REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)
DISTRIBUTION FOR INCOMING MATERIAL 50-261

REC: CASE E G
NRC

ORG: UTLEY E E
CAROLINA PWR & LIGHT

DOCDATE: 01/20/78
DATE RCVD: 01/23/78

DOCTYPE: LETTER NOTARIZED: NO
SUBJECT:
RESPONSE TO NRC LTR DTD 12/15/77...FORWARDING RESPONSE TO QUESTIONNAIRE CONCERNING STANDBY DIESEL GENERATOR UNITS...W/ATT SHEET OF PERSON RESPONSIBLE FOR ANY FOLLOW-UP COMMUNICATIONS.

COPIES RECEIVED
LTR 1 ENCL 1

PLANT NAME: H B ROBINSON - UNIT 2

REVIEWER INITIAL: XJM
DISTRIBUTOR INITIAL:

********** DISTRIBUTION OF THIS MATERIAL IS AS FOLLOWS **********

DISTRIBUTION OF "RELIABILITY OF STANDBY DIESEL GENERATOR UNITS" PER J.
(DISTRIBUTION CODE A014)

FOR ACTION: BRANCH CHIEF REID**W/7 ENCL

INTERNAL:
REG FILE**W/ENCL
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EXTERNAL:
LPDR'S
HARTSVILLE, SC**W/ENCL
TIC**W/ENCL
NSIC**W/ENCL
ACRS CAT B**W/16 ENCL

9

DISTRIBUTION: LTR 40 ENCL 40
SIZE: 1P+1P+1/4"

CONTROL NBR: 780230056

********** THE END **********

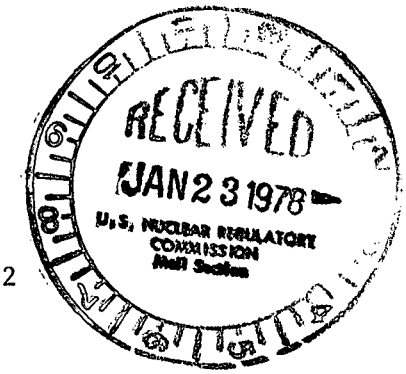
Rids 03

CP&L
Carolina Power & Light Company

January 20, 1978

B02324

FILE: NG-3514 (R) SERIAL: GD-78-176



Mr. Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

H. B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2
DOCKET NO. 50-261
FACILITY OPERATING LICENSE NO. DPR-23
STANDBY DIESEL GENERATOR UNITS QUESTIONNAIRE

Dear Mr. Case:

In the letter of December 15, 1977, from Mr. Karl R. Goller, it was requested that the enclosed questionnaire on Standby Diesel Generator Units be completed and returned to your office. Enclosed also is a separate sheet with the name, address, and phone number of the person responsible for responding to any follow-up communications concerning this questionnaire.

Yours very truly,

E. E. Utley
Senior Vice President
Power Supply

DCS:as

Enclosures

780230056

A014
1/1

336 Fayetteville Street • P. O. Box 1551 • Raleigh, N. C. 27602

For response to questions concerning the H. B. Robinson Unit No. 2 Standby Diesel Generator Units, please contact:

Mr. R. B. Starkey, Jr., Manager
H. B. Robinson Steam Electric Plant
Post Office Box 790
Hartsville, South Carolina 29550

Questionnaire

for

NUCLEAR REGULATORY COMMISSION
RELIABILITY STUDY

of

Standby Diesel Generator Units

Date Questionnaire Completed: January 6, 1978

Plant Name: H. B. Robinson Unit No. 2

Diesel Manufacturer: Fairbanks Morse Model: 38TD-8 1/8

Number of Units: 2

Size Kw/Unit: 2500 Rated Speed: 900

Average Operating Hours Per Unit to Date: 497.3

DIESEL GENERATOR STATUS

A. Engine:

1. Problems are caused chiefly by (give estimated number)

   a. Defective parts 2
   b. Installation errors: 1
   c. Failure of system to respond properly in function or sequence: 8
   d. Faulty adjustment: 0

2. Would more stringent inspection and testing requirements during acceptance or preoperational tests significantly improve the diesel-generator power plant performance?
   Yes ____ No X

B. Starting Systems (indicate which):

1. Air-to-cylinder cranking. X
   Air cranking motor ____ Mfr. N/A Model No. N/A
   Electric cranking motor ____ Mfr. N/A Model No. N/A

2. If air cranking, then:

Give size of starting air tank: Length 96" Diameter 30"

Normal standby air tank pressure 225-250 psi.

Is pressure reducer used? Yes _____ No X
Reducer pipe size? N/A inches.

Starting air control admission valve pipe size in air piping system, 1 1/2 inches. (2 Valves)

Minimum air tank pressure for engine cranking 150 psi.

Number of five-second cranking periods between above pressures with no tank recharging 8.

Number of air tanks per engine 1.

Can starting air tanks serve more than one engine?
Yes X No _____

Is air pipe to engine from top of air tank? Yes X No ____

Does starting air tank have water condensate drain?
Yes X No ___
Also air dryer between compressor and tank.
Does starting air pipe have water condensate trap and drain near engine? Yes ____ No X

Is starting air piping horizontal? Yes X No X
Some vertical runs also.
Does it slant toward drain? Yes ____ No X

If water condensate drains are provided, then is draining:

a. Automatic through float valve? Yes ___ No X
b. Manual by hand valve? Yes X No ___
c. If manual, then is draining water condensate done:

daily? ____
weekly? X
monthly? ____
before each start if manual? ____
no procedure? ____

Is dirt and rust filter provided in starting air pipe?
Yes X No ____

If provided, where installed? Before solenoid valves and before engine (3 total)

How is it cleaned? Remove screen and clean

How often and when? Refueling

Give pipe size of filter: 1 1/2 inches.

How is it known whether filter is plugged or has high pressure drop? We have experienced no problems with these screens.

Is starting air pipe to engine positioned:

a. Below floor? N/A
b. On the floor? X
c. Overhead? X

Overhead and then down to diesel skid floor

What is air pressure drop from air tank to engine during cranking UN psi No provisions for checking

Give approximate length (nearest ten feet) of starting air pipe for individual engine or all engines from air tank to:

a. Nearest engine 30 feet
b. Furthest engine 100 feet

Diameter of starting air pipe from:

a. Air tank to starting valve 1½-2-2½ inches
b. At air starting valve 1½ inches (2 Valves)
c. At engine 1½ inches

What is the primary source of power for the starting air system? 480 volt safety related bus

Is there a duplicate and redundant motor and air compressor set? Yes ___ No X

What is the time required to recharge one air tank? 4½ minutes

Does starting air supply system have independent secondary power supply for compressor? Yes ___ No X

If yes, then by:

a. Gasoline engine? N/A
b. Motor driven? N/A
c. Other? (Specify) N/A

3. If electric (Battery powered) cranking, then:

a. Battery charging: Continuous trickle charger N/A
Intermittent charging N/A

If so, how is charging requirement determined?

Time cycle N/A
Test N/A
Other N/A

b. Battery used: Common Plant N/A
Individual Unit N/A
Other N/A

Starting cable size N/A ; Length: Battery to engine (longest) N/A

C. Fuel Oil System: Bulk Tank to Day Tank

1. Does the bulk tank to day tank fuel supply system (viz: pump, motor, etc.) have redundant independent power supplies? Yes X No ____

   Does this system have a hand-operated emergency fuel pump? Yes ____ No X

   If yes, is this hand-operated pump and piping in immediate operating condition? Yes N/A No N/A

2. Is there a water and sediment drain from the very bottom of the:

   a. Bulk tank? Yes X No ____
   b. Day tank? Yes X No ____

3. Is the regular functional fuel oil outlet slightly above (two to three inches) the bottom of the:

   a. Bulk tank? Yes X No ____
   b. Day or integral tank? Yes X No ____

4. Is bottom of day tank and/or integral tank above all parts and piping of the engine fuel injection systems? Yes ____ No X

   If yes,

   Give approximate amount inches N/A feet N/A

5. Does the engine fuel system have a fuel bleed return line to the fuel day tank and/or integral tank? Yes X No ____

   During extended operation, such as more than two to three hours, does the fuel in the day tank become: (yes or no)

   a. Warm? No
   b. Hot? No (above 130°F)

What is fuel oil return line size (nominal)?

a. Pipe size 3/4 inches
b. Tubing size 3/4 inches

6. Do engine fuel oil filters have air bleed or vent valves readily accessible? Yes X No ____

7. How is fuel transferred from day tank to engine fuel system?

a. By gravity N/A
b. Engine driven pump X
c. Electric motor driven pump N/A
d. Is a manual pump also provided for injection system filling and/or air venting after servicing or replacement of parts in the fuel injection system? Yes X No ____

If yes, is the manual pump in immediate operating condition? Yes X No ____

8. Type of fuel (e.g., #1, #2, #3, JP-4, etc.) #2.

9. Approximate bulk tank capacity, 25,000 gallons. 200 in day tank

10. Typical frequency of refilling (weekly, monthly, etc.) 4-5 months.

11. Typical refill (gallons), 5,000.

D. Lube Oil System

1. Lube oil

a. Type URSA-ED-40
b. Viscosity 40
c. Specification number MIL-L-2104B
d. Oil change determined by:

Time interval: Yes ___ No X
Give interval N/A monthly, yearly
By oil analysis: Yes X No ____

2. Lube oil filters are:

   a. Full flow X
   b. Bypass N/A
   c. Combination N/A

3. Interval and/or basis for changing filter cartridge:

   a. Monthly N/A
   b. Yearly N/A
   c. By running time N/A hours
   d. By oil analysis. Yes ___ No X
   e. By pressure drop. Yes X No ___
   f. Does provisions exist for changing cartridges during engine operation? Yes ___ No X

4. Oil Pressure Monitoring

   a. Normal operating pressure 35 psi
   b. Alarm 18 psi
   c. Shutdown 18 psi Non-emergency only

5. Oil temperature control:

   a. By standby heater in engine sump 125 °F.
   b. Heating means for maintaining standby temperature:

      Direct in oil X
      Oil-to-water heat exchanger N/A
      Other (Specify) N/A

E. Cooling System - Engine Water

1. Temperature control by:

   a. By thermostat in water? Yes X No ___

      If yes, then:

      Bypass thermostat? Yes X No ___
      Throttle thermostat? Yes ___ No X

b. By radiator shutter:

Automatic N/A
Manual N/A
Other (give type) N/A

2. Corrosion control (water additive)? Yes X No ____

If yes, give chemical additive or name of compound.

Sodium Chromate

Proportion or concentration control:

a. By additive measurement? Yes ____ No X
b. By water coolant analysis? Yes X No ____

3. Engine cooling water cooled by:

a. Radiator? N/A
b. Heat exchanger from sea, river or other water? X
c. Other? (give type) N/A

4. Engine cooling water temperature-monitoring

a. Standby temperature 110 °F
b. Normal operating temperature 160 °F
c. Alarm temperature 88/195 °F
d. Shutdown temperature 205 °F (non-emergency only)
e. Water circulation during standby:

Thermo-syphon N/A
Pump X

5. Water Pressure Monitoring: Yes X No ____

a. Alarm X
b. Shutdown X (non-emergency only)
c. Both N/A

6. Water temperature Sensor Position:

   a. In piping from engine X
   b. In engine piping N/A
   c. In engine direct N/A

7. Water surge or supply tank in system. Yes X No ____

   If yes, then bottom connected to:

   a. Water pump suction? Yes X No ____
   b. Top of system? Yes X No ____
   c. Both of above? Yes X No ____
   d. Is bottom of surge tank above top of engine system? Yes X No ____
   e. Does engine have constant air bleed from top of engine water piping to surge or supply tank? Yes X No ____
   f. Give size of bleed or vent line, 1/2 inches. Tubing
   g. Manual air bleed only? Yes ____ No X

F. Governor - Speed Control

Manufacturer Woodward
Electric (speed sensing) N/A
Hydraulic Yes
Type or code (such as EGB-35, LSG-10, etc.) UG-8
Automatic load sharing? Yes ____ No X

1. Is compensation or stability control and/or speed of response manually adjustable? Yes X No ____

   If yes, adjusted by:

   a. Eye and ear? N/A
   b. Test and specification? N/A
   c. Other? (Specify) Manufacturer.

2. Engine - generator normal shutdown or stopping means and method.

Is the engine stopped:

a. Manually? Yes X No ____

If yes, then:

Directly at engine? Yes X No ____
Through local control panel? Yes X No ____

b. Automatically through the controls in the control room? Yes X No ____

c. By setting governor to "fuel-off" position? Yes X No ____

d. By over-ride of governor settings and control position directly to fuel injection pumps? Yes ____ No X

e. Other means. Describe briefly. N/A

3. When engine is stopped, is fuel control in:

a. Full fuel or maximum fuel position? X
b. Full off or no fuel position? N/A
c. Intermediate? N/A
d. Random? N/A

(If not consistent and typical in above, then give the usual.)

4. When starting from the standby condition after shutdown for at least 24 hours, give number of seconds from start-to-crank to full fuel or maximum fuel position of governor and fuel control, 8 seconds.

G. Governor - Overspeed (shutdown)

1. Speed sensing?

   a. Electrical N/A
   b. Flyball X
   c. Other (Specify) N/A

2. Fuel shutoff force generated by:

   a. Spring? N/A
   b. Air? N/A
   c. Hydraulic? N/A
   d. Electrical? Normal
   e. Other? (Specify) Manual Fuel Rack

3. Overspeed sensing setting? (in terms of full speed)

   a. 115% N/A
   b. 110% N/A
   c. Other (Specify) 112%

4. Is overspeed tripping set point tested periodically?
   Yes ____ No X

   If yes, then how often? N/A (yearly, monthly, etc.)

H. 1. Generator Mfr. Fairbanks Morse Model No. Type TGZJ
   Single bearing or two bearings? Two
   Does generator have damper windings? Yes ____ No X

2. Does generator have any obvious fault or difficulty?
   Yes ____ No X

   Is problem repetitive? Yes ____ No X

   If yes, then describe briefly. N/A

I. Exciter and Voltage Regulator

1. Exciter Manufacturer: Basler Model SBSR LV

Type: Rotating _____ Static X

If rotating drive? Direct N/A
Belt or Chain N/A
DC with field control N/A
Brushless with rectifier N/A

2. Voltage Regulator: Manufacturer Basler Model 90 50300 100

Type: Mechanical _____ Static X

3. Are paralleled units of automatic load sharing control of fully automatic type? Yes X No ___

If yes, has any obvious influence or interrelationship been noted between the stability and response time of the engine governor and the stability and voltage control of the generators? Yes ___ No X

4. Have engine governor and voltage regulator/exciter adjustments been made on the site or under any conditions since any of the units have been placed in service? Yes ___ No X

If yes, by means of what tests and what standards? Give name or very brief description. N/A

_____

5. If any difficulties have occurred, give approximate number of problems.

a. Components 10
b. Wiring 1
c. Other (damage in service or dropping of miscellaneous hardware into switchboard, etc.) N/A.

J. Paralleling: Engine-Generator Units

1. Do all units consistently have the proper voltage output? Yes X No ____

2. Do all units automatically share both the "real" or in-phase load and also the reactive load reasonably well? Yes X No ____

3. At the same Kw load, are both the field and the armature line currents of the several units consistently close to the same value? Yes X No ____

   If no, approximate percent difference. N/A

4. Synchronizing

   a. In automatic synchronizing do circuit breakers close immediately after reaching full synchronous speed? Yes N/A No N/A

   b. If "no" above then, does speed of some units drift slowly while failing to synchronize and close circuit breakers?

      How many seconds? N/A

      Occasionally N/A
      Always N/A
      Never N/A

K. Switch Gear and Electrical Con (other than exciter/ voltage regulator)

1. If any difficulties have occurred, then give approximate number of problems. None

   a. Components N/A
   b. Wiring N/A
   c. Other (damage in service or dropping of miscellaneous hardware into switchboard, etc.) N/A
   d. Design concept faults. That is, does the switch gear and its controls perform the proper functions and in proper sequence and timing. Yes

2. a. Do the on-site diesel generator units and related support equipment have any storage battery power systems for any service whatsoever? Yes X No ___

b. Identify each storage battery power system associated with the on-site diesel generator unit and its function. 1 - Station batteries - normal control and field flashing
2 - emergency field flashing batteries - field flashing only

c. Does each system identified above adequately fulfill the service requirements for which it is intended? Yes X No ____

If no, briefly describe. N/A

d. Is there a DG battery maintenance program? Yes X No ____

L. Safety Shut downs

Give safety shut down settings compared to equilibrium operating conditions.

1. Engine and generator speed. Give rpm or hertz:

a. Synchronous and usual 900 rpm or 60 Hz
b. Overspeed shutdown setting 1010 rpm or 67 Hz

2. Engine cooling water (see E.4)

a. Equilibrium 160 °F
b. Alarm 88/195 °F
c. Shut down 205 °F (non-emergency only)

3. Lube oil pressure (see D.4)

a. Equilibrium 35 psi
b. Alarm 18 psi
c. Shut down 18 psi (non-emergency only)

4. Lube oil temperature

   a. Equilibrium 200 °F
   b. Alarm 115/225 °F
   c. Shutdown 225 °F (non-emergency only)

5. Indicate all other protective interlocks (give name and;) 1) Generator Lockout
   2) Crankcase Pressure

   a. Usual or proper condition 1 - Reset
      2 - Trip Blocked Position

   b. Shutdown condition 1 - Reset
      2 - Trip Blocked Position

6. a. What source of power is provided to operate alarms and shutdown controls? (See G.2) Station Batteries

   b. Do the generator units automatically shutdown in case of the electrical power loss to its control system? Yes ____ No X

M. Emergency or Alert Conditions

1. Are all safety shutdown and safety interlocks bypassed during emergency conditions? Yes ____ No X

2. If "no" above, then which are not bypassed. Name items.

   Generator Lockout

   Overspeed Trip

3. For each interlock not bypassed is coincident logic used? Yes ____ No X

   If yes, is it testable? Yes N/A No N/A

N. Maintenance

1. Does plant have regularly scheduled maintenance procedures? Yes

   If so, return copy of these procedures with questionnaire.
   A serviceman checks the units out during refueling using the manual as a guide.

2. When need for minor adjustments obviously exists, then:

   a. Is remedial action taken immediately or at earliest practical opportunity? Yes X No ____

   b. Is remedial action taken only at periodic prescheduled or programmed times and conditions? Yes ____ No X

   c. For best performance record which of above appears better:

      immediate or early action? X
      as scheduled only? ____

   d. Must permission for minor maintenace be obtained from some higher out-of-plant authority? Yes ____ No X

   e. Is maintenance referred to above allowed and encouraged? Yes X No ____

   f. In periodic surveillance tests, simulated alert standby tests, etc., is the criteria "pass/not pass" the test used? Yes X No ____

   g. Is there a conscious continuing policy to detect and remedy marginal conditions or imminent trouble: for examples: lube oil pressure shutdown only two to five psi below operating pressure or, perhaps overspeed governor setting only one or two percent above starting speed surge or etc.? Yes X No ____

   h. Are efforts to remedy marginal or questionable conditions as mentioned above encouraged by plant management? ____

      Yes X No ____

   i. Are remedial steps on items similar to the above taken or allowed when the unit has started and operated satisfactorily within specified limits or conditions? Yes X No ____

O. Starting Conditions

1. Give starting or necessary cranking time as experienced.

   a. Starting time per specification 10 seconds
   b. Usual starting time 8 seconds
   c. Maximum starting time observed 9 seconds

2. Give usual time intervals as follows:

   a. Time from start-to-crank to first firing of any cylinder. UN seconds

   b. Time from start-to-crank to approximate full firing of all cylinders. UN seconds

3. Give maximum speed surge when starting; use both tachometer and frequency meter if possible.

   a. Usual conditions N/A rpm
      Hz

   b. Maximum observed N/A rpm
      Hz

4. During a surveillance test, give time from start-to-crank to when steady synchronous speed is attained and maintained.

   a. Usual 8 seconds
   b. Maximum 9 seconds
   c. As specified 10 seconds.

5. Give briefly the most troublesome problems in starting.

   a. Most troublesome Fuel Injectors.

   b. Next to most troublesome Crank case pressure trips.
      This trip is now blocked on emergency.

P. Air Cleaner or Air Filter - Combustion Air

1. Combustion air source: taken from engine room or inside the building, or from outdoors?

   a. Indoors N/A
   b. Outdoors X

2. Give type and make of air cleaners or air filters:

   a. Oil bath N/A Make N/A
   b. Oil wetted screen N/A Make N/A
   c. Paper N/A Make N/A
   d. Other Fiber Make Burgess Manning
   e. Precleaner: Yes ____ No X

3. Excessive air flow restriction and servicing need determined by?

   a. Instrument such as:

      manometer No
      If other give type N/A
   b. Personal judgement by appearance, etc. Yes
   c. By smoking exhaust No
   d. Time schedule No
   e. Other (Specify) N/A

4. Are climatic extremes normally experienced such as:

   a. Air heavily loaded with water mist, high humidity and low temperature? Yes ____ No X
   b. Blowing sand and dust? Yes ____ No X
   c. Blowing snow (blizzards)? Yes ____ No X
   d. Other-Name N/A

5. Are climatic extremes potentially possible such as:

   a. Air heavily loaded with water mist, high humidity and low temperature? Yes X No ____
   b. Blowing sand and dust? Yes X No ____
   c. Blowing snow (blizzards)? Yes X No ____
   d. Other-Name N/A

Q. Temperature Conditions

1. Ambient outside hottest 104 °F.

2. Ambient outside coldest 10 °F.

3. Engine-generator room hottest 105 °F.

4. Engine-generator room coldest 55 °F.

5. Inside switch gear hottest 105°F

R. Operator Qualifications (as presently exists, and suggested minimums if different)

1. Minimum education required (check)

	Existing	Suggested
a. High School	X	X
b. Trade School		
c. Technical School		
d. No minimum		

2. Minimum Years of operating experience (diesel electric generator)

	Existing	Suggested
a. 0-3	X	X
b. 3-6		
c. 6-10		
d. 10-15		

3. Operator training

	Existing	Suggested
a. Military		
b. Industrial		
c. On-the-job	X	X
d. Combination of a, b, and c (indicate which)		

4. Licensing required

	Existing	Suggested
a. State		
b. Federal	X	X
c. Utility or self		
d. None		

S. Are any foreign gases such as propane, freon, halon, carbon dioxide, etc. stored in the: Diesel Engine room? Yes _____ No X or adjacent buildings? Yes X No _____

If yes, (other than hand portable fire extinguishers), then identify gases and give approximate tank size.

Gases	~~Volume (ft^3)~~
CO_2	1525 lbs.

T. Does control system automatically bypass, in emergency starting, any engine temporarily out of service for maintenance? Yes _____ No X

If yes, then how many failures to bypass have occured?
N/A

U. Does the control system automatically override the test mode under emergency conditions? Yes X No _____

V. Have repetitive mechanical failures occurred in any component part or subsystem of the engine, generator, or switch gear, etc.? Yes X No _____

If yes, then which part or subsystem? Fuel Injectors

How many failures? 4

Give nature of failure. Sticking Injectors

W. Would periodic (yearly or other) evaluation and/or testing by "outside experts" contribute significantly to the diesel-generator reliability? Yes X No _____

Give brief reasons for the answer. Manufacturer should check units on refueling outages normally and anytime their expertise is needed.

X. 1. Give the accumulated time-load operating record for each diesel-generator unit from installation to the present (Running Hours): A - 499.8 Hours
B - 494.9 Hours

Preoperational test Date 5-5-70

	Engine Serial No.	Surv. Testing & Maintenance Hrs. No Load	Loaded	Emergency and Other Service Hrs.	Total Hours
A	38D868030TDSM12	UN	UN	UN	499.8
B	38D868025TDSM12	UN	UN	UN	494.9

2. Surveillance test load (percent of continuous rating) 100%

3. Give the projected or planned time-load operation for each diesel-generator unit during the next 12 months.

Surveillance & Maintenance Hrs.	Emergency and other Service Hrs.	Total Hours	
70	0	70	

4. Provide the following summary of the periodic surveillance testing experience:

a. Starting date of surveillance testing (OL date) 9-1-70
b. Periodic test interval Bi-Weekly-Refueling
c. Total number of surveillance tests performed 202
d. Total number of test failures 6

failure to start 1 failure to accept load None
failure to carry load 5 failures due to operator error None
failure due to equipment not being operative during emergency conditions None

e. Supply a copy of the surveillance test procedures with this completed questionnaire. PT-23.1
PT-23.2 - Attached
PT-23.3

Additional Comments

_____

_____

_____

_____

_____

_____

Y. General Suggestions

Briefly give constructive criticism or suggestions as to improvement in reliability of the diesel generators. These remarks may cover tests, maintenance, practices, orders, policy, adjustments, etc.

H. B. ROBINSON STEAM ELECTRIC PLANT

UNIT NO. 2

PERIODIC TEST NO. CPL-PT-23.1

EMERGENCY DIESELS

BI-WEEKLY INTERVAL

REVISION 4

OCTOBER, 1977

TEST PROCEDURE APPROVAL

RECOMMEND APPROVAL: R C Lamar — Operating Supervisor — Date: 11-3-77

APPROVED: W B Mauldin — Plant Manager — Date: 11/9/78

UNIT NO. 2

PERIODIC TEST NO. CPL-PT-23.1

EMERGENCY DIESELS

BI-WEEKLY INTERVAL

REVISION 4

OCTOBER, 1977

1.0 PURPOSE

1.1 To verify mechanical performance and assess operational readiness of components to fulfill their required safeguard functions.

1.2 The valves shall be tested in accordance with ASME Section XI "Rules for Inservice Inspection of Nuclear Power Plant Components", editions or addenda as set forth in Technical Specifications; and to comply with the testing requirements set forth in Technical Specifications.

2.0 SCOPE

2.1 To ensure that the diesel generators will operate properly when required during emergency conditions.

2.2 The following test quantities shall be measured or observed as applicable:

2.2.1 Valves

1. Valve stem travel or disk movement
2. Proper operation of Remote Position Indicators (R.P.I.'s)
3. Time required to cycle valve
4. Verification that the valve assumes its proper failure position on loss of operating power.

2.3 All data will be compared to baseline data after the completion of this test.

3.0 REFERENCES

3.1 Technical Specification 4.6.1.1; 4.6.2; 4.6.3.3

3.2 ASME Section XI, Subsection IWV

3.3 CPL-OP-07

3.4 Engineering flow diagrams:

3.4.1 Emergency Diesel Generator Systems

G-190204

3.4.2 Service and Cooling Water Systems

G-190199

4.0 EQUIPMENT REQUIRED

4.1 Stopwatch

5.0 PRECAUTIONS AND LIMITATIONS

5.1 Only one diesel generator shall be tested at a time.

5.2 A minimum fuel oil storage of 25,000 gallons.

NOTE: 19,000 gallons in diesel fuel oil tank plus 6,000 gallons in I.C. turbine oil tank or 25,000 gallons in diesel fuel oil tank.

6.0 PREREQUISITES

6.1 The diesel generators are aligned for operation in accordance with CPL-OP-07.

6.2 The plant is in such a condition that performing this test will not prevent the system from performing its intended safety function. There are no outstanding OWP's which could adversely affect this system.

6.3 Any steps that are not applicable shall be marked N/A.

6.4 Unless otherwise noted, the data recorded in this PT is "as found". If adjustments are performed, the "as left" data will be recorded adjacent to the "as found" and remarks made as appropriate.

6.5 The Shift Foreman has given permission to perform this test and all prerequisites are met.

_____ _____

Authorizing Shift Foreman Date.

7.0 DIESEL GENERATOR TEST

7.1 Initial Conditions

7.1.1 480V breakers lined up and in normal service _____

7.1.2 Emergency diesel generator "A" and "B" in emergency standby condition and system aligned per CPL-OP-07. _____

7.1.3 Air start solenoid defeat switch to normal position ("A" and "B" diesels). _____

7.1.4 All emergency diesel generator annunciators cleared.

_____

7.1.5 Verify emergency diesel generator "Trips Defeat" key switches are in the "Trip Defeat" position. _____

7.1.6 Station an auxiliary operator in the respective diesel generator room to monitor the starting of the diesel generator and to observe and time the opening and closing of service water valves TCV-1660 and TCV-1661.

7.2 Diesel Generator "2A" Test Procedure

7.2.1 Ensure that field voltage control switch is in the "auto" position. _____

7.2.2 "Parallel-Isolation" switch to parallel. _____

7.2.3 Observe, time and record the opening of TCV-1660 on the attached data sheet when the diesel starts. _____

7.2.4 Diesel "2A" controls in remote start position. _____

7.2.5 Turn 2A diesel generator switch (on RTB) to START position. (2A diesel generator will prelube two minutes, start and come up to speed. _____

7.2.6 After the diesel has run for one minute, reinstate the diesel engine trips by placing the Engine Trips Defeat Key Switch in the "Trips in Service" position. _____

NOTE: Monitor the diesel engine control panel closely during this one minute time period. If any abnormal conditions are indicated, manually trip the diesel generator.

7.2.7 Flash field and adjust Generator "2A" terminal voltage as required for load operation. _____

7.2.8 Synchronize Generator "2A" with Bus E-1 _____

7.2.9 Close Breaker 52/17B and adjust governor to assume rated load of 2500 kw for one hour. Complete attached data sheet.

Time Closed_____

7.2.10 Reduce Generator "2A" load. Time Reduced_____

7.2.11 Observe the closing of TCV-1660 and record on the attached data sheet when the diesel stops. _____

7.2.12 Open Breaker 52/17B and shutdown diesel "2A". _____

7.2.13 Diesel "2A" controls in remote start position. _____

7.2.14 "Parallel-Isolation" switch to isolation. _____

7.2.15 Place the engine "Trips Defeat" key switch in the "Trip Defeat" position and remove the key. _____

7.3 Diesel Generator "2B" Test Procedure

7.3.1 Ensure that field voltage control switch is in the "auto" position. _____

7.3.2 "Parallel-Isolation" switch to parallel. _____

7.3.3 Observe, time and record the opening of TCV-1661 on the attached data sheet when the diesel starts. _____

7.3.4 Diesel "2B" controls in remote start position. _____

7.3.5 Turn 2B diesel generator switch (on RTB) to START position. (2B diesel generator will prelube two minutes and come up to speed). _____

7.3.6 After the diesel has run for one minute, reinstate the diesel engine trips by placing the Engine Trips Defeat Key Switch in the "Trips in Service" position. _____

NOTE: Monitor the diesel engine control panel closely during this one minute time period. If any abnormal conditions are indicated, manually trip the diesel generator.

7.3.7 Flash field and adjust Generator "2B" terminal voltage as required for load operation. _____

7.3.8 Synchronize Generator "2B" with Bus E-2. _____

7.3.9 Close breaker 52/17B and adjust governor to assume rated load of 2500 kw for one hour. Time Closed _____

7.3.10 Reduce Generator "2B" load. Time Reduced _____

7.3.11 Observe the closing of TCV-1661 and record on the attached data sheet when the diesel stops. _____

7.3.12 Open Breaker 52/27B and shutdown diesel "2B". _____

7.3.13 Diesel "2B" controls in remote start postion _____

7.3.14 "Parallel-Isolation" switch to isolation _____

7.3.15 Place the Engine Trips Defeat Key Switch in the "Trip Defeat" position and remove the key. _____

8.0 Diesel Generator Valve Test

8.1 The necessary valve stem or disk movement shall be established by exercising the valve and verifying travel by the method(s) indicated on the valve data sheet. _____

8.2 Perform all required tests as indicated by blank data blocks on the appropriate valve data sheet(s). _____

9.0 COMPLETION OF TEST

9.1 All required tests have been completed, all required data has been recorded and the system has been restored to pretest condition.

_____

10.0 VALVE ACCEPTANCE CRITERIA

10.1 Each valve shall exhibit the required change of valve stem or disk position by full stroke, part stroke, and/or fail testing. For valves required to be stroke-timed, the valve shall stroke within time indicated on the valve data sheet. Any abnormalities or erratic action shall be reported.

11.0 VALVE CORRECTIVE ACTION

11.1 If a valve fails to exhibit the required change of valve stem or disk position by this testing, corrective action shall be initiated immediately. If the condition is not or cannot be corrected with 24 hours, the valve shall be declared inoperative. When corrective action is required as a result of tests made during cold shutdown, the condition shall be corrected before startup. A retest showing acceptable operation shall be run following any required corrective action before the valve is returned to service.

_____	_____
_____	_____
_____	_____
Data Acquisition By:	Date
_____	_____
Authorizing Shift Foreman	Date
_____	_____
Reviewed and Approved By Operations Supervisor	Date

ENGINE DATA SHEET

	Diesel		Max. or Min.*	Trip Point
	A	B		
Lube oil pressure, psig			20 min	18
L.O. strainer inlet pressure, psig				
L.O. strainer outlet pressure, psig				
L.O. strainer ΔP, psi			15 max.	
L.O. filter inlet pressure, psig				
L.O. filter outlet pressure, psig				
L.O. filter ΔP, psi			13 max.	
Coolant discharge pressure, psig			20 min.	12
Coolant temperature, ^{o}F			195 max.	205
Crankcase vacuum, inches water			0.8 (vacuum)	+0.5 (press.)

* Write a trouble ticket if the maxumum or minimum is reached and so state below:

VALVE DATA SHEET

VALVE NUMBER	PRE-TEST POSITION	FULL STROKE	VERIFICATION OF TRAVEL BY			STROKE TIME (SEC.)		LOSS OF POWER TEST	POWER RESTORED	POST-TEST POSITION	DATE	ACCEPTANCE CRITERIA
			STEM	IND. LIGHTS	* OTHER	OPEN	CLOSED					
TCV-1660	C			N/A	N/A		N/A	N/A	N/A			60 Seconds
TCV-1661	C			N/A	N/A		N/A	N/A	N/A			60 Seconds

All spaces next to valve number shall be filled in with an appropriate entry, initials or N/A as applicable.

* List in comments the method used to determine valve travel.

COMMENTS: _____

_____

Date: _____ Performed By: _____

Date: _____ Reviewed By: _____

H. B. ROBINSON STEAM ELECTRIC PLANT

UNIT NO. 2

PERIODIC TEST CPL-PT-23.2

REVISION 3

SEPTEMBER 30, 1975

EMERGENCY DIESEL AUTO START ON LOSS OF POWER AND SAFETY INJECTION

EMERGENCY DIESEL TRIPS DEFEAT

REFUELING INTERVAL

TEST PROCEDURE APPROVAL

RECOMMEND APPROVAL: _____ DATE: 10/2/75
Engineering Supervisor

APPROVED: _____ DATE: 9/4/75
Plant Manager

H. B. ROBINSON STEAM ELECTRIC PLANT

UNIT NO. 2

PERIODIC TEST NO. CPL-PT-23.2

SEPTEMBER 30, 1975

EMERGENCY DIESEL AUTO START ON LOSS OF POWER AND SAFETY INJECTION

EMERGENCY DIESEL TRIPS DEFEAT

REFUELING INTERVAL

REV. 3

1.0 PURPOSE

1.1 The purpose of this test is to:

1.1.1 Assure auto start of the diesel generators, load shedding and restoration to operation of particular vital equipment initiated by a loss of power to the vital busses together with a Safety Injection signal.

1.1.2 Assure that the diesel generators will start and assume required load within 50 seconds after the initial starting signal.

1.1.3 Demonstrate that the diesel protective trip devices will not trip the diesels when in the "trips defeat" position.

1.2 Satisfactory completion of this test will fulfill the requirements of Technical Specifications 4.6.1.2 and 3.7.1 D.

2.0 EQUIPMENT LIST

4.3

2.1 20 point event recorder - Rec. Calib. Date _____ Ser. No. _____

2.2 Stop watch

3.0 INITIAL CONDITION

3.1 Connect the recorder as shown below:

EQUIPMENT	RELAY	RACK	CONTACT	RECORDER	SAFEGUARD SHEET
RHR Pump A	2RHRA	51	4 6	1	12
SI Pump A	2SIA	51	4 6	2	12
HVH-1	2HVH1	51	4 6	3	12
HVH-2	2HVH2	51	4 6	4	12
SW Pump A	2SWA	51	4 6	5	12
SW Pump B	2SWB	51	4 6	6	12
870A, 841A 867A, 744A	SI11X	52	12 16	7	6
870B, 841B 867B, 744B	SI21X	64	12 16	8	6
RHR Pump B	2RHRB	63	4 6	9	12
SI Pump C	2SIC	63	4 6	10	12
HVH-3	2HVH3	63	4 6	11	12
HVH-4	2HVH4	63	4 6	12	12
SW Pump C	2SWC	63	4 6	13	12
SW Pump D	2SWD	63	4 6	14	12
SWBP-A	Relay G(83X)	Aux. Pnl. FB	9 10	15	CWD 845
SWBP-B	Relay G(83X)	Aux. Pnl. JB	9 10	16	CWD 846
SI Pump B	*	Aux. Pnl. JE	112 C 114	17	CWD 238
AFW Pump A	*	Aux. Pnl. FF	76 C 78	18	CWD 651
AFW Pump B	*	Aux. Pnl. JF	76 C 78	19	CWD 655
Push Button for Time Zero				20	--

* Connect an auxiliary relay in series with the "b" contacts of the subject breaker to obtain a spare contact. Numbers denote connection points on the auxiliary panel.

3.0 INITIAL CONDITIONS (Continued)

3.2 Plant in a cold or refueling shutdown condition on RHR _____

3.3 Refueling water storage tank above the low level alarm point. _____

3.4 All control rods on bottom. _____

3.5 SI Accumulators A, B, and C are depressurized to less than RCS pressure. _____

3.6 Emergency diesel generators in standby condition. _____

3.7 RHR Pumps "A" and/or "B" running as required for RCS temperature control. _____

3.8 Service water system lined up for normal service. _____

3.9 Perform the following valve line up:

3.9.1 SI Pump Recirculation

888A	SI Pump A Discharge	Closed_____
856A	Recirc. to RWST	Open _____
888B	SI Pump B Discharge	Closed_____
856B	Recirc. to RWST	Open _____
888C	SI Pump C Discharge	Closed_____
886A	SI Pump A Suction	Open _____
886B	SI Pump B Suction	Open _____
886C	SI Pump C Suction	Open _____
805B	SFP to RWST	Closed_____
864A	Refueling Tank Isolation	Open _____
864B	Refueling Tank Isolation	Open _____
895P	SI Test Line to RWST Isolation	Closed_____
898G	SI Pump A Miniflow Isolation	Open _____
898H	SI Pump B Miniflow	Open _____
898J	SI Pump C Miniflow Isolation	Open _____

3.0 INITIAL CONDITIONS (Continued)

865A	"A" Accumulator Isolation	Closed_____
865B	"B" Accumulator Isolation	Closed_____
865C	"C" Accumulator Isolation	Closed _____
866A	Hot Leg Injection	Closed_____
866B	Hot Leg Injection	Closed_____
841A	Boron Injection Tank to Boric Acid Tanks	Closed_____
841B	Boron Injection Tank to Boric Acid Tanks	Closed_____
867A	Safety Injection Line to Boron Injection Tank	Closed_____
867B	Safety Injection Line to Boron Injection Tank	Closed_____
870A	Safety Injection Line to Cold Legs	Closed_____
870B	Safety Injection Line to Cold Legs	Closed_____

3.9.2 RHR Recirculation

862A	Refueling Water to RHR Pump Suction	Closed_____
862B	Refueling Water to RHR Pump Suction	Closed_____
752A	RHR Pump A Suction	Open _____
752B	RHR Pump B Suction	Open _____
754A	RHR Pump A Discharge	Open _____
754B	RHR Pump B Discharge	Open _____
757C	RHR Hx A Bypass	Open _____
757D	RHR Hx B Bypass	Open _____
757A	RHR Hx A inlet	Open _____
757B	RHR Hx B Inlet	Open _____
759A	RHR Hx A Outlet	Open/Closed_____
759B	RHR Hx B Outlet	Open/Closed_____
750	Loop 2 Hot Leg to RHR	Open _____
751	Loop 2 Hot Leg to RHR	Open _____

3.0 INITIAL CONDITIONS (Continued)

	863A	RHR Hx A Outlet to SI Pump Suction	Closed_____
	863B	RHR Hx B Outlet to SI Pump Suction	Closed_____
	764	RHR Hx Exchanger outlet orifice isolation	Open _____
	758	RHR Hx Exchanger outlet blocked partially	Closed_____

3.9.3 Aux. FW Pump Recirculation

	AFW-1	Suction from condensate storage tank	Open _____
	AFW-16	Motor driven AFW pump suction header stop	Open _____
	SGB-24	S/G drain pump disch. to AFW Header	Closed_____
	AFW-18	Emergency back up supply stop	Closed_____
	AFW-22	AFW Pump A suction stop	Open _____
	AFW-32	AFW Pump B Suction stop	Open _____
	AFW-29	AFW Pump A discharge stop	Closed_____
	AFW-41	AFW Pump B discharge stop	Closed_____
	AFW-28	AFW Pump A recirculation stop	Throttled/Open_____
	AFW-39	AFW Pump B recirculation stop	Throttled/Open_____
	AFW-40	Common Recirc. Stop	Open _____
	SGB-25B	S/G Drain Pump to condensate storage Tank	Closed_____
	AFW-16A	AFW to A steam generator	Closed_____
	AFW-16B	AFW to B steam generator	Closed_____
	AFW-16C	AFW to C steam generator	Closed_____
3.9.4	IVSW-12	Seal Water Supply to Phentrations	Closed_____
3.9.5	CCW-737A	Component cooling water to excess letdown	Closed_____
3.9.6	Containment Spray pump breakers racked out		_____

3.0 INITIAL CONDITIONS (Continued)

3.10 No Reactor Coolant Pumps Running. _____

3.11 Cycle the following valves one at a time. _____

867A Safety injection line to boron injection tank _____

867B Safety injection line to boron injection tank _____

870A Safety injection line to cold legs. _____

870B Safety injection line to cold legs. _____

865A Accumulator "A" discharge isolation _____

865B Accumulator "B" discharge isolation _____

865C Accumulator "C" discharge isolation _____

744A RHR line to cold legs _____

744B RHR line to cold legs _____

841A Boron injection tank to Boric Acid tanks _____

841B Boron injection tank to Boric Acid tanks _____

3.12 Open and rack out E1 - E2 tie breaker 52/22B so that it will not close during the safety injection starting sequence. _____

3.13 Close E1-E2 tie breaker 52/29B _____

Note: This test will check that 52/29B will close on safety injection if 52/22B has not closed.

3.14 Personnel required outside the control room

3.14.1 2 men at E1 - E2 to verify load shedding of breakers on E1 and E2.

3.14.2 2 men at emergency diesels to record load at 50 seconds after starting signal

3.14.3 2 men in 4 KV room at 4 KV Busses No. 2 and 3

4.0 PRECAUTIONS

4.1 During this test power will be lost to 480 V Busses No. 1 and 3

4.2 During this test power will be momentarily lost to 480 V Emergency Busses E-1 and E-2.

4.3 The safety injection pumps are lined up to recirculate with their manual discharge valves closed and will not inject water into the RCS during this test. These pumps should not be run on recirculation for more than 15 minutes.

4.4 The auxiliary feedwater pumps are lined up to recirculate with their manual discharge valves closed and will not inject water into the steam generators during this test. These pumps should not be run on recirculation for more than 15 minutes.

4.5 The Residual Heat Removal (RHR) pumps will be lined up to recirculate the RCS through 750 and 751 and the normal RHR flow path during this test.

4.6 Do not prelube the diesel generators and then not start them.

4.7 Ensure that refueling operations are not in progress.

4.8 Instrument air will be lost to containment during the Safety Injection portion of this test.

4.9 Do not exceed 3750 gpm flow rate with one RHR pump running and 7500 gpm flow rate with 2 RHR pumps.

4.10 Halt any steam generator tests or operations requiring work in or around the channel head.

4.11 The station batteries should be capable of accepting emergency loads.

4.12 Both diesel field flashing batteries charged and operable.

5.0 INSTRUCTIONS

NOTE: The following Steps 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7 and 5.8 are to be performed after all other requirements for this test are met and just prior to the initiation of the start of the test.

5.1 To simulate an undervoltage on E1 such that breaker 52/29B will close, Jumper Points 11 and 12 on Terminal Block 5L in safeguards rack 51, and Points 3 and 12 on Aux. Panel JA.

5.2 Open 841 A & B Boron Injection Tank to Boric Acid Tanks _____

5.3 If the turbine is on the turning gear, start the emergency D.C. lube oil pump. _____

5.4 If the seal oil system is in operation, start the D.C. air side seal oil backup pump and leave the A.C. air side seal oil pump running. _____

5.5 Stop the RHR pump (s) _____

5.6 Close 744A RHR to cold legs. Closed_____

Close 744B RHR to cold legs. Closed_____

5.7 Prelube both 2A and 2B diesels for 1 minute 2A _____

2B _____

5.8 Verify one component cooling water pump on the vital bus (B or C) operating _____

5.9 Announce over the plant P.A. System:

"A 5-second count down follows for loss of power and safety injection"

(Twice) 5

4

3

2

1

Zero

5.0 INSTRUCTIONS (CONT'D)

5.10 Perform the following steps simutaneously to initiate a safety injection signal together with a loss of power.

5.10.1 At 4 KV Bux No. 2

Open breaker 52/13 4KV Bus No. 2 supply to station service transformer 2A _____

5.10.2 At 4 KV Bux No. 3

Open breaker 52/15 4 KV Bux No.3 supply to station service transformer 2C _____

5.10.3 Depress either safety injection push button to initiate a safety injection signal. _____

5.10.4 Note this time as time 0. (Start the stop watch)

Mark the 20 point event recorder at time "0". _____

5.11 Load shedding.

5.11.1 Verify that the following breakers trip open

52/1B 480V Bus No. 1 and E1 feeder breaker _____

52/2B 480V Bus No. 1 feeder breaker _____

52/18B E1 main breaker _____

52/29B E1 - E2 tie breaker _____

52/16B 480V Bus No. 3 and E2 feeder breaker _____

52/15B 480V Bus No. 3 main breaker _____

52/28B E2 main breaker _____

Note exceptions _____ _____

_____ _____

5.11.2 Verify load shedding of all breakers on E1 except for MCC-5.

Note exceptions _____ _____

_____ _____

5.0 INSTRUCTIONS (Continued)

5.11.3 Verify load shedding of all breakers on E-2 except for MCC-6.

Note exceptions _____ _____

_____ _____

5.12 Restoration of Power to Vital Busses by the Emergency Diesels

5.12.1 Verify that emergency diesels start. 2A ____

2B ____

5.12.2 Verify that emergency diesel breakers close.

2A diesel 52/17B Closed____

2B Diesel 52/27B Closed____

5.12.3 Verify that E1 - E2 tie breaker closes.

52/29B Closed____

Note: 52/29B should close because an undervoltage condition on Bus E1 is simulated along with SI signal.

5.13 Verify that the following pumps and fans start.

Note: The time indicates time after 52/17B and 52/27B closed. This PT does not include timing the start of each pump.

SI Pump A	5 sec.	____
SI Pump C	5 sec.	____
SI Pump B	10 sec.	____
RHR Pump A	15 sec.	____
RHR Pump B	15 sec.	____
SW Pump A	20 sec.	____
SW Booster Pump A	20 sec.	____
SW Pump C	20 sec.	____
SW Booster Pump B	20 sec.	____
SW Pump B	25 sec.	____

5.0 INSTRUCTIONS (Continued)

SW Pump D	25 sec.	_____
HVH-1	30 sec.	_____
HVH-3	30 sec.	_____
HVH-2	35 sec.	_____
HVH-4	35 sec.	_____
AFW Pump A	40 sec.	_____
AFW Pump B	40 sec.	_____

5.14 When the above motors have been verified started from the RTGB stop the stopwatch and record the duration of the sequence. _____sec.

5.14.1 At RTGB Record:

Emergency Bus E1 Volts_____

Amps _____

Emergency Bus E2 Volts_____

Amps_____

5.14.2 At 2A emergency diesel generator panel Load_____KW

5.14.3 At 2B emergency diesel generator panel Load_____KW

Note: Since the SI Pumps, Aux. FW Pumps are on recirc. loads on the Generator may be below design.

5.15 Check to see that one or more component cooling pumps are operating. If no pump is running, start either B or C CCW pump. _____

5.16 Verify that the safety injection status panel is solid pink. (RHR 758 will not be pink, do not note below.) _____

Note exceptions _____

5.0 INSTRUCTIONS (Continued)

5.17 Verify that Phase "A" isolation status panel is solid pink. _____

Note exceptions. _____

5.18 Two minutes after the initiation of SI, reset:

Safety injection _____

Phase A isolation _____

Containment Ventilation Isolation _____

Feedwater Isolation _____

5.18.1 Restart Instrument Air Compressors and Station Battery Chargers as required. _____

5.19 Shutdown the following equipment as desired. _____

Safety injection pumps _____

Auxiliary Feedwater pumps _____

Residual heat removal pumps _____

HVH 1, 2, 3, 4 _____

Service water pumps _____

Service water booster pumps _____

Emergency DC lube oil pump if running _____

Air side seal oil back up pump if running _____

5.20 Return valve that operated automatically to their normal cold (refueling) shutdown conditions in accordance with OP-42, 38, and 14. _____

5.21 Turn off the 20 point event recorder and mark the time on the chart. _____

5.22 Rack out the SI pumps' breakers and open their manual discharge valves. _____

5.23 Return valve line ups to normal as required by plant conditions in accordance with OP-42, 38, and 14. _____

5.24 With "B" Safety Injection pump stopped, remove jumpers from Points 11 and 12 of 5L in Rack 51 and Points 3 and 12 on Aux. Panel JA. Open breaker 29B and close breaker 22B to

5.0 INSTRUCTIONS (Continued)

to complete the normal tie-bus line up. _____

5.25 Restore power to 480V Bus No. 1

4.1 5.25.1 Close 52/~~14~~ 13 4KV Bus No. 2 supply to station service transformer 2A. _____

5.25.2 Close 52/1B 480V Bus No. 1 and E1 feeder breaker. _____

5.25.3 Close breaker 52/2B 480V Bus No. 1 feeder breaker. _____

Note: Power is now restored to 480V Bus No. 1 from 4KV Bus No. 2 but is still separated from E1 which is being supplied from 2A diesel.

5.25.4 Synchronize Emergency Bus E-1 with system at 2A diesel panel and close Breaker 52/18B, E1 main breaker. _____

5.25.5 Separate 2A diesel generator from the system by reducing load to "0" and opening diesel generator breaker 52/17B 52/17B Open_____

5.25.6 Restore all normal loads to 480V Bus 1 and emergency Bus E1. _____

5.26 Restore power to 480V Bus No. 3

5.26.1 Close breaker 52/15 4KV Bus No. 3 supply to station service transformer 2C. _____

5.26.2 Close breaker 52/16B 480V Bus No. 3 and E2 feeder breaker. _____

5.26.3 Close breaker 52/15B 480V Bus No. 3 feeder breaker. _____

Note: Power is now restored to 480V Bus No. 3 from 4KV Bus No. 3 but is still separated from E-2 which is being supplied from 2B diesel.

5.26.4 Synchronize Emergency Bus E-2 with system at 2B diesel panel and close breaker 52/28B, E-2 main breaker. _____

5.0 INSTRUCTIONS (Continued)

5.26.5 Separate 2B diesel generator from the system by reducing load to "0" and open diesel generator breaker 52/27B. _____

5.27 Restore all normal loads to 480V Bus 3 and Emergency Bus E-2. _____

5.28 Diesel protective bypasses shall be demonstrated to be operable by simulating a trip signal to each of the trip devices that is bypassed and observing that diesel does not trip. Test the trips for each diesel as follows:

5.28.1 Ensure 2A and 2B diesels trip defeat switches are in the trips defeat position. 2A _____ 2B _____

5.28.2 Low Lube Oil Pressure Trip

Isolate the lube oil pressure switch and gauge at the 8 valve manifold. Bleed down low lube oil pressure switch until red "low lube oil pressure trip" light illuminates. The diesel should not trip. _____ _____

5.28.3 Place low lube oil pressure switch back in service. _____ _____

5.28.4 Low Coolant Pressure Trip

Isolate the low coolant pressure switch at the 8 valve manifold. Bleed down the "low coolant pressure" switch until the red "low coolant pressure trip" light illuminates. The diesel should not trip. _____ _____

5.28.5 Place "Low Coolant Pressure" switch back in service. _____ _____

5.0 INSTRUCTIONS (Continued)

		2A	2B
5.28.6	High Coolant Temp. Trip Have I and C adjust temperature switch CTHS until red "High Coolant Temp Trip" light illuminates. The diesel should not trip.	_____	_____
5.28.7	Return temperature switch CTHS to normal.	_____	_____
5.28.8	High Crankcase Pressure Trip Have I and C jumper pressure switch CP and check that the "High Crankcase Pressure Trip" light illuminates. The diesel should not trip.	_____	_____
5.28.9	Return pressure switch CP to normal.	_____	_____
5.28.10	Starting Failure Trip of Fuel Racks Have I and C operate relay TD-2, assure red "Starting Failure Trip" light illuminates. The diesel should not trip.	_____	_____
5.28.11	Return relay TD-2 to normal.	_____	_____

42

6.0 ACCEPTANCE CRITERIA:

This Periodic Test is acceptable if the requirements of Technical Specifications 3.7.1.d and 4.6.1.2 are met.

APPLICABLE STEPS:

5.11, 5.12, 5.13 Diesel generators 2A and 2B must start automatically. All breakers listed in Step 5.11 must load shed, and all equipment listed in Step 5.13 must operate. The diesels must assume required load within 50 seconds after initial starting signal.

5.28 Diesels shall not trip when initiating trip signals in Step 5.28.

The reviewing authority may accept this test when the specific acceptance criteria is not met if known plant conditions have caused an expected variation in operation, provided no violation to Technical Specifications or the FSAR occurs.

Date Completed: _____

Performed By:

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

Reviewed by:

_____ Shift Foreman _____ Date

_____ Test Coordinator _____ Date

Recommend Approval _____ _____ Date
Engineering Supervisor

Approved By _____ _____ Date
Plant Manager

H. B. ROBINSON STEAM ELECTRIC PLANT

UNIT NO. 2

PERIODIC TEST CPL-PT-23.3

SEPTEMBER 30, 1976

DIESEL GENERATORS EMERGENCY FIELD FLASHING

AND

MANUAL CLOSURE OF GENERATORS MAIN BREAKERS

REFUELING INTERVAL

REVISION 3

TEST PROCEDURE APPROVAL

RECOMMENDED APPROVAL: K. E. Brownlee — Engineering Supervisor — 10-19-76 — Date

APPROVED: [signature] — Plant Manager — 10/20/76 — Date

H. B. ROBINSON STEAM ELECTRIC PLANT

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SEPTEMBER 30, 1976

REVISION 3

DIESEL GENERATORS EMERGENCY FIELD FLASHING AND MANUAL CLOSURE OF GENERATORS MAIN BREAKERS

REFUELING INTERVAL

1.0 PURPOSE

1.1 The intent of this Periodic Test is to verify both emergency busses can be energized to provide vital safeguard equipment in the event of total or partial loss of DC Power.

2.0 INITIAL CONDITIONS

2.1 Plant is at cold shutdown. _____

2.2 Diesel generators in standby condition. _____

2.3 Diesels have been shutdown for 24 hours. _____

NOTE: 24 hours ensures minimum effect of Residual Magnetism on Field Flashing.

3.0 PRECAUTIONS

3.1 This test is to be performed in a manner so that emergency operation features of the system will not be decreased in the event of an accident during the test.

3.2 Personnel involved in the P.T. should thoroughly familiarize themselves with evolutions to be performed.

3.3 Notify shift foreman prior to performing this test.

4.0 INSTRUCTIONS

4.1 Diesel Generator 2A and Bus E-1

4.1.1 Announce the following over the Plant P.A. System: "Attention all personnel in Containment, disregard the Hi-Flux at Shutdown Alarm until further notice".

4.1.2 Transfer all loads from 480V Bus E-1 to 480V Bus E-2 except MCC-5. _____

4.1.3 Swap Instrument Bus No. 1 supply from MCC-5 to MCC-8.

4.1.4 Transfer MCC-5 power supply from Bus E-1 to 480V Bus No. 3 as per OP-3, Plant Electrical Distribution, Section F. _____

4.1.5 Open E-1/E-2 Tie Breaker 52/22B and pull breaker control fuses. _____

4.1.6 Pull fuses on 2A Emergency Generator Main Breaker 52/17B and all equipment breakers that close when voltage is lost and restored. _____

NOTE: Breakers that close on loss of voltage are identified with a red DANGER plate.

4.1.7 Open 2A Emergency Generator Exciter D-C supply breaker on 125 VDC Panel A Circuit 8. _____

4.1.8 Open E-1 Main Breaker 52/18B. _____

NOTE: Emergency Diesel will start at this time.

4.1.9 Open E-1 Bus D-C Supply Breaker at 125VDC Panel A Circuit 1. _____

4.1.10 Replace fuses in 2A Emergency Generator Main Breaker 52/17B. _____

4.1.11 In Diesel Generator 2A Control Panel, position the Field Flashing Switch to the Emergency Position. _____

4.0 INSTRUCTIONS (Continued)

4.1.12 Establish operating voltage and frequency on Emergency Generator 2A. _____

4.1.13 Manually close 2A Emergency Generator Breaker 52/17B by placing lever in manual closure device on breaker and pushing downward. _____

4.1.14 NOTE: Bus E-1 will be energized at this time. _____

4.1.15 Close E-1 D-C Supply Breaker, Circuit 1 on 125VDC Panel A _____

4.1.16 Synchronize 2A Emergency Generator with 480V system and close E-1 Main Breaker 52/18B. _____

4.1.17 Reduce load on 2A Emergency Generator, open Generator Main Breaker and retire diesel. _____

4.1.19 Close 2A Emergency Generator Exciter D-C Supply Breaker Circuit 8 on 125 VDC Panel A. _____

4.1.20 Place 2A Diesel Generator Field Flashing Switch in the normal position. _____

4.1.21 Return equipment to normal that starts on loss of voltage by holding the Start Switch on the RTGB in the OFF position and replacing fuses. _____

NOTE: This completes the first portion of the test.

4.2 Diesel Generator 2B and Bus E-2.

4.2.1 Transfer all loads from 480V Bus E-2 to Bus E-1 except MCC-6. _____

4.2.2 Transfer all loads from MCC-6 and MCC-9 that can be transferred to MCC-5 and MCC-10. _____

4.2.3 Swap Instrument Bus No. 4 from MCC-6 to MCC-8. _____

4.0 INSTRUCTIONS (Continued)

4.2.4 Pull fuses on 2B Emergency Generator Main Breaker 52/27B and all equipment breakers that close when voltage has been lost and restored. _____

NOTE: Breakers that close on loss of voltage are identified with a red DANGER plate.

4.2.5 Open 2B Emergency Generator Exciter D-C Supply Breaker on 125 VDC Panel B Circuit 8. _____

4.2.6 Announce on P.A. System, "Attention all personnel, some plant lighting will be lost momentarily". _____

4.2.7 Open Bus E-2 Main Breaker 52/28B. _____

NOTE: 2B Emergency Diesel will start at this time, and power will be lost to MCC-6 and MCC-9.

4.2.8 Open Bus E-2 125VDC Supply Breaker on 125VDC Panel B Circuit 1. _____

4.2.9 Replace fuses in 2B Emergency Generator Main Breaker 52/27B. _____

4.2.10 In Diesel Generator 2B Control Panel, position the Field Flashing Switch to the Emergency position. _____

4.2.11 Establish operating voltage and frequency on 2B Emergency Generator. _____

4.2.12 Manually close 2B Emergency Generator Breaker by placing lever in manual closure device on breaker and pushing downward. _____

NOTE: Bus E-2, MCC-6, and MCC-9 will be energized at this time. Be sure "B" Battery Charger has energized.

4.2.13 Close Bus E-1 D-C Supply Breaker Circuit 1 on 125 VDC Panel B. _____

6.0 ACCEPTANCE CRITERIA:

Steps 4.1.12 and 4.2.11 - Voltage buildup on diesel generator verifies emergency field flashing proper operation. Voltage buildup to approximately 480 volts.

Steps 4.1.15 and 4.2.12 - Manually closing E-1 and E-2 Main Breakers verifies the Emergency Busses can be energized when D-C power is not available.

The revieving authority may accept this test when the specific acceptance criteria is not met if known plant conditions have caused an expected variation in operation, provided no violation to Technical Specifications or the FSAR occurs.

Date Completed: _____

Performed By:

_____ _____

_____ _____

_____ _____

Reviewed By Shift Foreman:

_____ Date: _____

Reviewed by Test Coordinator:

_____ Date: _____

Recommend Approval: _____ Date: _____
Engineering Supervisor

Approved By: _____ Date: _____
Plant Manager