35.5	171	9	10		1405					
4-12-77	—	36	173	10	11		2885					
	—	36	175	11	11		2872					
	—	36	175	10	11		2872					
	—	35	176	10.5	11.5		2867					

ATTACHMENT I

Summary of EDG Lube Oil System Logs and Special Test Results: EDG Nos 11, 12, 13 and 14

EDG #11

DATE	L.O. PRESS (PSI)	L.O. TEMP. (°F)	FILTER ΔP (PSI)	STR. ΔP (PSI)	C.C. VAC. (in Hg)	HIGH LOAD (KW)	NOTES
8 28 82	36	184	10	4	1.0	2950	CA10.000.014
9-01-82	37	185	8	3	1.4	2915	"
1-17-83	32	183	10	4	1.0	2900	"
2-11-83	33	182	11	2	2.0	1800	STE LOG
2-11-83	32.5	182	11	2	2.2	1800	"
2-15-83	32.5	182.5	10	4	1.2	2800	"
2-16 83	30	183	10	3	1.2	2750	"
2-17-83	32	184	10	3	0.4	3150	PRET R3000.001, Rev 0
2-18-83	32.5	182	10	3	1.4	2850	"
3-27-83	33	NA	NA	2	1.2	2500	SEE R3000-17
4-14-83	33	182	NA	2	0.8	2852	" -21
4-18-83	32	182	NA	NA	1.2	2800	" -21
3-05-84	31.5	180	3	2	0.0	2850	" -27
3-07-84	31	181	3	3	1.0	3135	" "
7-26-84	32	181	6	4	1.0	3100	PRET R3000.001, Rev 2
7-27-84	31	180	5	4	2.4	2860	"
7-25-84	31	176	5	3	4.1	1900	24 307 26
7-28-84	29	183	6	4	2.7	3180	PRET R3000.003, Rev 1
7-27-84	30	181	2.5	2	2.8	2950	"
7-28-84	30	182	3.5	2	4.0	2650	24 307.01
8-18-84	30	181	NA	NA	1.5	NA	24 307 14
9-18-84	29.5	180	5	3	2.3	NA	"
1-16 84	29.5	181	4	3	2.8	2952	"
2-16-84	30	181	5	2	3.0	2950	"
1-2-85	30	180	4	2	2.4	2860	"

Lube Oil Filters were changed out on 7-15-83

EDG # 12

Page 1 of 1

DATE	L.O. PRESS (PSI)	L.O. TEMP. (°F)	FILTER ΔP (PSI)	STR. ΔP (PSI)	C.C. VAC. (in Hg)	HIGH LOAD (KW)	NOTES
1-12-82	37	185	4	4	1.8	3000	CA10.000.014
1-10-83	34	184	4	3	1.9	2750	"
2-2-84	35	185	5	3	0.75	3135	SCER3000-28-4
2-25-84	34.5	182	5	3	1.9	1800	24.307.26
2-28-84	31	185	6	3	1.4	3150	PREP R3.00.003 Rev 1
2-29-84	31	190	6	4	1.6	2900	"
3-29-84	32	187	6	3	1.1	2200	24.307.02
3-23-84	31	186	6	3	0.5	2900	NA
4-16-84	31.5	187	6	4	1.0	2950	24.307.15
9-16-84	32	184	4	2	1.5	3000	"
11-14-84	32	183	5	4	1.2	2500	"
1-8-85	32	183	6	3	1.0	2900	"

Lube Oil Filters were not changed during this period

EDG #13

Page 1 of

DATE	L.O. PRESS (PSI)	L.O. TEMP. (°F)	FILTER ΔP (PSI)	STR. ΔP (PSI)	C.C. VAC. (in Hg)	HIGH LOAD (KW)	NOTES
3-20-84	33.	184	2	4	4.0	3135	SOE R3000-29
5-10-84	33	184	0	4	1.6	3135	-36
5-13-84	33.5	183.5	2	4	1.4	3150	PRET R3000.001 Rev 2
5-14-84	33.5	183	2	4	0.7	2850	PRET R3000.001 Rev 2
7-31-84	35	177	2	4	0.6	330	24.307.03
7-31-84	33	184	3	4	1.3	2850	" .12
7-31-84	32	183	2	3	2.2	2230	" .32
7-6-84	32	184	NA	4	1.5	2860	" .16
8-19-84	33	186	2	3.5	1.2	3160	PRET R3000.003, Rev 1
8-23-84	32	184	2	4	1.0	2870	24.307.16
7-17-84	32	183	3	4	1.7	2900	"
6-18-84	33	183	3	4	0.2	2850	"
2-17-84	33	182	3	4	0.5	2900	"

Lube Oil Filters were not changed during this period

EDG # 14

PAGE 1 of 1

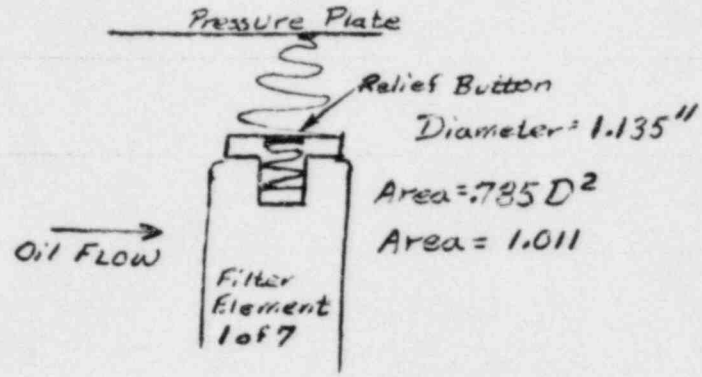
DATE	L.O. PRESS (PSI)	L.O. TEMP. (°F)	FILTER ΔP (PSI)	STR. ΔP (PSI)	C.C. VAC. (in Hg)	HIGH LOAD (KW)	NOTES
1-1-84	34	185	8	3	2.75	3135	SOE R3000-34
1-13-84	35	186	2	4	2.0	3180	" 37-2
1-18-84	35.5	192	3	5.5	2.0	2850	" 37-3
1-19-84	35	186	3	4	4.0	3125	PRET R3000.001 Rev 2
1-20-84	35	184	3	3	4.9	2850	"
1-31-84	35	184	2	2	5.0	2200	24.307.04
1-31-84	37	180	2	2	2.5	550	"
1-31-84	34	186	3	3	5.0	2850	" .13
2-1-84	34	189	2	3	5.0	3125	PRET R3000.001 Rev 1
2-1-84	35	175	2	2	6.0	2850	"
2-18-84	34	187	2	3	4.5	2850	24.307.17
2-18-84	34	184	NA	NA	4.1	2875	"

Lube Oil Filters are estimated to have been changed between 5-2-84 and 6-7-84.

1-29-85
Wm Chandler

Lube Oil Filter Relief Setpoints

Formula $\text{Pressure} = \frac{\text{Force (pounds)}}{\text{Area (in}^2\text{)}}$



6" Caliper Ser.# V-6002
0-50# Force Gauge Ser.# FTE-6321
CAL. 8-14-84 ±3% FS
DUE 2-14-84

EDG #11		EDG #12	
Force	Relief Pressure (PSI)	Force	Relief Pressure (PSI)
25.5	25.2	23.5	23.2
25.5	25.2	25.0	24.7
26.0	25.7	27.5	27.2
25.0	24.7	27.5	27.2
24.5	24.2	22.4	22.2
27.0	26.7	21.3	21.1
29.5	29.2	23.5	23.2

Comments: Metal Particles / Shavings found wedged between disc and seating surface of valves (indicative of opening during flow).

Manufacturer Setpoint - 20 PSI

Lube Oil Filter Relief Setpoints

Formula $\text{Pressure} = \frac{\text{Force (pounds)}}{\text{Area (in}^2\text{)}}$

Diameter = 1.135

Area = .785 D^2

Area = 1.011

6" Caliper Ser.# C-6005

-180# Force Gauge Ser.# ZZ-100056

CAL. 2-21-85 DUE 5-21-85

EDG #14			EDG #13	
	Force	Relief Pressure (PSI)	Force	Relief Pressure (PSI)
1	25	24.7	1. 29	27.7
2	23	22.8	2. 25.5	25.2
3	25	24.7	3. 26	25.7
4	28	27.7	4. 26.5	26.2
5	28	27.7	5. 29	28.7
6	25.5	25.2	6. 22	21.8
7	29	28.7	7. 27	26.7

Comments: Upon reassembly of EDG #14 filters the distance between pressure plate and filter was ≥ 2.5 inches on three filter assemblies.

Manufacturer Setpoint - 20 PSI

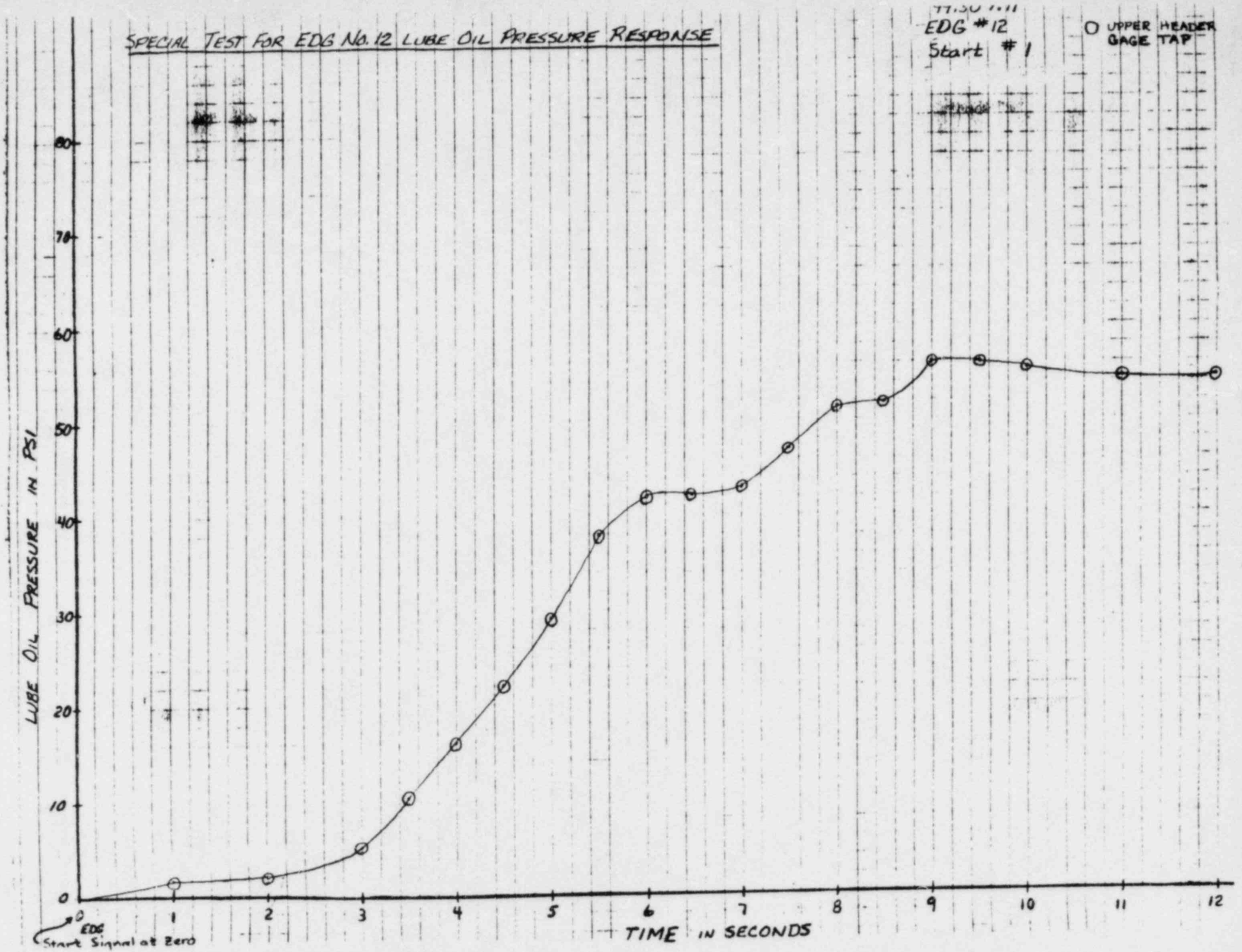
Debris found lodged on seat of 5 relief valves on EDG #13 soft black carbon-like material

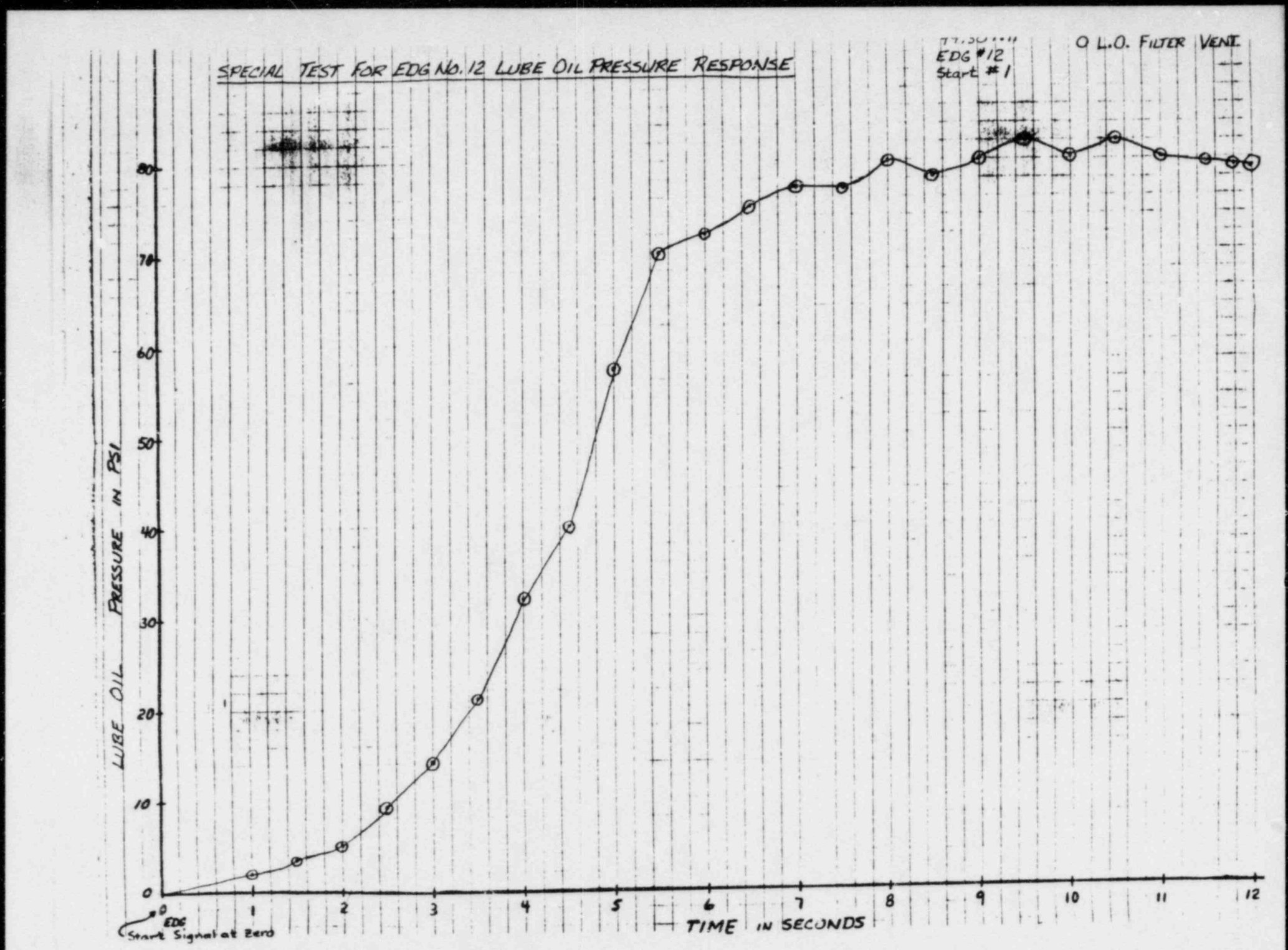
Rad. Chemistry Samples taken

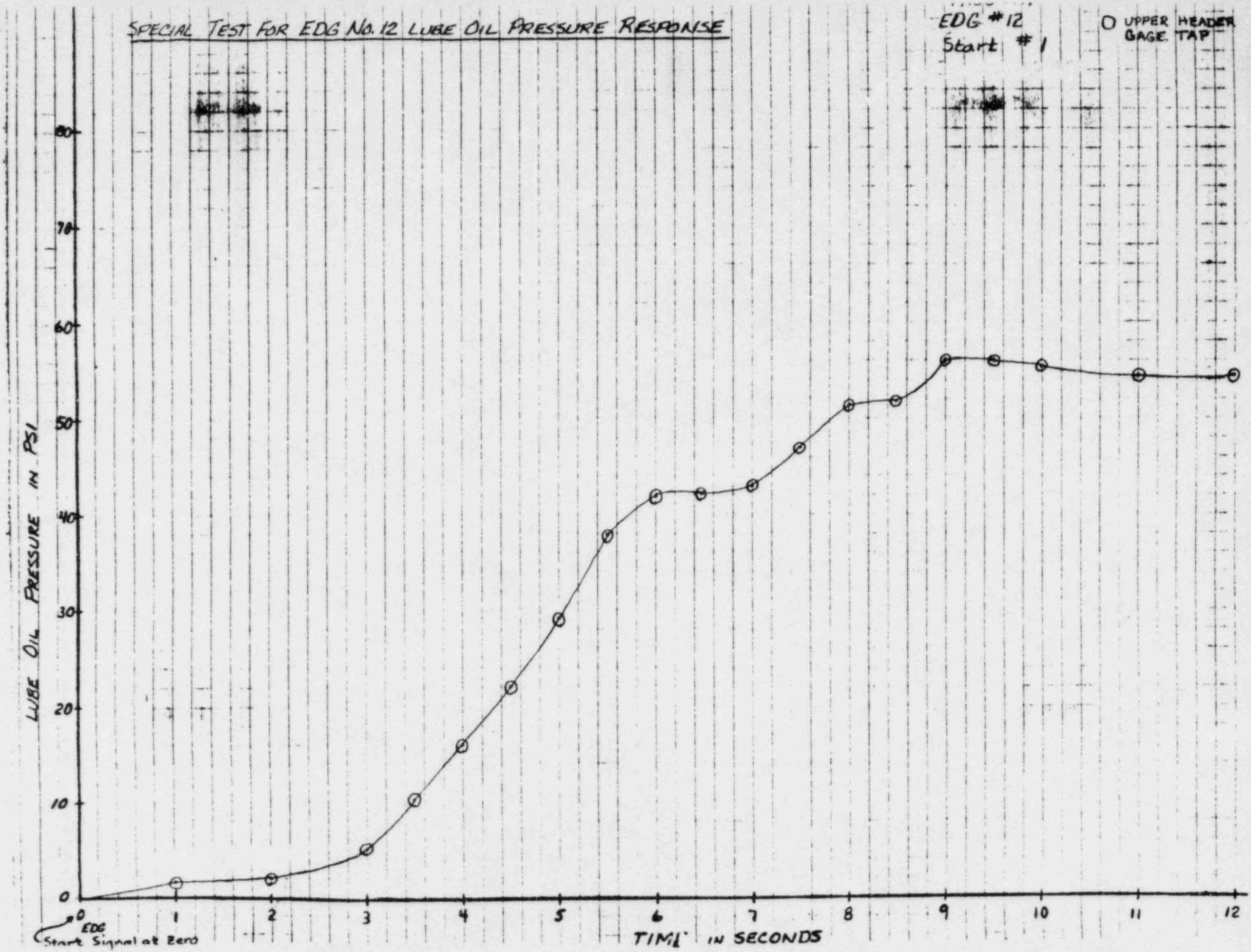
All but two lube oil filter reliefs were dry with no oil puddle on top

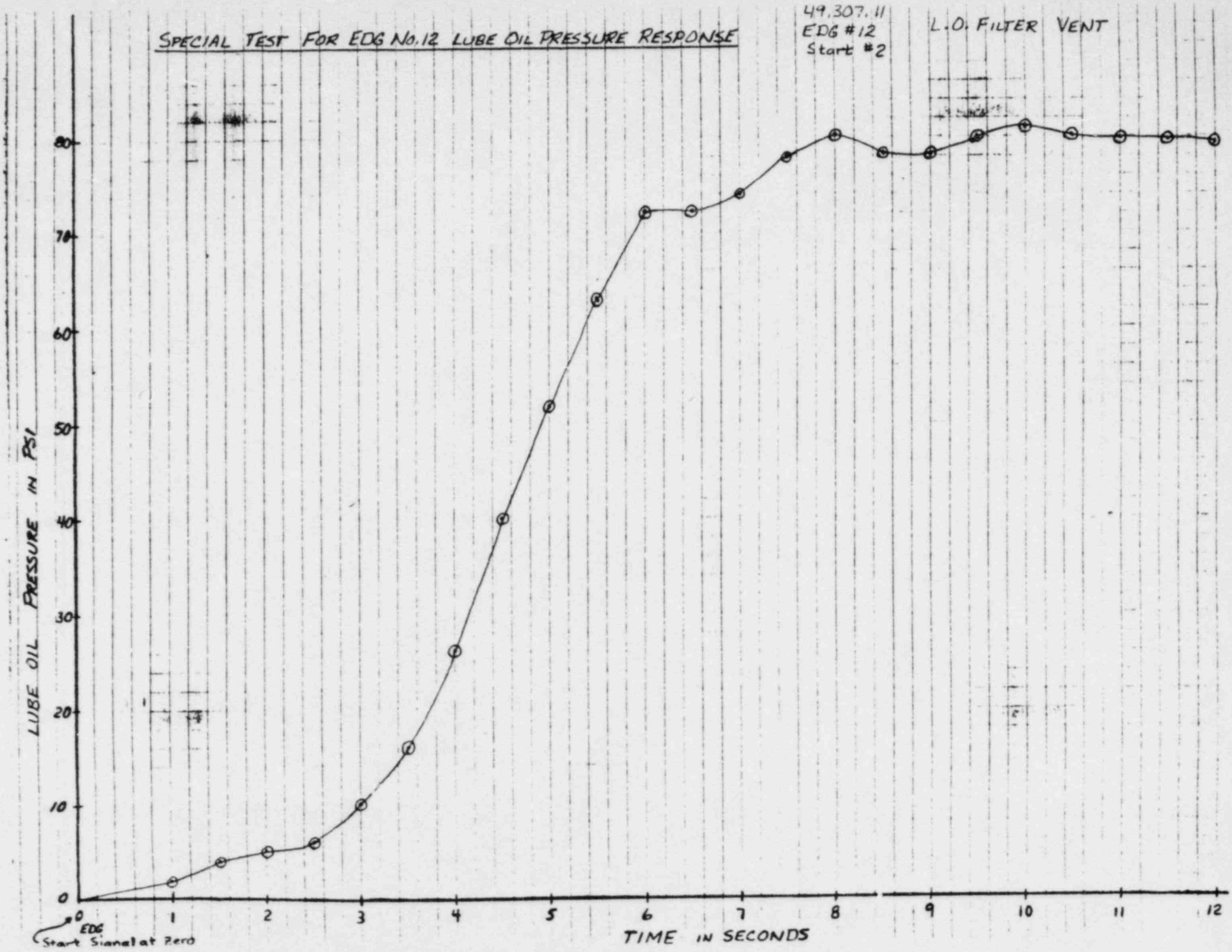
Acceptable gap of ≤ 2.5 inches found on all filter assemblies for EDG #13

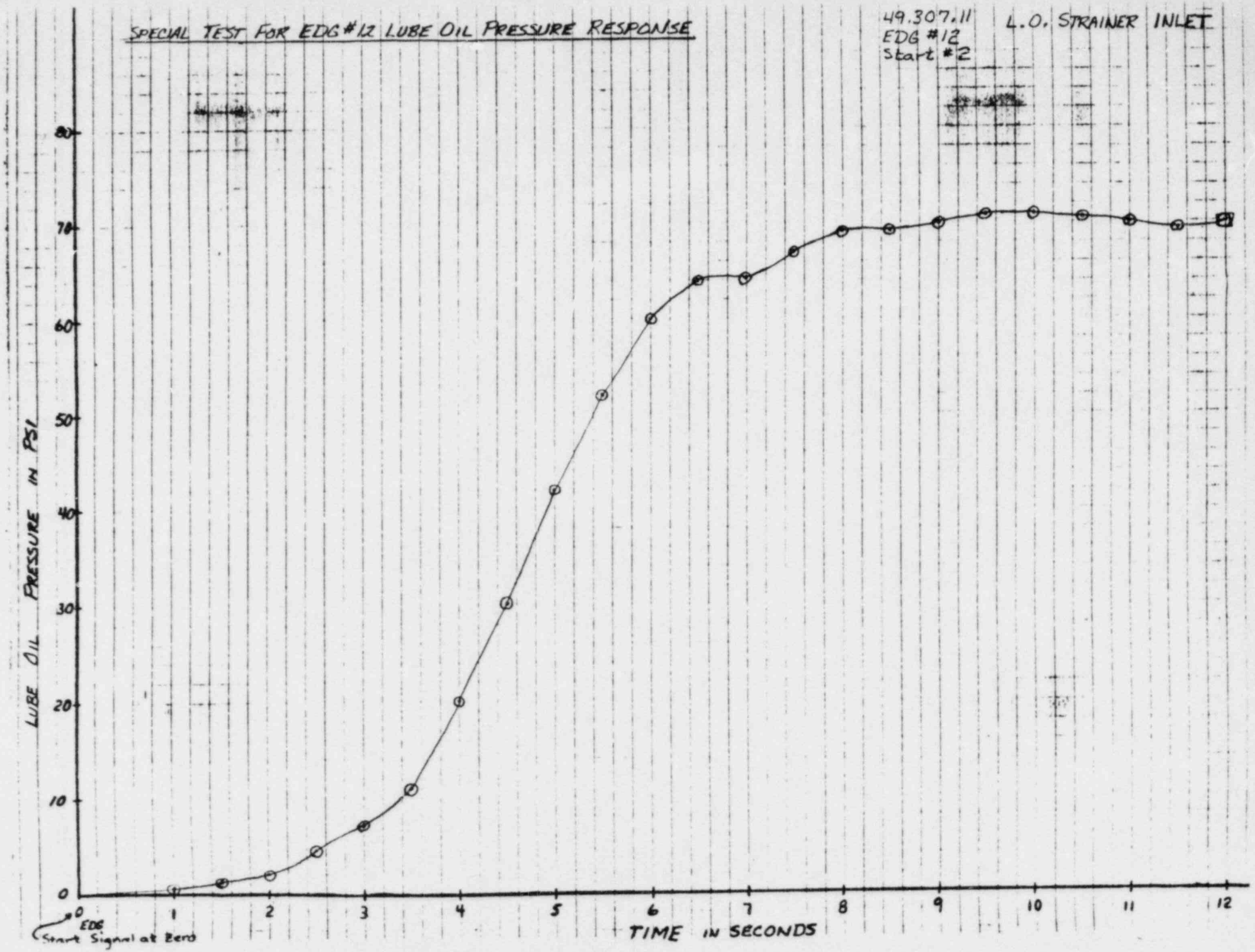
Glen Christian 5-3-85

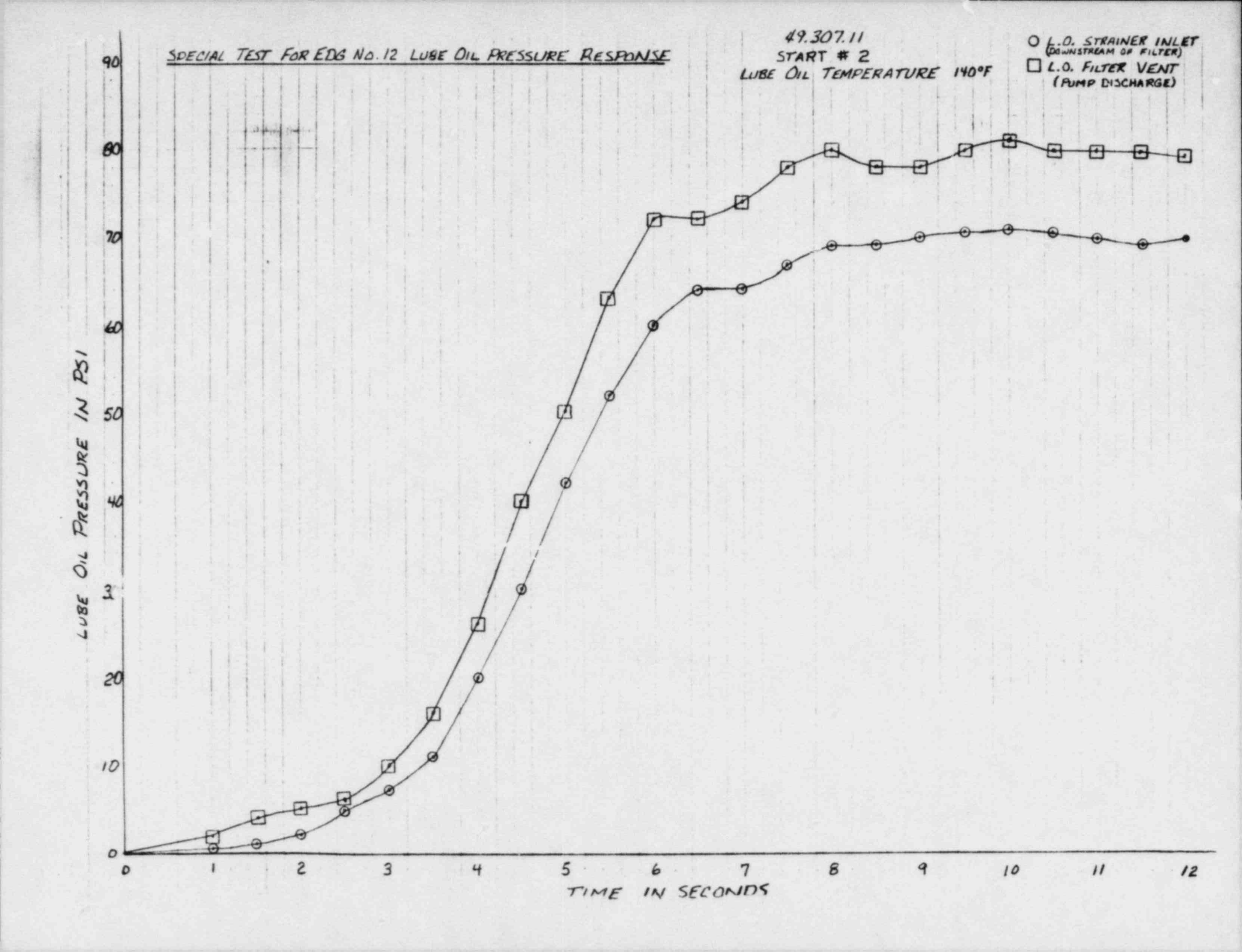

SPECIAL TEST FOR EDG No. 12 LUBE OIL PRESSURE RESPONSE
EDG #12
Start #1
O UPPER HEADER GAGE TAP
LUBE OIL PRESSURE IN PSI
0
10
20
30
40
50
60
70
80
0 EDG Start Signal at Zero
1
2
3
4
5
6
7
8
9
10
11
12
TIME IN SECONDS

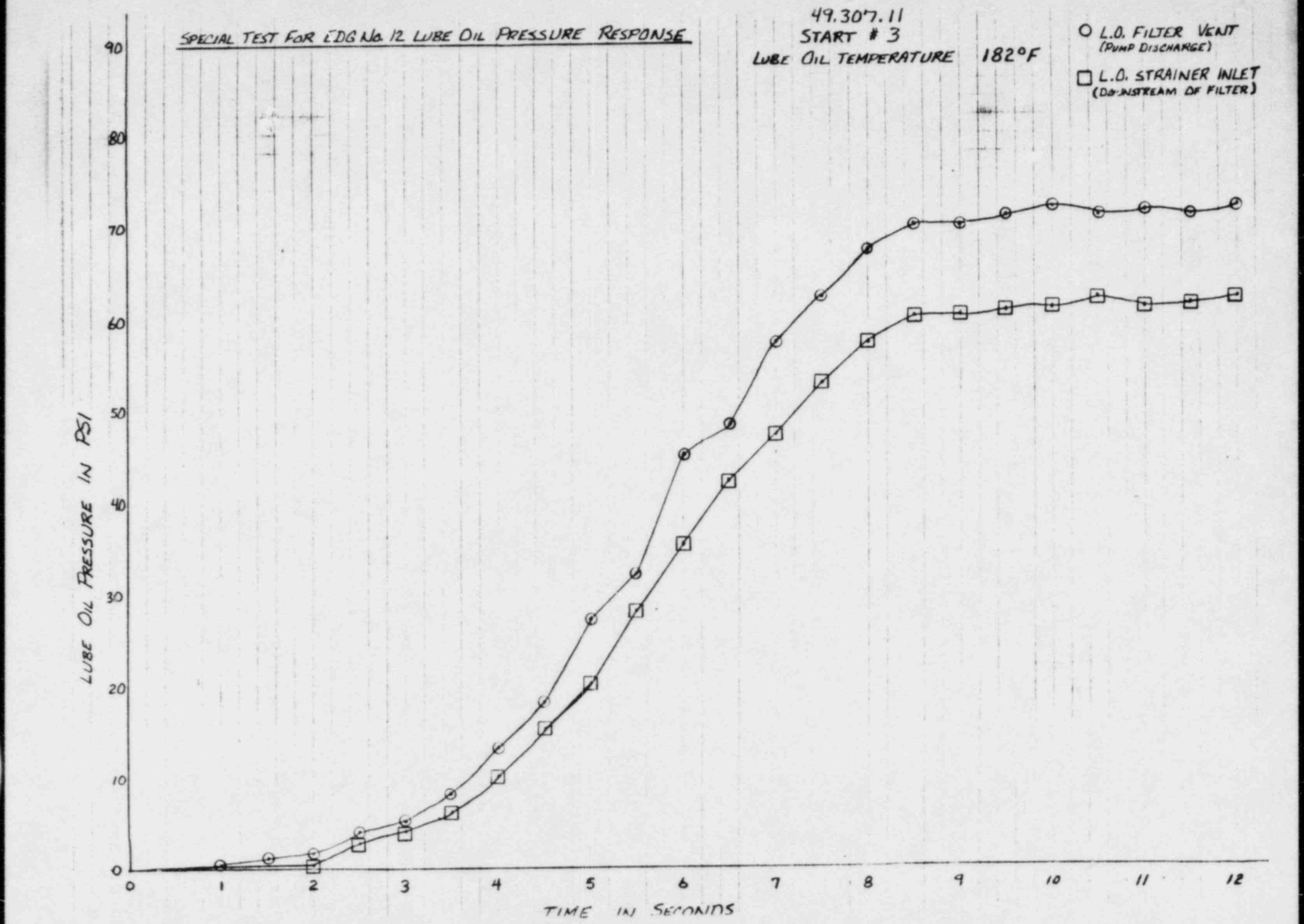

SPECIAL TEST FOR EDG No. 12 LUBE OIL PRESSURE RESPONSE
EDG #12
Start #1
O L.O. FILTER VENT
LUBE OIL PRESSURE IN PSI
0
10
20
30
40
50
60
70
80
1
2
3
4
5
6
7
8
9
10
11
12
TIME IN SECONDS
0
EDG
Start Signal at Zero

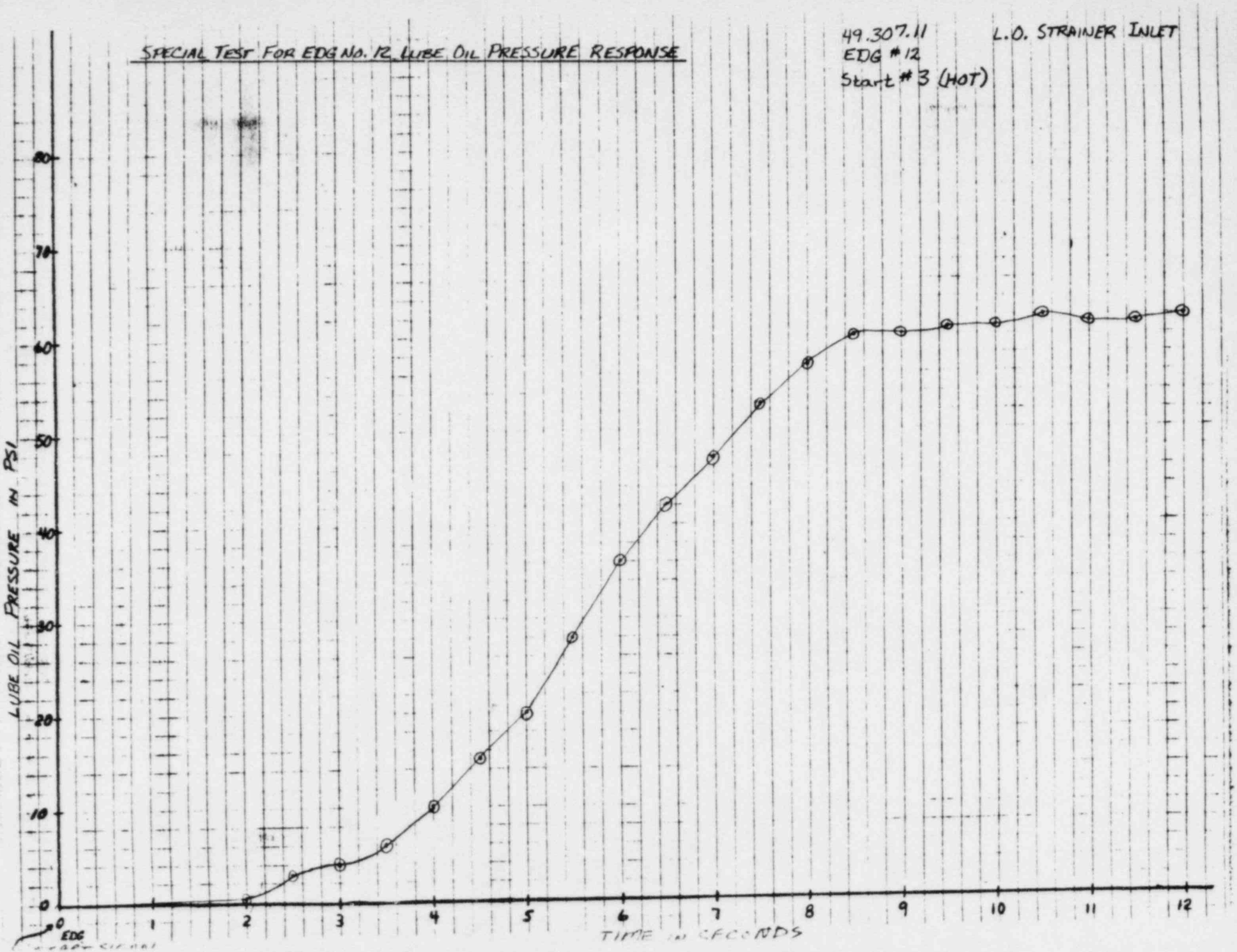

SPECIAL TEST FOR EDG No. 12 LUBE OIL PRESSURE RESPONSE
EDG #12
Start #1
O UPPER HEADER GAGE TAP
LUBE OIL PRESSURE IN PSI
0
10
20
30
40
50
60
70
80
0
1
2
3
4
5
6
7
8
9
10
11
12
TIME IN SECONDS
EDG
Start Signal at Zero

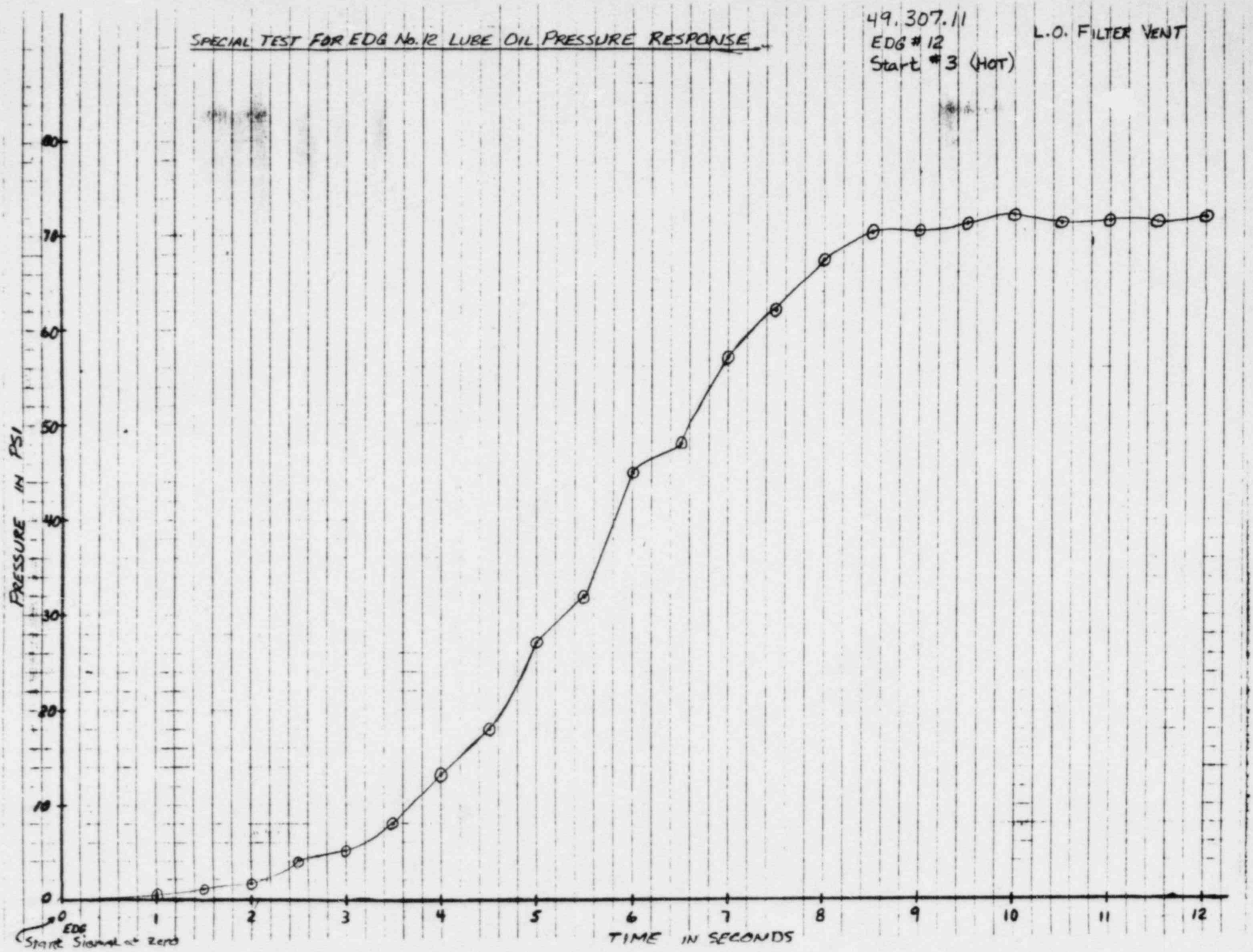

SPECIAL TEST FOR EDG No. 12 LUBE OIL PRESSURE RESPONSE
49.307.11
EDG #12
Start #2
L.O. FILTER VENT
LUBE OIL PRESSURE IN PSI
0
10
20
30
40
50
60
70
80
0
1
2
3
4
5
6
7
8
9
10
11
12
EDG
Start Signal at Zero
TIME IN SECONDS


SPECIAL TEST FOR EDG #12 LUBE OIL PRESSURE RESPONSE
49.307.11 L.O. STRAINER INLET
EDG #12
Start #2
LUBE OIL PRESSURE IN PSI
0
10
20
30
40
50
60
70
80
0
EDG Start Signal at Zero
1
2
3
4
5
6
7
8
9
10
11
12
TIME IN SECONDS


SPECIAL TEST FOR EDG NO. 12 LUBE OIL PRESSURE RESPONSE
49.307.11
START # 2
LUBE OIL TEMPERATURE 140°F
L.O. STRAINER INLET (DOWNSTREAM OF FILTER)
L.O. FILTER VENT (PUMP DISCHARGE)
LUBE OIL PRESSURE IN PSI
TIME IN SECONDS
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
7
8
9
10
11
12


SPECIAL TEST FOR EDG No. 12 LUBE OIL PRESSURE RESPONSE
49.30-7.11
START # 3
LUBE OIL TEMPERATURE 182°F
L.O. FILTER VENT (PUMP DISCHARGE)
L.O. STRAINER INLET (DOWNSTREAM OF FILTER)
LUBE OIL PRESSURE IN PSI
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
7
8
9
10
11
12
TIME IN SECONDS


SPECIAL TEST FOR EDG NO. 12 LUBE OIL PRESSURE RESPONSE
49.307.11
L.O. STRAINER INLET
EDG #12
Start #3 (HOT)
LUBE OIL PRESSURE IN PSI
0
10
20
30
40
50
60
70
80
0
1
2
3
4
5
6
7
8
9
10
11
12
EDG
TIME IN SECONDS


SPECIAL TEST FOR EDG No. 12 LUBE OIL PRESSURE RESPONSE
49.307.11
EDG # 12
Start # 3 (HOT)
L.O. FILTER VENT
PRESSURE IN PSI
0
10
20
30
40
50
60
70
80
0
1
2
3
4
5
6
7
8
9
10
11
12
TIME IN SECONDS
EDG Start Signal at Zero

ATTACHMENT J

Letter, T. J. Skinner (Fairbanks-Morse) to W. H. Jens, January 22, 1985, "Lube Oil System Modification Design Concept and Test Results"

copies: JC Agosti
JR Green
AD Lenart
JA Hyquist
Doc Control
1-24-85

Colt Industries

January 22, 1985
948-850/85

Fairbanks Morse
Engine Division
701 Lawton Avenue
Beloit, Wisconsin 53511
608/364-8174

Thomas J. Skinner
Manager - Product Service

RECEIVED
JAN 23 1985
W. H. JENS

Detroit Edison
Enrico Fermi II Nuclear Plant
6400 N. Dixie Highway
Newport, Michigan 48166

Attn: Mr. W. Jens

Dear Wayne,

The attached Engineering Report dated 8/28/81, prepared by V. Stonehocker, may be useful in describing the design concept of the latest engine "keepwarm" system. In addition, the following drawings would aid in system evaluation:

10560216 - L.O. Heater & Piping
16403478 - L.O. System Modification
11868684 - L.O. Standby Pump
11868658 - L.O. System Schematic

Please advise if your copies are not readily available.

As we discussed 1/21/85, the failure experienced on engine #11 and conditions observed on engine #12 appear to be due to lack of lubrication due to loss of lube oil pressure, or insufficient oil flow. This could have occurred as recently as during the last startup, or prior to modification of the keepwarm system. Inadequate lubrication could have been caused by one or more of the following:

1. Failure to pre-lube engine before startup (prior to keepwarm system modification).
2. Failure to operate current keepwarm system prior to startup.
3. Cummulative effect of premature discharge of oil in main bearing booster oil reservoir either during previous engine shutdown procedure, or operation of air start device without subsequent refilling of reservoir as would occur during a "false start".
4. Obstruction in lube oil piping.
5. Increased clearance on one overheated bearing would decrease oil pressure and transfer loading to adjacent bearings.

Other possible, but less likely, causes of bearing failure:

1. Excessive dirt in lube oil system (not likely due to no dirt scratches seen in non-failed bearings).
2. Excessive engine loading - check piston pins for "extrusion".
3. Excessive air entrapment in oil.
4. Decrease in oil viscosity due to dilution with fuel oil.
5. Oil contaminated with water.

Please feel free to call upon us as your investigation progresses. Our personnel at the site may be able to assist in reviewing maintenance and operating practices, but they would not be familiar with technical design details of your specific installation, or Ed Greene could help with these questions.

As a note for your future consideration, we have staffed and opened a new training facility in Beloit which would be ideal for an operational/ maintenance course for your personnel directly involved in operating and monitoring these engines. For example, the procedure for starting an engine from a cold state (keepwarm system below 110°F) could be reviewed for use when starting from this condition. Our Mr. Roger Brenneke, Manager-Training Center (608/364-8352) would be pleased to discuss this with you in greater detail. A descriptive brochure is attached for your information.

One other item that may be of interest would be a copy of a proposed ASME paper entitled "Inservice Testing of Diesel Drives in Nuclear Power Stations". Although not yet published, we believe the draft copy would be available from the committee chairman:

Raymond P. Necci
Northeast Utilities Service Co.
P. O. Box 270
Hartford, Connecticut 06141-0270

We look forward to assisting you in determining the cause of problems recently experienced, and in developing a support program to enhance the reliability of this installation.

Very truly yours,

COLT INDUSTRIES OPERATING CORP.
FAIRBANKS MORSE ENGINE DIVISION

T. J. Skinner, Manager
Product Support Department

TJS/lm

Attachments

cc: C. Ankrum
A. Belvedere
R. Brenneke
E. Greene
T. V. O'Sullivan
M. Peterson

Fairbanks Morse
Engine Division

ENGINEERING REPORT

SHEET 1 OF 5 | PAGE NO. 5

FILE NUMBER VTS-985-082881-01R

SUBJECT: ENGINE PRELUBE/KEEPWARM SYSTEM REQUIREMENTS

DATE: AUGUST 28, 1981

PREPARED BY: V.T. STONEHOCKER

REPORT TITLE: KEEPWARD L.O. SYSTEM MODIFICATION
NUCLEAR STANDBY UNITS (OP ENGINES)

APPROVED BY: V.T. Stonehocker

GENERAL

This report covers modifications to be made to the OP skidded engine units to provide an engine more readily prepared to make fast starts such as are required in Nuclear service. In the previous engine skid designs, the unit was provided with two systems to precondition the engine lube oil system. The one referred to as the keepwarm system, consisted of a motor driven pump and a heater thru which a small flow of lube oil was run while the engine was not in operation. The oil was pumped from the L.O. sump, thru the heater and back into the opposite end of the sump. The heater was thermostatically controlled to attempt to maintain the L.O. sump at a moderate temperature. The other system consisted of a somewhat larger capacity pump which was used immediately prior to operating the engine to fill the engine with lube oil in preparation for an engine start. This arrangement was used when ever the engine was started for testing or maintenance operations. In the event of a need for emergency service, startup was made without prelubing the engine.

Research work was undertaken to see if it was possible to derive a system which would allow the engine to be continuously lubricated but not to the point of over-oiling the upper crankline. Work was done at a commercial power plant having a skidded engine unit similar to those in nuclear applications to develop such a system. This report covers the results of that work and explains the modification to be accomplished on nuclear units in the field.

RESULTS OF THE DEVELOPMENTAL WORK

Field testing was done that demonstrated that a system could be made to provide oil flow to the engine while at rest without filling the upper crankline. The test work demonstrated that with a properly sized L.O. circulating pump, with the oil at the proper temperature, an oil level could be maintained somewhat above the lower crankline, but below the level of the upper crankline. With such a system, oil was more readily available to the upper crankline upon fast startup of the engine. The leakage rate of the oil thru the bearings of the lower crankline, oil spitters, and return flow thru the main (engine driven) L.O. pump could be controlled by the oil temperature (viscosity) to the point of keeping the engine full to a level just above the lower crankline. However, it was discovered that if lube oil circulation was reinitiated immediately after the engine was shut down, without allowing some oil drainback from the upper

crankline, the upper crankline could still be overfilled when the engine came to rest. It was demonstrated that if a period of 6 to 10 minutes was allowed before circulation was commenced, that the overfilling of the upper crankline could be prevented.

Figure 1 shows the final system arrived at resulting from this development program. In summary, the lube oil circulating system was modified so that oil was delivered to the system at a point near the engine driven pump discharge, thru a check valve. The L.O. circulating heater was increased in capacity from 6 to about 15KW in order to maintain L.O. temperature (viscosity) and to account for the greater losses in the L.O. system because of the increase in the extent of piping thru which the oil would then flow.

The selected changes to the system and engine are covered in two parts; modification of the systems external to the engine, and internal modifications. The specific investigation enumerated here, covers the Alabama Power units (F.M. S.O. 205917), but are generally also applicable to other similar units. (Specific reports/instructions will be written for other contracts.)

MODIFICATION OF THE EXTERNAL SYSTEM

Investigation has shown that to adapt this system to the units at Alabama Power would require the following:

Mechanical (Ref: Figure 1)

1. Change the 6KW L.O. heater to 15KW. Information from the most probable vendor indicates that a 15KW heater unit, not exceeding 15 watts per square inch of heater element, can be provided and can be accomodated on the skid in place of the present heater, using the same mounting arrangement. The new unit is about the same size as the present J.W. heater. L.O. inlet would be at the same location.

2. Change the piping from the discharge of the new heater to a point in the piping at the discharge of the engine driven pump (at the same location to which the prelube pump is now piped), including a check valve (same check valve as used with the prelube piping). Include a connection for location of the thermostatic switch (OHT) at the heater outlet. 1 1/2" piping is required.

3. Block off the cross to which the old connection was made (drain to front of L.O. sump).

Electrical (Ref: Figure 2)

1. Relocate conduit to heater connection and thermostatic switch connection as required (raised approx. 12").

2. Replace CB3 (20A) with a 50A unit (Same as CB1). (Our drawings do not indicate source on this item. Customer should identify circuit breaker unit manufacture so that it can be duplicated.)

3. Replace M3 contactor with 11905926 (Cutler Hammer C20DN3A) (Same as M1).

4. Replace wiring (3 wires each) between CB3 and M3 and between M3 and the heater (OH) with #8 AWG (was #12).

5. Add a Time Delay Relay - TDX (FM #11904628 - Agastat 7012AH) in the circuit as shown on the electrical schematic - Figure 2.

   (One side of the coil to wire G, other side of coil to wire J7. One side of switch to wire J7 [removing J7 from coil of M4]. New wire J7X between other side of switch [N.O. contacts] to coil of M4 (from which wire J7 was removed.)

6. TDX has a range from 3 to 30 minutes and should be set at 10 minutes.

MODIFICATION TO INTERIOR OF ENGINE (Ref: Figure 3)

This modification consists of rerouting the supply to the upper L.O. header such that the header will not readily drain (a loop of tubing up over the crankshaft above the level of the header). See Figure 3.

This modification also consists of adding a lube oil booster/accumulator system to the upper crankline, similar to that used on the aft lower main bearing. This booster system fills with oil during normal engine operation. The next time the engine is started, the lube oil accumulated in the cylinder assembly is forced by starting air pressure acting on the opposite side of a piston, to be fed into the bearings along the upper crankline, thus filling the bearings with oil as the engine begins to be rotated in starting.

No external connections are required with this system as the air supply to the accumulator is tied internally to that of the aft main bearing booster system. The system is self regulating.

Parts for this system are identified on drawings and R/M #16403478 (Release PC3752).

FILE NUMBER VTS-985-082881-01R

DATE AUGUST 28, 1981

PREPARED BY V.T. STONEHOCKER

APPROVED BY

SUBJECT: ENGINE PRELUBE/KEEPWARM SYSTEM REQUIREMENTS

REPORT TITLE: KEEPWARD L.O. SYSTEM MODIFICATION
NUCLEAR STANDBY UNITS (OP ENGINES)

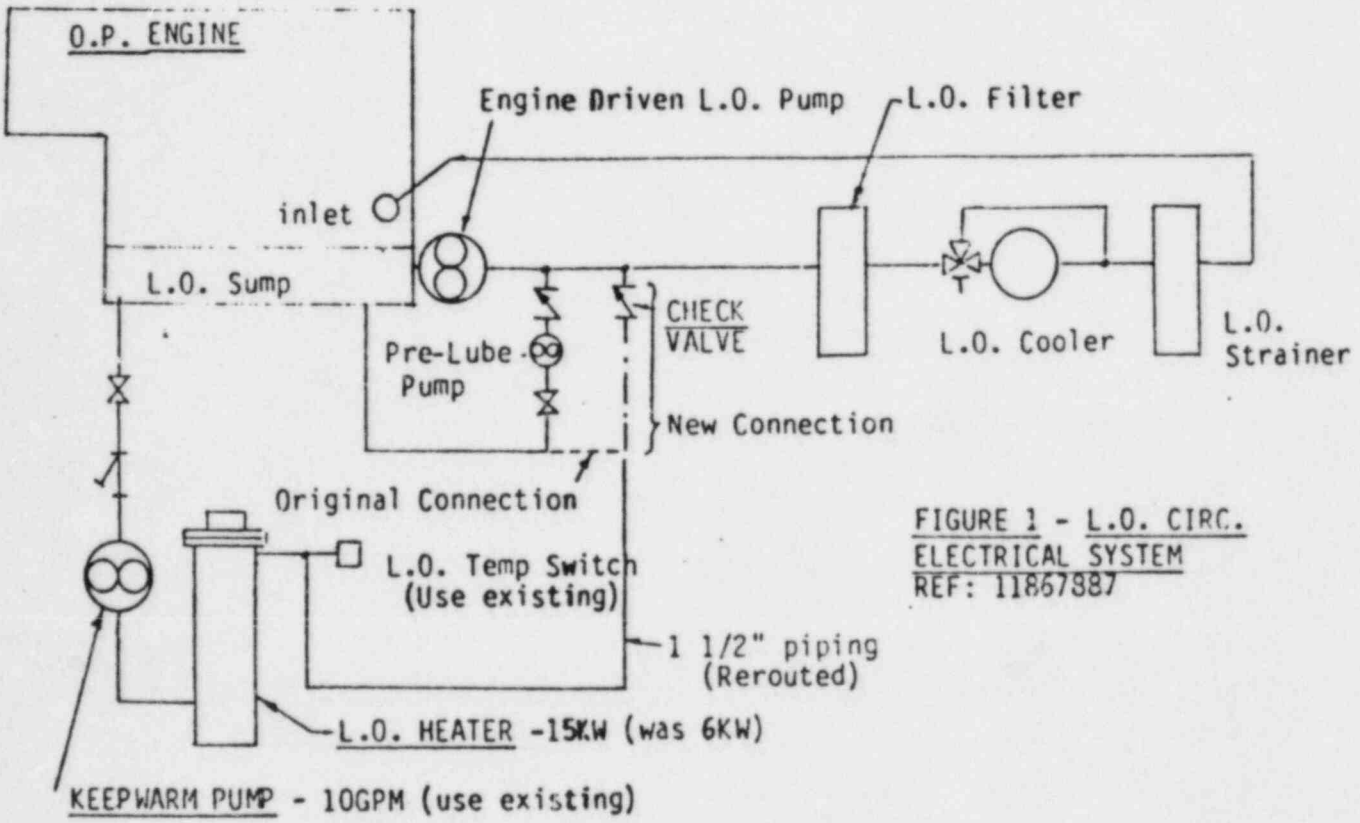


FIGURE 1 - L.O. CIRC. ELECTRICAL SYSTEM
REF: 11867887

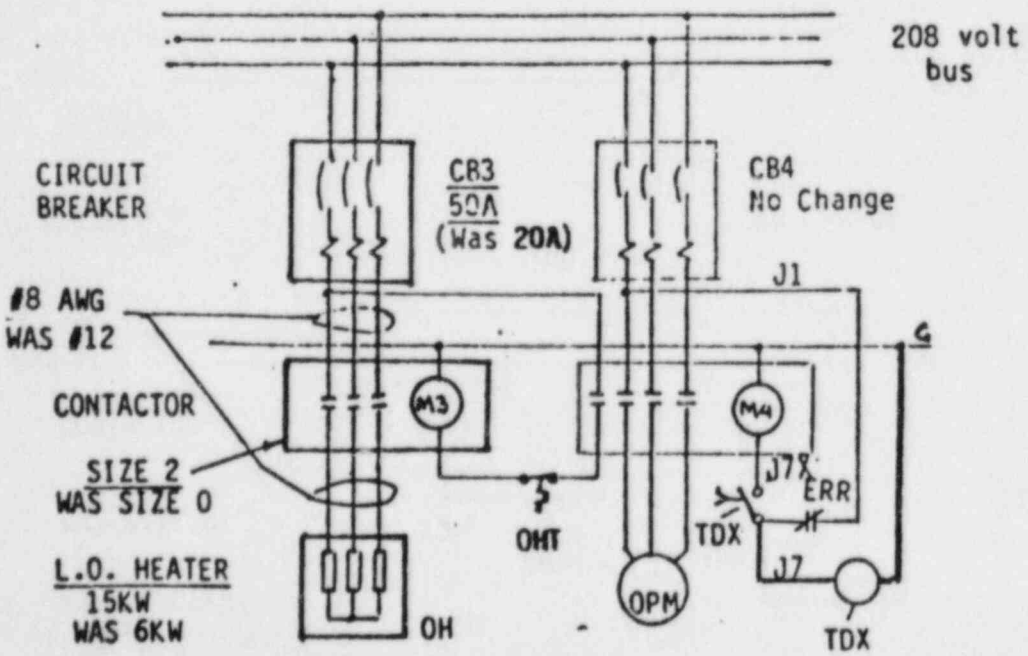


FIGURE 2
ELECTRICAL SYSTEM MODIFICATION
REF: 11867708
SHEET 2

Fairbanks Morse
Engine Division

ENGINEERING REPORT

FILE NUMBER TS-985-082881-01R

SUBJECT: ENGINE PRELUBE/KEEPWARM SYSTEM REQUIREMENTS

DATE: AUGUST 28, 1981

PREPARED BY: V.T. STONEHOCKER

REPORT TITLE: KEEPWARD L.O. SYSTEM MODIFICATION
NUCLEAR STANDBY UNITS (OP ENGINES)

APPROVED BY:

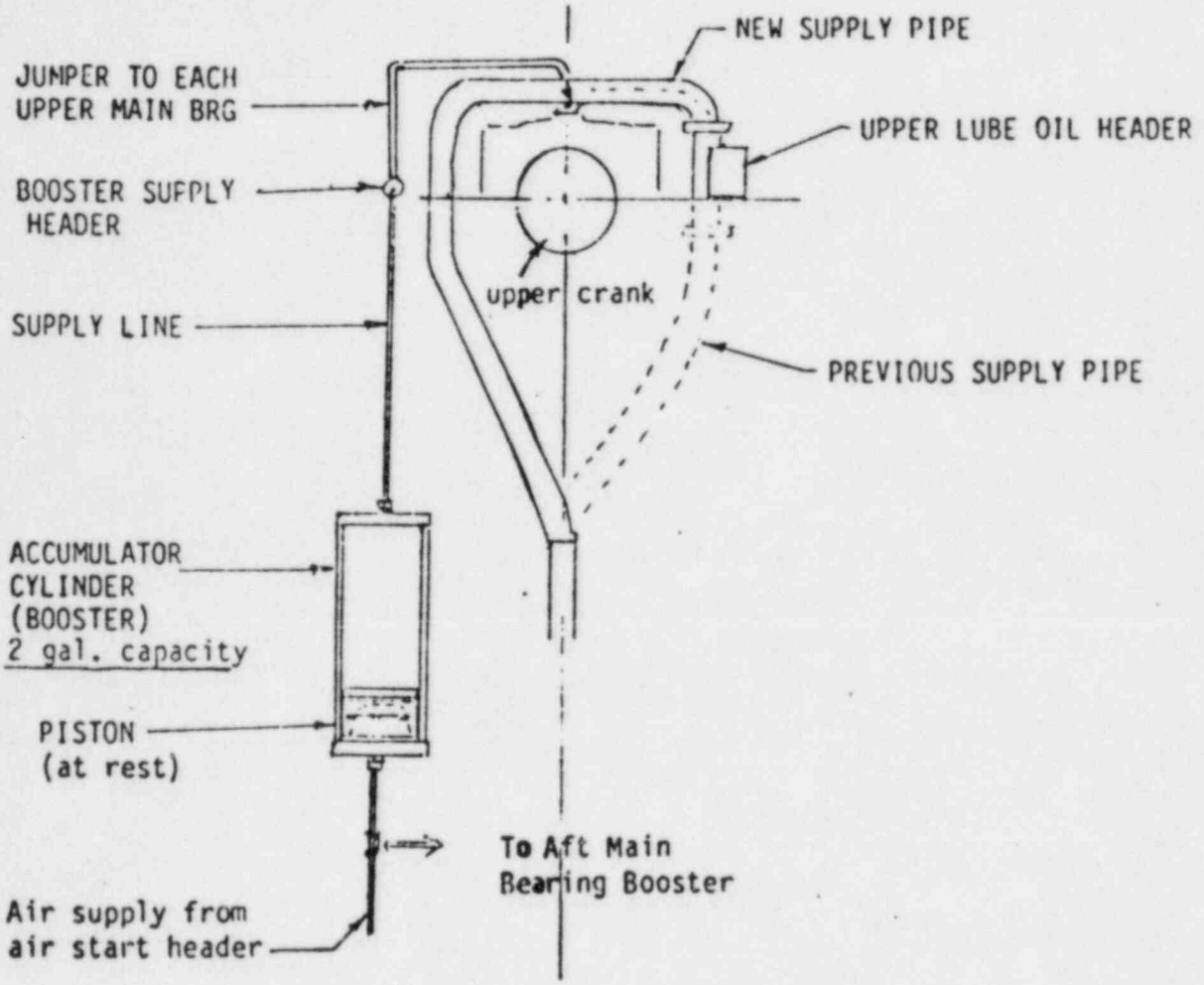


FIGURE 3 - ENGINE INTERNAL MODIFICATIONS

LUBE OIL SUPPLY & BOOSTER SYSTEM

Fairbanks Morse
Engine Division

ENGINEERING REPORT

SHEET OF	PAGE NO. 1
FILE NUMBER	R5.08-501
DATE	7/27/82
PREPARED BY	G. Slaymaker
APPROVED BY	D. Kasel

SUBJECT: LUBE OIL MODIFICATION KIT FOR NUCLEAR STANDBY UNITS

REPORT TITLE: TEST OF THE MAIN BEARING BOOSTER

PROCEDURE:

The main bearing booster was bench tested in the lab as shown on the attached sketch. To fill the booster with oil, the air vent valve was opened, L.O. pump discharge valve opened, and the L.O. pump turned on. The booster was determined to be full when the oil pressure increased and flow into the L.O. tank increased. With the booster full and pump running the restriction valve was set to obtain L.O. pressures varying between 6 and 25 psi. To empty the booster, the pump was turned off, L.O. pump discharge valve closed, air vent valve closed and air pressure valve opened.

Variables measured during each cycle were time to fill booster, time to empty booster, oil pressure during boost, and weight of oil emptied out of booster. Air pressure was regulated to 150 psi for all cycles. The lube oil used was pegasus 485 at room temperature.

RESULTS:

As the restriction valve was opened to decrease the oil pressure from 25 psi to 6 psi, the time required to fill the booster increased from 24 to 56 seconds and the time to empty booster decreased from 7 to 3 seconds. While the booster was filling, the oil pressure gage read 5 psi regardless of the restriction. For all 75 logged cycles, the weight of oil emptied from the booster was 8-1/4 pounds, or 1.1 gallons.

CONCLUSIONS:

The booster filled to capacity and emptied completely without the accumulator piston cocking or getting stuck during all the cycles performed. A L.O. pressure of at least 5 psi is required to move the piston when filling the booster. The booster will displace 1.1 gallons of lube oil to deliver about 1-1/4 cups of oil to each upper main bearing on a 12 cylinder engine.

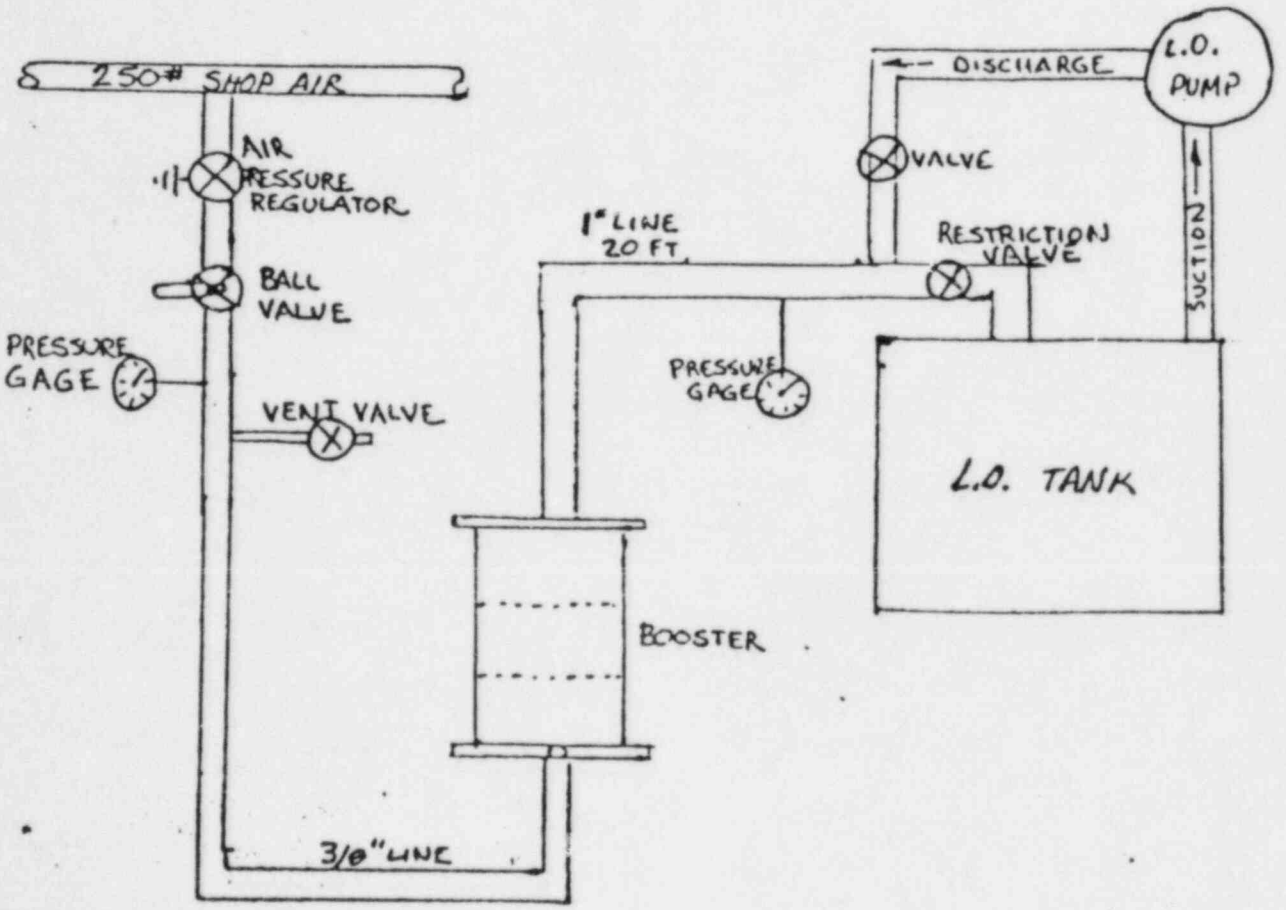
Fairbanks Morse
Engine Division

ENGINEERING REPORT

SHEET OF	PAGE NO.
FILE NUMBER	R5.08-501
DATE	7/27/82
PREPARED BY	G. Slaymaker
APPROVED BY	

SUBJECT: LUBE OIL MODIFICATION KIT FOR NUCLEAR STANDBY UNITS

REPORT TITLE: BENCH TEST SET-UP



ATTACHMENT K

Letter, T. J. Skinner to J. A. Nyquist, January 31, 1985, "Evaluation of EDG Nos. 13 and 14 Bearings

Colt Industries

Fairbanks Morse
Engine Division
701 Lawton Avenue
Beloit, Wisconsin 53511
608/364-8174

Thomas J. Skinner
Manager - Product Service

Via Telecopier #313/586-5769

J. A. NYQUIST

January 31, 1985
948-878/85

FEB 4 1985

Detroit Edison
6400 N. Dixie Highway
Newport, Michigan 48166

Attn: Mr. John A. Nyquist

Dear Mr. Nyquist:

This will confirm that we have thoroughly inspected the upper main and connecting rod bearings removed from your emergency diesel generator units #13 and #14. In all cases, the bearing condition was found serviceable and appropriate for continued use.

In observing the #5 upper connecting rod bearing, bottom half, we noted an imbedded non-ferrous particle. Although removal of particle and minor surface preparation would have, in our opinion, allowed continued use of this bearing, without ircident, we recommend replacement to avoid any questions regarding suitability of operation.

Very truly yours,

COLT INDUSTRIES OPERATING CORP.
FAIRBANKS MORSE ENGINE DIVISION

T. J. Skinner, Manager
Product Support Department

TJS/lm

cc: C. Ankrum
E. Greene
R. Montenero

ATTACHMENT L

Letter to E. D. Green to W. Kirchoff, July 20, 1985,
"F.M. Diesel Generators Prelubrication"

Colt Industries

Engine Division
701 Lawton Avenue
Beloit, Wisconsin 53511
608/364-4411

July 20, 1983

Detroit Edison
Enrico Fermi Nuclear Plant
6400 No. Dixie Hwy.
Newport, MI 48166

Attention: W. Kirchoff

Subject: F.M. Diesel Generators Prelubrication

Dear Sir:

In reply to your telephone request on July 19, 1983, we are attaching a copy of Nuclear Power Plant Prelubrication Instructions.

The 2 to 3 minute prelube should be adequate unless the oil system has been drained, and refilled. This could require 5 to 10 minutes before the system is adquately prelubed.

Prelube requirements may be eliminated on the unit following the addition of both the upper header modification kit and the keepwarm continuous circulating lube oil modification kit provided:

a. The engine has not been bumped or barred over by starting air subsequent to the last engine operation.
b. The circulating, keepwarm lubricating system is operating.
c. It is confirmed that all drain valves on the lubricating oil cooler, lubricating oil filter and the lubricating strainer are all closed.
d. The circulating lube oil pump flow is periodically checked (suggest monthly) by observing cooling oil running down the lower connecting rods or draining from the lower pistons.

Yours very truly,

COLT INDUSTRIES OPERATING CORP.
FAIRBANKS MORSE ENGINE DIVISION

E. D. Greene

E. D. Greene, Area Supervisor
Customer Service Department

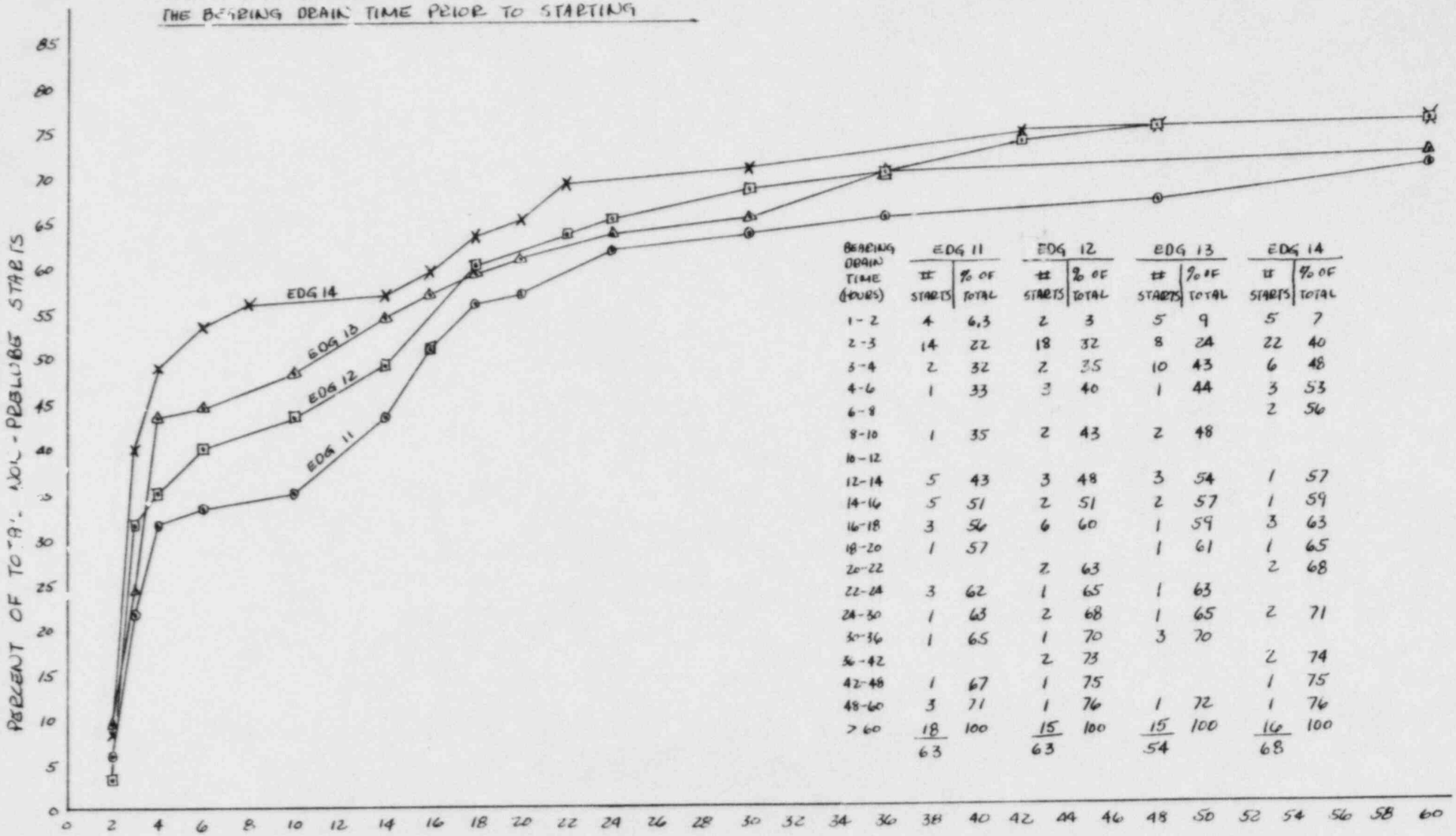
EDG:sk
Attachment
cc: T. O'Sullivan
K. Rehard

over

ATTACHMENT M

Time between Starts without Prelubrication: EDG Nos. 11, 12, 13 and 14

DETROIT EDISON
EMERGENCY DIESEL GENERATORS
PERCENT OF THE TOTAL NON-PRELUBE STARTS VS
THE BEARING DRAIN TIME PRIOR TO STARTING



BEARING DRAIN TIME (HOURS)	EDG 11		EDG 12		EDG 13		EDG 14	
	# STARTS	% OF TOTAL	# STARTS	% OF TOTAL	# STARTS	% OF TOTAL	# STARTS	% OF TOTAL
1-2	4	6.3	2	3	5	9	5	7
2-3	14	22	18	32	8	24	22	40
3-4	2	32	2	35	10	43	6	48
4-6	1	33	3	40	1	44	3	53
6-8							2	56
8-10	1	35	2	43	2	48		
10-12								
12-14	5	43	3	48	3	54	1	57
14-16	5	51	2	51	2	57	1	59
16-18	3	56	6	60	1	59	3	63
18-20	1	57			1	61	1	65
20-22			2	63			2	68
22-24	3	62	1	65	1	63		
24-30	1	63	2	68	1	65	2	71
30-36	1	65	1	70	3	70		
36-42			2	73			2	74
42-48	1	67	1	75			1	75
48-60	3	71	1	76	1	72	1	76
> 60	18	100	15	100	15	100	16	100
	63		63		54		68	