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 RUEGER, G.M. Pacific Gas & Electric Co.
 RECIP. NAME RECIPIENT AFFILIATION
 Document Control Branch (Document Control Desk)

SUBJECT: Forwards documents re purchase & dedication of sixth EDG, to address open items discussed during 920601-05 insp at util ofcs in San Francisco, CA, consisting of Rev 0 to Post-Mod Test Procedure PMT 21.16, "DG 23 Preoperational...."

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Pacific Gas and Electric Company

77 Beale Street
San Francisco, CA 94106
415/973-4684

Gregory M. Rueger
Senior Vice President and
General Manager
Nuclear Power Generation

October 9, 1992

PG&E Letter No. DCL-92-218



U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Re: Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Transmittal of Documents Related to Purchase and Dedication of the
Sixth Emergency Diesel Generator

Gentlemen:

This letter transmits documentation associated with open items from the NRC inspection conducted June 1 to June 5, 1992, at PG&E's offices in San Francisco for PG&E's purchase and dedication of a sixth emergency diesel generator (EDG).

Enclosure 1 provides a copy of the documentation issued to specify the sixth EDG post-modification test (PMT) requirements and the approved PMT 21.16, "Diesel Generator 2-3 Pre-operational Endurance Test." PMT 21.16 provides the detailed testing requirements as discussed with the NRC during the inspection. In addition, to address open items for the governor, PMT 21.16 incorporates visual inspection for loose parts and solenoid valve nut epoxy. To address open items for the generator, PMT 21.16 also incorporates visual inspection of insulating bushings, insulating material, and lead-to-coil terminations and visual inspection of welds on bearing brackets, threaded rods/studs, rivets, and lugs on the rotor pole spider end rings.

Enclosure 2 provides documentation associated with PG&E Quality Evaluation (QE) Q0009781, which documents resolution of (1) verification of accuracy (linearity) of the current transformer discussed in the excitation panel current boost transformer Replacement Parts Evaluation (RPE) E-6795, (2) potential setpoint drift for the sixth EDG components, and (3) the impact of maximum EDG room ambient temperature on the sixth EDG electrical components qualified by their respective RPEs.

Enclosure 3 provides a copy of Action Evaluation 5 to Action Request A0266483, which addresses the resolution of anomalies identified during seismic testing of the Crosby relief valves used on the air start and turbo air receiver tanks. This information is provided to close out an item identified by Mr. J. Rajan during his review of the seismic qualification of the sixth EDG and its support equipment.

The only sixth EDG inspection activities remaining open, subject to review of the attached documentation, are (1) completion of the design change/equivalency review by NEI Peebles - Electric Products, Inc.

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ADD 1/1



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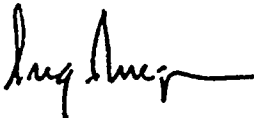
October 9, 1992

(P-EP) for the generator, (2) revision of RPE E-7505 for the generator to reflect incorporation of the results of this review, and (3) successful completion of the pre-operational endurance test. The test results for the lightly varnished wire used in the rotor pole magnet have been received by P-EP, and a preliminary review of the test results indicates that the wire is suitable for use in the generator. P-EP's final test report will be reviewed by PG&E, and the results will be incorporated into RPE E-7505.

The current schedule for the 200-hour endurance test reflects start of this test in early December. This schedule is subject to change based on interaction of the sixth EDG testing with the ongoing Unit 1 fifth refueling outage. Updates to this testing schedule will be provided to Mr. Steve Matthews and Mr. Dyle Acker in order to aid in scheduling further NRC review during the endurance test.

If you have any questions regarding the attached documentation or the open item status summary, please contact Alan Nicholson at (415) 973-9654.

Sincerely,

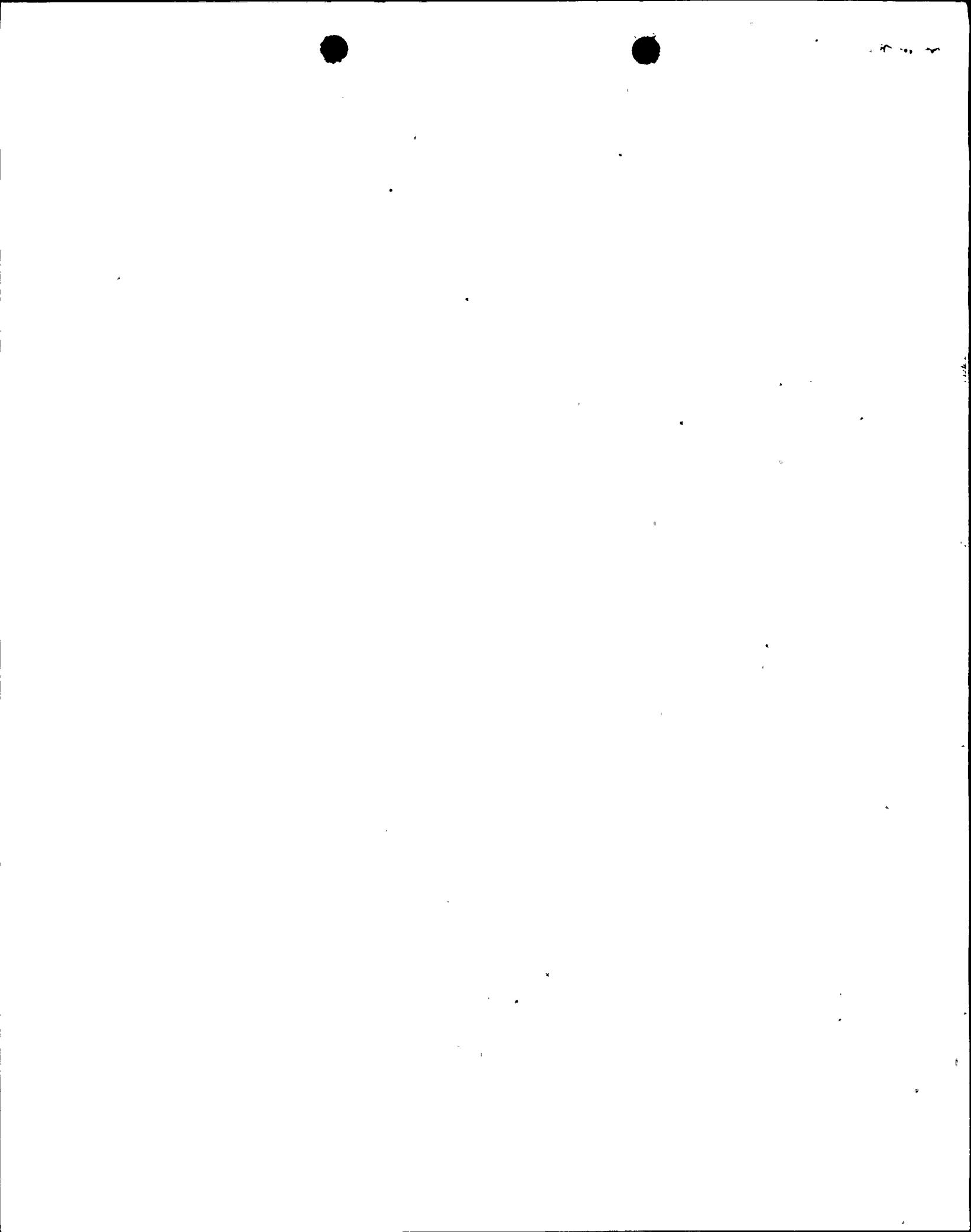


Gregory M. Rueger

cc: Ann P. Hodgdon
John B. Martin
Philip J. Morrill
Harry Rood
CPUC
Diablo Distribution

Enclosures

5876S/85K/ALN/2054



ENCLOSURE 1

Field Change M-16128, Revision 0, for DC2-EM-44405
Post-modification Test 21.16, "Diesel Generator 2-3
Pre-operational Endurance Test"

9210200148



DCP/DCN NO. DC2-EM-44405 REV: 1 FC NO.: M-16128 REV.: 0

SUPERSEDING: [] YES [x] NO FC NO.: _____ REV.: _____

SAFETY RELATED: [x] YES [] NO [] NO, BUT GRADED QA

Bill Young 4-30-92
Originator/Date

Cliff Novak 4/30/92
Discipline Supervisor/Date

Cliff Novak 4/30/92
Group Supervisor/Date

N/A PER AP C-1S3
DCPP Review/Date

DESCRIPTION OF PROPOSED CHANGE: (Provide complete description including marked-up sketches, drawings, and pages from the DCN/DCP)

Add Test Requirements as Detailed in attached letter (Chron 188370). Provide pre-lab system operational requirements during testing (CAL to POFB letter 5/10/92). Provide correlation between delineation activities and pre-op testing.

REASON FOR PROPOSED CHANGE:

This information was not included as part of the post modification Test Requirements.

ENGINEERING APPROVAL SECTION: The proposed change is considered to be within the intent of the DCP and does not conflict with any statement or requirement of the DCP Evaluation Package.

APPROVED: [x] ^{v.j. 4/12} APPROVED SUBJECT TO NOTED CHANGES: [✓] DISAPPROVED: []

REMARKS: (Include information on coordination and calculations if required to justify acceptance or note reason for disapproval.)
See additional testing guidance

See Attached

APPROVAL

COORDINATION

Discipline Engineer/Date

Signature/Discipline/Date

Engineering Group Supervisor/Date

Signature/Discipline/Date

Project Engineer/Date

Signature/Discipline/Date

DCPP Review/Date

Signature/Discipline/Date



DIABLO CANYON
FIELD CHANGE

NUMBER NECS-E3.6 DC
REVISION 0
ATTACHMENT Q
PAGE 1 OF 1
2 of 12
REV.: 0

DCP/DCN NO.: DC 2-EM-44405 REV: 1 FC NO.: M-16/28 REV.: 0

SUPERSEDING: [] YES [] NO FC NO.: _____ REV.: _____

SAFETY RELATED: [] YES [] NO [] PARTIAL [] NO, BUT GRADED QA OR OTHER

Originator/Date Discipline Supervisor/Date

Group Supervisor/Date DCPP Review/Date

DESCRIPTION OF PROPOSED CHANGE: (Provide complete description including marked-up sketches, drawings, and pages from the DCN/DCP)

see Attached

REASON FOR PROPOSED CHANGE:

ENGINEERING APPROVAL SECTION: The proposed change is considered to be within the intent of the DCP and does not conflict with any statement or requirement of the DCP Evaluation Screen/Package.

APPROVED: [] APPROVED SUBJECT TO NOTED CHANGES: DISAPPROVED: []

REMARKS: (Include information on coordination and calculations if required to justify acceptance or note reason for disapproval.)

This package was co-ordinated with Randy Ricks, S/U Test Engineer, and Bill Goelzer, DCP system Engineer for DG 2-3.

EVALUATION

Ed Wall 6/4/92
Discipline Engineer: Name/Signature/Date

REVIEW DR Hardesty

DR Hardesty 6/8/92
Discipline Engineer: Name/Signature/Date

APPROVAL

Carl P. R. 6/10/92
Engg. Grp. Supvr: Name/Signature/Date

COORDINATION

Name/Signature/Discipline/Date

P. B. Ch... 6/10/92
Project Engineer/Date

Name/Signature/Discipline/Date

DCPP Review/Date

Name/Signature/Discipline/Date



POST MODIFICATION/FUNCTIONAL TESTS

1. Startup tests required by the various DCNs in DCP M-44405 and DCP M-46799, with the exception of CO-2 system and roll-up door tests, and in addition the preoperational checks on the lube oil, fuel oil, starting air, turbo air assist and jacket water systems should be completed prior to starting these tests.

Note: Ensure that the engine lube oil prelube pump and heater and the engine jacket water heaters are operating whenever the engine is between tests. As modified by the attached manufacturers letter, Chron #190058.

2. Manufacturer's recommended break-in testing, GE Test Procedure 50D77481, CN-50525, 91-05-07, sections 3.6, 3.7, 3.8, and 3.9 should be performed before beginning any other operational testing. The testing procedure will be reformatted into PMT format.

Note: There were problems encountered with the KWS relay operation during system testing at the vendor's shop in Toronto. It would be prudent to obtain the services of a Basler representative when performing the testing of section 3.8 of the vendor's test procedure. The problems encountered would not have affected the Safety Related function of the diesel generator system, but rather, were problems in the control and actuation of the turbo air assist valves during assumption of large loads.

3. At a minimum, the following testing shall be performed:

Note: Tests may be performed in any order although 3.i) should be performed as a prerequisite.

- a) Multiple start tests. With the compressors for Air Start and Turbo Air Assist isolated and the air storage tanks at their normal full capacity, record all start attempts until DEG 2-3 can no longer start. Record time to start and pressure in all tanks for each start as well as initial conditions. Parameters to be recorded are for information, i.e., the diesel does not have to start in 10 seconds.
- b) Repeat a) above for each Air Start receiver separately with and without Turbo Air Assist (total of 4 tests).
- c) With compressors isolated, perform three (3) 15 second cranking cycles, without starting engine, to verify sizing criteria described in FSAR for air receivers has been met in the final system configuration. Record pressure in the tanks before starting and after each cranking cycle. This

Revised Version of Chron #188370

Daniel R Hardesty 6-10-92
Curt P. K. 6-10-92



will require defeating the engine overcrank timers in the control panel. At the completion of this test, start the diesel and record start time and remaining pressure in the air tanks. This is not required to be a 10 second start, but is for information only.

- d) Perform Starting tests as defined by IEEE 387-1984 Section 6.3.1. These tests include timing starts for air start valve individually and in combinations, with and without turbo air assist. The starts w/o Turbo Air Assist are for information and are not required to meet 10 second starting requirements. One air start motor, 2 A/S motors and 4 A/S motors, with and w/o Turbo, for a total of 6 tests.
- e) Perform Load acceptance tests as defined by IEEE 387-1984 section 6.3.2. As much as is possible, this test should be performed using the load banks.
- f) Perform rated load tests as defined by IEEE 387-1984, section 6.3.3.
- g) Perform Load rejection tests as defined by IEEE 387-1984, section 6.3.4. Short time rated load is defined as 110% of full generator load.
- h) Perform Electrical load tests as defined by IEEE 387-1984, section 6.3.5.
- i) Perform subsystem tests as defined by IEEE 387-1984, section 6.3.6. Subsystems are as defined by section 7.5.1.4.
- j) Perform the Load Capability tests as defined by IEEE 387-1984, section 7.2.1.

Note: After performing the next step, all future starts will count as start attempts and must be recorded and evaluated if failures occur. Therefore, this test should be performed after all testing with the possibility of requiring changes has been completed.

- k) Perform Start and Load Acceptance tests as defined by IEEE 387-1984, section 7.2.2, Reg Guide 1.108 Rev. 1, and Draft Rev. 3 of Reg. Guide 1.9. A total of 23 valid starts is required, in lieu of the 300 called for since this is not an initial type test. All starts will meet the requirements of subsections 1, 2, and 3 of 7.2.2 of IEEE 387-1984. After each test, it is required that the engine be cooled down to a maximum of 110 °F in the Lube Oil system. When engine is started it should pick up a single load equal to or greater than 50% of rated load and

DR Hardesty 6-10-92
Curt P. 6-10-92



then continue to run until it reaches 170 +/- 10 degrees Fahrenheit. It may be necessary to increase load above 50% to reach 170 °F. An additional three starts shall be performed in accordance with section 7.2.2.4.

- l) Perform Margin tests as defined by IEEE 387-1984, section 7.2.3.
- m) Perform start, load to 110% gradually, and run for one hour, with the priming system fuel oil solenoid valve blocked and verified open, and the throttling valve on the return to the priming tank fully open. The acceptance criterion for this test is that priming tank level must stay constant or rise during the test. This test is being performed with the express intention of verifying that the fuel oil solenoid valve and the throttling valve can be eliminated from the system.

Note: If the priming tank overflows, it is directed back to the daytank.

- n) Two hundred hours of full load endurance testing. This testing may be able to be combined with the 23 starts. The 200 hours may be performed as discrete segments or as on continuous run. One hour in eight will be performed at full load minus the largest step load. This load is approximately 600 kw. At the end of the 200 hours, the last 2 hours shall be at 110% load. This endurance testing is a commitment to the NRC as part of the dedication of the engine generator set.
- o) Perform heat balance and flow balance testing of the jacket water system, at the direction of GE-ALCO. If this testing is required, GE-ALCO will provide procedure and acceptance criteria.

Note: It is suggested that GE-ALCO representatives be on hand for critical portions of testing, such as final alignment, break-in testing, and the above heat and flow balance testing. Contact NECS-GO Engineering to make arrangements for GE-ALCO, and Basler representatives.

Revised Version of Chron #188370

DR Harder 6-10-92
A.P.R. 6-10-92





190058

GE Locomotives
Canada

Générale Électrique du Canada Inc.
1505, rue Dickson
Montréal (Québec) H1N 2H7
514-253-7333 Tx: 05-628641
Fax 514-253-7334

FCM-16128
6 of 12

May 13, 1992

Daniel Hardesty
Pacific Gas & Electric
333 Market street A7070
San Francisco, CA
USA
94106

Daniel;

Next to our telcon of May 12, you will find enclosed the answer of your 4 questions in regards of the pre-lube oil system.

Question #1: Does the engine pre-lube oil system need to operate prior to barring the engine over?

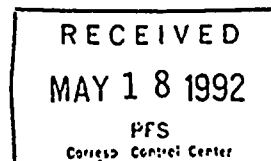
Yes, to protect the engine bearings it is a prudent action to assure that they receive adequate lubrication at a temperature high enough to coat the bearings. The minimum temperature per the vendor manual is 70 deg. F and for a period of one hour would be sufficient

Question #2: Does the engine pre-lube oil system need to be in operation during the barring over of the engine?

No, but it would be prudent to repeat the prelube operation for approximately 10 minutes, once per hour during the course of the alignment checks. If the room air temperature is sufficiently below 70 degrees it may make sense to leave the pre-lube system operating because of the time required to heat the oil.

Question #3: Does the engine pre-lube oil system need to be in operation during the time after the barring over of the engine and the beginning of testing?

Not continuously, however, the representation of the engine lubricating oil system will be required if the prelube system is not operated periodically. Operation of the system twice a week for a period of one hour after reaching the minimum temperature would be satisfactory to maintain the system.



Dr Hardesty 6-10-92
at P&E 6-10-92



190058

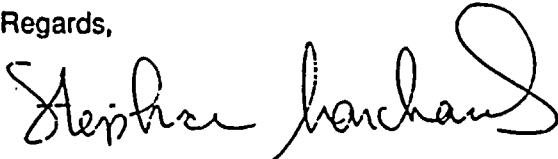
FC-M-16128

7 of 12

Question #4: Does the engine pre-lube oil system need to be in operation between testing cycles?

As above, operation of the system twice per week and immediately prior to starting the engine would be sufficient.

Regards,



Stéphane Marchand, P. Eng.

SM/sm

cc:

Martin Lu

Sylvain Champoux

DR Handley 6-10-92
C+PA 6-10-92



**CORRELATION OF SITE PRE-OPERATIONAL TESTING
TO SIXTH DIESEL DEDICATION ACTIVITIES**

Implementing Document: Design Change Package DCP-M-44405

In order to clarify the relationship between the Pre-Operational Startup Testing performed for the Sixth Diesel Assembly per this Design Change Package (DCP) and the Dedication of Commercial Grade subcomponents of the Sixth Diesel in accordance with component specific Replacement Part Evaluations (RPE), the following tabulation of system and specific component Critical Characteristics is provided. Note that these are NOT Verification activities, only clarification. Per PG&E Procedures, Dedication Activities can only be specified/implemented per an RPE, not a DCN.

GENERIC CRITICAL CHARACTERISTICS OF THE SIXTH DIESEL ASSEMBLY

- 1. Critical Characteristic: Available within a time consistent with the requirements of ESF or shutdown system loads under normal and accident conditions. (DCM S-21 4.3.1.c)

How Verified: IEEE 387 Testing, Acceleration Test, Dead Load Pickup Test, Starting Capacity Test.

Acceptance Criteria: Starts and accelerates to rated speed and voltage in less than 10 seconds. (FSAR 8.3.1.1.13.2)

- 2. Critical Characteristic: Capable of supporting rated load required to provide power to operate the required ESF systems to mitigate a design basis accident (LOCA). (DCM S-21 4.3.1.h)

How Verified: IEEE 387 Testing, Rated Load Test, Dead Load Pickup Test.

Acceptance Criteria: Stable operation at rated load of 2600 KW.

DR Hardisty 6-10-92

W.P. 6-10-92



3. Critical Characteristic: During recovery from transients caused by disconnection of the largest single load, speed is maintained. (DCM S-21 4.3.1.1 and 4.3.4.d)

How Verified: IEEE 387 Testing, Rated Load Test, Load Rejection Test, Dead Load Pickup Test, R.G 1.9 Testing and 23 Starts.

Acceptance Criteria: Speed does not exceed 75% of the difference between nominal speed and the overspeed trip setpoint or 115% of nominal speed, whichever is lower.

4. Critical Characteristic: Nominal voltage is restored during load sequencing. (DCM S-21 4.3.1.k, 4.3.1.m, 4.3.4.c, and 4.3.4.e)

How Verified: IEEE 387 Testing, Rated Load Test, Load Rejection Test, Dead Load Pickup Test, R.G. 1.9 Testing and 23 Starts.

Acceptance Criteria: Voltage is within 10% of nominal in less than 40% of each load sequence time interval, no less than 75% of nominal voltage during loading.

5. Critical Characteristic: Nominal frequency is restored during load sequencing. (DCM S-21 4.3.1.j, 4.3.1.n, 4.3.4.c and 4.3.4.e)

How Verified: IEEE 387 Testing, Rated Load Test, Load Rejection Test, Dead Load Pickup Test, R.G. 1.9 Testing and 23 Starts.

Acceptance Criteria: Within 2% of nominal in less than 40% of each load sequence time interval, no less than 95% of nominal during loading.

D.H. Hardesty 6-10-92
C.P.H. 6-10-92



FC M-16128
10 of 12

COMPONENT SPECIFIC CRITICAL CHARACTERISTICS VERIFIED BY INTEGRATED TESTING (SUPPLIER OR PG&E)

COMPONENT: Aux Air Controller REFERENCE RPE: E-6797

1. Critical Characteristic: Integrated System Operation

How Verified: IEEE 387 Testing, Rated Load Test, Load Rejection Test, Acceleration Test, Dead Load Pickup Test.

Acceptance Criteria: Starts and accelerates to rated speed and voltage in less than 10 seconds (FSAR 8.3.1.1.13.2); Speed does not exceed 75% of the difference between nominal speed and the overspeed trip setpoint or 115% of nominal speed, whichever is lower; Voltage is within 10% of nominal in less than 40% of each load sequence time interval, no less than 75% of nominal voltage during loading; Frequency is within 2% of nominal in less than 40% of each load sequence time interval, no less than 95% of nominal during loading.

COMPONENT: Electrical Governor Assembly REFERENCE RPE: E-6800

1. Critical Characteristic: Integrated System Operation

How Verified: IEEE 387 Testing, Rated Load Test, Load Rejection Test, Acceleration Test, Dead Load Pickup Test.

Acceptance Criteria: Starts and accelerates to rated speed and voltage in less than 10 seconds (FSAR 8.3.1.1.13.2); Speed does not exceed 75% of the difference between nominal speed and the overspeed trip setpoint or 115% of nominal speed, whichever is lower; Voltage is within 10% of nominal in less than 40% of each load sequence time interval, no less than 75% of nominal voltage during loading; Frequency is within 2% of nominal in less than 40% of each load sequence time interval, no less than 95% of nominal during loading.

COMPONENT: Voltage Regulator REFERENCE RPE: E-6802

1. Critical Characteristic: Operability

How Verified: IEEE 387 Testing, Rated Load Test, Load Rejection Test, Acceleration Test, Dead Load Pickup Test.

Acceptance Criteria: Starts and accelerates to rated speed and voltage in less than 10 seconds (FSAR 8.3.1.1.13.2); Speed does not exceed 75% of the difference between nominal speed and the overspeed trip setpoint or 115% of nominal speed, whichever is lower; Voltage is within 10% of nominal in less than 40% of each

D. Hardesty 6-10-92 3
C.A.P. 6-10-92



FC M-16128
11 of 12

load sequence time interval, no less than 75% of nominal voltage during loading; Frequency is within 2% of nominal in less than 40% of each load sequence time interval, no less than 95% of nominal during loading.

COMPONENT: High Voltage Chassis REFERENCE RPE: E-6806

1. Critical Characteristic: Operability

How Verified: IEEE 387 Testing, Rated Load Test, Load Rejection Test, Acceleration Test, Dead Load Pickup Test.

Acceptance Criteria: Starts and accelerates to rated speed and voltage in less than 10 seconds (FSAR 8.3.1.1.13.2); Speed does not exceed 75% of the difference between nominal speed and the overspeed trip setpoint or 115% of nominal speed, whichever is lower; Voltage is within 10% of nominal in less than 40% of each load sequence time interval, no less than 75% of nominal voltage during loading; Frequency is within 2% of nominal in less than 40% of each load sequence time interval, no less than 95% of nominal during loading.

COMPONENT: Solenoid Valve REFERENCE RPE: J-1042

1. Critical Characteristic: Pressure Rating/Flow Capacity

How Verified: IEEE 387 Testing, Acceleration Test, Dead Load Pickup Test, Starting Capacity Test.

Acceptance Criteria: Starts and accelerates to rated speed and voltage in less than 10 seconds. (FSAR 8.3.1.1.13.2)

COMPONENT: Pressure Regulator REFERENCE RPE: J-1146

1. Critical Characteristic: Regulation/Flow

How Verified: IEEE 387 Testing, Acceleration Test, Dead Load Pickup Test, Starting Capacity Test.

Acceptance Criteria: Starts and accelerates to rated speed and voltage in less than 10 seconds. (FSAR 8.3.1.1.13.2)

COMPONENT: Sixth Diesel Engine and Auxiliary Mechanical Components
REFERENCE RPE: M-6602

1. Critical Characteristic: Integrated System Operation

How Verified: Endurance Testing. (See PG&E to NRC Letter, CHRON 188555)

DL Hardesty
6-10-92
Ant P. Wood
6-11-92

