PACIFIC GAS AND ELECTRIC COMPANY

DEPARTMENT OF NUCLEAR POWER GENERATION

DIABLO CANYON POWER PLANT

NUMBER STP M-81E

REVISION 1

PAGE 1 OF 15

UNITS 1 AND 2

TITLE: SURVEILLANCE TEST PROCEDURE
DIESEL ENGINE GENERATOR INSPECTION
(90 MONTH INTERVALS)

APPROVED: [signature] 10/24/91 DATE 10/24/91 EFFECTIVE DATE

** PROCEDURE CLASSIFICATION - QUALITY RELATED **

1.0 SCOPE

1.1 Performance of this procedure will provide guidance needed to perform maintenance inspections AND services on the Emergency Diesel Engine and Generator.

1.2 Performance of this procedure will also provide guidance for meeting requirements of Technical Specification 4.8.1.1.2.b.1.

1.3 This procedure covers items required to be serviced at specific time intervals. Because of the diesel engine infrequent operation, manufacturer's recommendations were modified and approved for Diablo Canyon Preventive Maintenance Program and Routine Surveillance Test Schedule. Operational Tests such as overspeed trip tests and Cooling Water Tests are not included.

1.4 References in procedure such as (MI-11025) refer to ALCO instruction Manual 663082-80. 81 ALCO Maintenance Instructions (MIs) have a number followed by a letter. MIs referenced herein will NOT have revision letter identified. Latest revision in controlled manual is to be used.

1.5 Sections of this procedure can be performed out of sequence as long as all items are completed for intervals scheduled.

1.6 STP M-81E was formerly Mechanical Section E of STP M-81.

2.0 RESPONSIBILITIES

2.1 Mechanical Maintenance Engineer, as Test Director, is to:

2.1.1 Schedule test.

2.1.2 Provide technical assistance.

2.1.3 Review test results.

2.2 Mechanical Maintenance Foremen are to:

2.2.1 Obtain equipment clearance.

2.2.2 Perform inspections.

2.2.3 Provide service to conduct tests.

3.0 FREQUENCY

3.1 This test shall be performed at the interval shown on STP M-81A Appendix 7.1.

4.0 TECHNICAL SPECIFICATIONS

4.1 Technical Specification 4.8.1.1.2.b.1.

5.0 ACCEPTANCE CRITERIA

5.1 All applicable mechanical data recorded is within acceptable limits.

5.2 All applicable electrical data recorded is within acceptable limits.

6.0 REFERENCES

6.1 PG&E Drawing No. 663082-80, Rev. 25, Unit 1, Instruction Manual, ALCO Diesel Engine 18-251-F.

6.2 PG&E Drawing No. 663082-81, Rev. 26, Unit 2, Instruction Manual, ALCO Diesel Engine 18-251-F.

6.3 Preventive Maintenance Letter from ALCO Division to PG&E, September 5, 1975, Maintenance File 425.8.

6.4 Preventive Maintenance Letter from ALCO Division to PG&E, December 3, 1982, File 425.8.

6.5 Technical Specification, 3/4.8, "Electrical Power Systems."

6.6 NPAP C-6, "Clearance Request/Job Assignment."

6.7 NPAP C-10, "Housekeeping - General."

6.8 NPAP C-12, "Identification and Resolution of Problems and Nonconformances."

6.9 AP C-4S3, "Control of Lifted Circuitry Jumpers During Maintenance."

6.10 AP C-10S4, "Foreign Materials Exclusion Area Control."

6.11 AP C-13, "Fire Loss Prevention."

6.12 AP C-62, "Determination of Preventive Maintenance."

6.13 AP D-753, "Control of Plant Lubricants."

6.14 STP M-9A, "Diesel Engine Generator Routine Surveillance Test."

6.15 MP M-21.4, "Diesel Lubricating Oil Filter Element Replacement."

6.16 MP M-21.5, "Diesel Engine Water Pump Maintenance."

6.17 MP M-21.6, "Diesel Engine Turbocharger Maintenance."

6.18 MP M-21.8, "Diesel Engine Governor Drive."

6.19 MP M-21.9, "Diesel Engine Lube Oil Pump."

6.20 MP M-21.10, "Diesel Engine Pre-Lube Oil Pump."

6.21 MP M-21.11, "Diesel Engine Fuel Injection Pump Maintenance."

6.22 MP M-21.12, "Diesel Engine Cylinder Head."

6.23 MP M-21.16, "Diesel Engine Camshaft."

6.24 MP M-21.19, "Diesel Engine Governor Control Linkage."

6.25 MP M-21.20, "Diesel Engine Radiator Fan and Drive."

6.26 MP M-21.23, "Diesel Engine Fuel Pump Control Shaft and Crossover Linkage."

6.27 MP M-21.24, "Diesel Engine Hose Fabrication, Inspection and Replacement."

7.0 APPENDICES

None

8.0 ATTACHMENTS

None

9.0 RECORD OF REVIEWS

9.1 Prepared by: Rex Ozment

9.2 Sponsored by: Larry Price

9.3 Independent Technical Review by: Dave Stupi

START DATA SECTION

UNIT _____ DATE ____/____/____

DIESEL GENERATOR #_____ WORK ORDER #_____ ENGINE HR METER_____Hrs.

		INITIALS
10.0	PRECAUTIONS AND LIMITATIONS	
10.1	IF cleaning solvents are used, fire precautions are required per AP C-13.	_____
10.2	A pre-test briefing has been conducted by Test Director for involved personnel.	_____
10.3	Drawings and procedures used in the performance of this test are of the current revision.	_____
10.4	Precautions and Limitations have been read and understood.	_____
11.0	PREREQUISITES	
11.1	Diesel engine has been cleared AND tagged per NPAP C-6.	_____
11.2	CO_2 system has been disabled for individual engine being inspected.	_____
11.3	Generator 4kV circuit breaker has been racked out.	_____
11.4	Starting Air, AND 480 volt switches for recirculation oil pump, oil and water heaters has been cleared.	_____
11.5	Housekeeping Zone requirements have been established for disassembly work per NPAP C-10.	_____
11.6	Foreign Materials Exclusion Area (FMEA) Controls have been established per AP C-10S4.	_____
11.7	Diesel room floor drains have been taped off.	_____

INITIALS

11.8 All M&TE used to perform this procedure is in current calibration, as evidenced by an affixed calibration sticker. _____

11.8.1 M&TE should be selected where values to be measured fall within middle range of instrument. _____

11.9 RECORD required M&TE information in Section 12.1.19, including:

11.9.1 Step number where M&TE was used. _____

11.9.2 M&TE Identification number(s). _____

11.9.3 M&TE Calibration due date(s). _____

11.10 Steps in procedure, marked with "PM" entry, must have approval from Preventive Maintenance (PM) Evaluator before they can be deleted. _____
(See AP C-62 for additional information)

11.11 Quality Control (QC) Hold Points, identified in the Work Order, are annotated in the controlled copy of this procedure that is included in the Work Order package. _____

NOTE: Assignment of QC Hold Points will be accomplished per QC procedures, and annotated in the controlled copy of this procedure during the Work Order approval process.

11.12 Any discrepancies identified in parts, materials, OR in workmanship which cannot be corrected during normal course of work, OR in procedures shall be reported AND documented per NPAP C-12. _____

12.0 INSTRUCTIONS

PERF BY

12.1 Inspection and Maintenance

12.1.1 Visually inspect water pump as directed by Maintenance Engineer. (Reference M-21.5 and MI-11206) _____

a. Maintenance Engineer to evaluate water pump based upon inspection of tell-tale drain leakage and vibration analysis. _____

b. Maintenance Engineer to initiate an AR IF corrective action is required. _____

Pump condition acceptable [ ] YES _____

Pump maintenance required, initiated

AR #_____. _____

12.1.2 Maintenance Mechanic to inspect condition of Turbocharger. (Reference MP M-21.6, MI-11209) _____

NOTE: IF a problem with turbocharger is identified, THEN, change out with a complete unit is recommended. (Stock Code 42-3031)

a. Visually inspect air inlet side of turbocharger. _____

b. Visually inspect exhaust inlet side of turbocharger. _____

c. Measure axial thrust of turbocharger. _____

d. Visually inspect condition of air inlet boot. _____

e. Initiate an AR IF corrective action is required. _____

[ ] Turbocharger Acceptable. _____

[ ] Turbocharger maintenance required. _____

AR #_____ initiated.

PERF BY

12.1.3 Evaluate condition of at least one cylinder and head from each bank (total of two required).

a. Maintenance Engineer to identify cylinder/head(s) for inspection and evaluation, based on Engine Performance Analyzer results from STP M-81A. _____

1. Inspect Right Bank cylinder/head(s)

No. _____

2. Inspect Left Bank cylinder/head(s)

No. _____

b. Maintenance Engineer, OR Alco representative, OR ISI representative to perform fiberscope inspection of cylinder head(s) identified above. _____

c. Maintenance Engineer to initiate an AR IF any corrective action is required. _____

[ ] Cylinder head(s) condition acceptable. _____

[ ] Cylinder head maintenance required. _____

AR #_____ initiated.

			PERF BY
PM	12.1.4	Perform maintenance on Radiator Fan Drive per following instructions:	
		a. Measure blade angles per Section 7.12 of MP M-21.20.	_____
		b. RECORD blade angles on MP M-21.20, Appendix 8.1.	_____
		c. Measure fan blade-to-shroud clearance per Section 7.15.8 of MP M-21.20.	_____
		d. RECORD clearance on MP M-21.20, Appendix 8.1.	_____
		e. Check fan blade track per MP M-21.20, Section 7.15.10.	_____
		f. RECORD tracking distance on MP M-21.20, Appendix 8.1.	_____
	12.1.5	Maintenance Engineer to identify any corrective maintenance required for the lube oil pump based on inspection results and evaluation of data from vibration analysis. (Reference STP M-81A)	_____
		[ ] No Corrective Maintenance required.	_____
		[ ] Corrective Maintenance required. See AR # _____	

PERF BY

12.1.6 Inspection and maintenance of Lube Oil Regulating Valve.

a. Disassemble AND inspect valve(s) per MI-12010:

DIESEL ENGINE GENERATOR No.	VALVE No.	
1-1	1-PCV-86	_____
1-2	1-PCV-87	_____
1-3	0-PCV-88	_____
2-1	2-PCV-87	_____
2-2	2-PCV-86	_____

b. Initiate an AR IF any problems are identified. _____

[ ] No problems were identified. _____

[ ] Problem(s) identified on:

AR # _____. _____

c. Reassemble valve(s) per MI-12010. _____

PERF BY

12.1.7 Inspection and maintenance of Lube Oil Relief Valve(s).

a. Disassemble AND inspect valve(s), on following Diesel Engine Generators (DEG), per MI-12010:

DIESEL ENGINE GENERATOR No.	VALVE No.	
1-1	1-RV-68	_____
1-2	1-RV-69	_____
1-3	0-RV-70	_____
2-1	2-RV-69	_____
2-2	2-RV-68	_____

b. Initiate an AR IF any problems were identified. _____

[ ] No problems were identified. _____

[ ] Problem(s) identified on:

AR # _____. _____

c. Reassemble valve(s) per MI-12010. _____

12.1.8 Replace Fuel Oil Regulating Valve(s) (Stock Code 94-6094) on following DEGs: _____

DIESEL ENGINE GENERATOR No.	VALVE No.	
1-1	1-PCV-83	_____
1-2	1-PCV-82	_____
1-3	0-PCV-80	_____
2-1	2-PCV-82	_____
2-2	2-PCV-83	_____

	PERF BY	VERIF BY
12.1.9 Perform maintenance of Cooling Water Temperature Regulating Valve(s)		
a. Replace valves (Stock Code 42-4208) on following DEGs:	_____	

DIESEL ENGINE GENERATOR No.	VALVE No.	
1-1	1-TCV-3	_____
1-2	1-TCV-4	_____
1-3	1-TCV-5	_____
2-1	2-TCV-3	_____
2-2	2-TCV-4	_____

b. Initiate requisition to return valves removed from service to supplier OR manufacturer for refurbishing.	_____	
1. Initiated requisition #_____.	_____	
12.1.10 Inspect Manual Fuel Priming Pump, AND recondition, IF necessary. (Reference MI-17021)	_____	
12.1.11 VERIFY camshaft gear train is acceptable.	_____	_____
a. Document condition. (Reference NI-11030)	_____	
Condition: _____		
_____		
12.1.12 Measure camshaft gear backlash.	_____	
a. Adjust, IF necessary. (Ref. MI-11071)	_____	
12.1.13 RECORD "As Left" camshaft gear backlash.	_____	
Left side _____" (Max. allowable: 0.028")		
Right side _____" (Max. allowable: 0.028")		

	PERF BY	VERIF BY
12.1.14 Replace camshaft gear cover gaskets with Stock Code 93-2988 (2 each, required).	_____	
12.1.15 VERIFY camshaft thrust and vibration dampers are in good condition AND all capscrews are properly lockwired.	_____	_____
a. Document condition: (Ref. MI-11071)	_____	
Condition: _____		
_____		
12.1.16 Measure camshaft thrust per MP M-21.16.	_____	
12.1.17 RECORD "As Left" camshaft thrust.	_____	
Left side _____" (Max. allowable: 0.022")		
Right side _____" (Max. allowable: 0.022")		
12.1.18 Was any work performed in this section that would affect engine analyzer results?		
[ ] YES [ ] NO	_____	

12.1.19 Test Equipment Used:

Step No.	Equipment	Manufacturer	Model No.	Company No.	Cal Due Date
_____	_____	_____	_____	_____	___/___/___
_____	_____	_____	_____	_____	___/___/___
_____	_____	_____	_____	_____	___/___/___
_____	_____	_____	_____	_____	___/___/___

Comments: _____

_____

_____

12.1.20 Test Performers and Verifiers:

_____ _____
(Signature/Print last name) Initials

_____ _____
(Signature/Print last name) Initials

_____ _____
(Signature/Print last name) Initials

_____ _____
(Signature/Print last name) Initials

_____ _____
(Signature/Print last name) Initials

_____ _____
(Signature/Print last name) Initials

REVIEWED BY FOREMAN: _____ ___/___/___
(Signature/Print last name) Date

REVIEWED BY FOREMAN: _____ ___/___/___
(Signature/Print last name) Date

APPROVED BY M.M. ENGINEER: _____ ___/___/___
(Signature/Print last name) Date

APPROVED BY M.M. ENGINEER: _____ ___/___/___
(Signature/Print last name) Date

END DATA SECTION

13.0 DATA REDUCTION AND REPORTING OF RESULTS

13.1 Maintenance Foreman to review and sign data sheet and forward to Mechanical Maintenance Engineer.

13.2 Mechanical Maintenance Engineer to review and approve:

13.2.1 Data Sheets.

13.2.2 Update schedule (STP M-81A, Appendix 7.1).