PRINTE RIDS 1818 REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS) DISTRIBUTION FOR INCOMING MATERIAL 50-331

REC: CASE E G	ORG: LIU L	DOCDATE: 01/20/78
NRC	IA ELEC LIGHT & PWR	DATE RCVD: 01/24/78
DOCTYPE: LETTER	NOTARIZED: NO	COPIES RECEIVED

DOCTYPE: LETTER NOTARIZED: NO COF SUBJECT: LTF COMPLETED DIESEL QUESTIONAIRE REQUESTED BY THE NRC LTR OF 12/15/77.

PLANT NAME: DUANE ARNOLD

REVIEWER INITIAL: XBT DISTRIBUTOR INITIAL:

LTR 1

ENCL 1

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

FOR ACTION:

BRANCH CHIEF LEAR**W/7 ENCL

INTERNAL:

REG_EILE**W/ENCL I&E**W/ENCL HANAUER**W/ENCL EISENHUT**W/ENCL BAER**W/ENCL GRIMES**W/ENCL J. MCGOUGH**W/ENCL NRC PDR**W/ENCL OELD**W/ENCL CHECK**W/ENCL SHAO**W/ENCL BUTLER**W/ENCL J. COLLINS**W/ENCL

F. CLEMENSON**W/ENCL

EXTERNAL:

LPDR'S CEDAR RAPIDS, IA**W/ENCL TIC**W/ENCL NSIC**W/ENCL ACRS CAT B**W/16 ENCL

DISTRIBUTION: LTR 40 ENCL 40 SIZE: 1P+70P CONTROL NBR:

780260092

THE END



IOWA ELECTRIC LIGHT AND POWER COMPANY

General Office Cedar Rapids, Iowa

LEE LIU VICE PRESIDENT - ENGINEERING

3 1

January 20, 1978 IE-78-112



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

Dear Mr. Case:

Enclosed herewith is the completed diesel questionnaire requested by the NRC letter of December 15, 1977.

Very truly yours,

Lee Liu Vice President, Engineering

LL/KAM/gan

Attachment

- cc: K. Meyer w/a
 - D. Arnold w/o
 - R. Lowenstein w/a R. Clark (NRC) w/a L. Root w/a
 - File: A-107

A014/5

RECEIVED DOCUMENT CONTROL DESK

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-1978 JAN 24 PM 2 14

U.S. NRC DISTRIBUTION SERVICES BRANCH

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Questionnaire

for

NUCLEAR REGULATORY COMMISSION RELIABILITY STUDY

of

Standby Diesel Generator Units

Date Questio	nnaire Completed:	January, 19	978	······································
Plant Name:	Duane Arnold Ener	gy Center	Unit No.]
Diesel Manuf	acturer: Fairbanks	Morse (Colt	Ind) Model:	<u>3800TD8-1/</u> 8
Number of Un	its:2	·		
Size Kw/Unit	: 3250	Rated	Speed: <u>900</u>	RPM
Averade Oper	ating Hours Per Un	it to Date.	155 65	bours

DIESEL GENERATOR STATUS

A. Engine:

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

- a. Defective parts <u>1</u>
- b. Installation errors: 1
- c. Failure of system to respond properly in function or sequence: \cap
- d. Faulty adjustment:
- 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.	Model No.
	Electric cranking motor	Mfr.	Model No.

2. If air cranking, then:

Give size of starting air tank: Length <u>103</u>" Diameter <u>30</u>"

Normal standby air tank pressure ______240 ____ psi.

Is pressure reducer used? Yes No XX Reducer pipe size? ______ inches.

Starting air control admission valve pipe size in air piping system, <u>2.0</u> inches.

Minimum air tank pressure for engine cranking 150 ____ psi.

Number of five-second cranking periods between above pressures with no tank recharging <u>5 tank</u>.

Number of air tanks per engine 3

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

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

Does starting air tank have water condensate drain? Yes X No ____

Does starting air pipe have water condensate trap and drain near engine? Yes ____ No \underline{XX}

Is starting air piping horizontal? Yes ____ No <u>XX</u>at the engine Does it slant toward drain? Yes ____ No ____ not applicable If water condensate drains are provided, then is draining:

a. Automatic through float valve? Yes No \underline{xx} b. Manual by hand valve? Yes \underline{x} No from air tank c. If manual, then is draining water condensate done:

-2-

daily? x ____ once each shift
weekly? _____
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? between air tank and starting valve

How is it cleaned?replaceable elementHow often and when?yearly during maintenance inspectionGive pipe size of filter:2inches.

How is it known whether filter is plugged or has high pressure drop? reduction in air flow to engine or visual inspection

of element

Is starting air pipe to engine positioned:

a. Below floor?

b. On the floor? $_{XXXX}$

c. Overhead?

What is air pressure drop from air tank to engine during cranking _____ psi Data not available

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

a. Nearest engine $\frac{40}{55}$ feet b. Furthest engine $\frac{55}{55}$ feet Diameter of starting air pipe from:

a. Air tank to starting value 2.0 inches

b. At air starting valve 1.5 inches

c. At engine 1.5 inches

What is the primary source of power for the starting air system? <u>Primary Source: AC Motor driven compressor</u> Secondary Source: Diesel engine driven compressor Is there a duplicate and redundant motor and air compressor set? Yes XX_No____

What is the time required to recharge one air tank? 10-15 minutes

Does starting air supply system have independent secondary power supply for compressor? Yes $\chi\chi$ No ____

If yes, then by:

a. Gasoline engine?

b. Motor driven?

c. Other? (Specify) Diesel Driven

3. If electric (Battery powered) cranking, then: NOT APPLICABLE

a. Battery charging: Continuous trickle charger _____ Intermittent charging _____

If so, how is charging requirement determined?

Time cycle _____ Test _____ Other _____

b. Battery used: Common Plant _____ Individual Unit _____ Other _____

Starting cable size ____; Length: Battery to engine (longest) _____

-4-

- C. Fuel Oil System: Bulk Tank to Day Tank
 - Does the bulk tank to day tank fuel supply system (viz: pump, motor, etc.) have redundant independent power supplies? Yes XX No

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

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

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

- a. Bulk tank? Yes ____ No XX __ Water removal is provided however
- b. Day tank? Yes XX No ____ not from bottom of bulk tank
- 3. Is the regular functional fuel oil outlet slightly above (two to three inches) the bottom of the:

a. Bulk tank? Yes XX No _____ Pump suction approximately 8" from bottom
 b. Day or integral tank? Yes XX No _____

4. Is bottom of day tank and/or integral tank above all parts and piping of the engine fuel injection systems? Yes _____ No \underline{XX}

If yes,

Give approximate amount inches _____ feet

5. Does the engine fuel system have a fuel bleed return line to the fuel day tank and/or integral tank? Yes XX 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?

b. Hot? ____(above 130°F) Data not available

-5-

 -6- What is fuel oil return line size (nominal)? a. Pipe size <u>.75</u> inches b. Tubing size <u></u>			
<pre>What is fuel oil return line size (nominal)? a. Pipe size <u>.75</u> inches b. Tubing size <u></u></pre>			-6-
 a. Pipe size <u>.75</u> inches b. Tubing size <u>inches no tubing used</u> 6. Do engine fuel oil filters have air bleed or vent valves readily accessible? Yes XXNo 7. How is fuel transferred from day tank to engine fuel system? a. By gravity b. Engine driven pump <u>XX</u> c. Electric motor driven pump 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 <u>XX</u>			What is fuel oil return line size (nominal)?
 6. Do engine fuel oil filters have air bleed or vent valves readily accessible? Yes XX_No 7. How is fuel transferred from day tank to engine fuel system? a. By gravity			 a. Pipe size <u>.75</u> inches b. Tubing size inches no tubing used
 7. How is fuel transferred from day tank to engine fuel system? a. By gravity b. Engine driven pump XX c. Electric motor driven pump 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 XX NO		6.	Do engine fuel oil filters have air bleed or vent valves readily accessible? Yes XXNo
 a. By gravity		7.	How is fuel transferred from day tank to engine fuel system?
<pre>If yes, is the manual pump in immediate operating condition? Yes XX_NO</pre>			 a. By gravity b. Engine driven pump XX c. Electric motor driven pump 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 XX No
 8. Type of fuel (e.g., #1, #2, #3, JP-4, etc.) <u>#1</u> 9. Approximate bulk tank capacity, <u>40,000</u> gallons. 10. Typical frequency of refilling (weekly, monthly, etc.) <u>2 month</u> 11. Typical refill (gallons), <u>4000</u> D. <u>Lube Oil System</u> 1. Lube oil a. Type <u>Amoco Alkalube #1540</u> b. Viscosity <u>SAE 40</u> c. Specification number <u>API Service CD</u> d. Oil change determined by: Time interval: Yes <u>No</u> <u>Monthly, yearly</u> By oil analysis: Yes <u>XX</u> No <u>Analysis every 4 months</u> 		If y Yes∙	ves, is the manual pump in immediate operating condition?
9. Approximate bulk tank capacity, <u>40,000</u> gallons. 10. Typical frequency of refilling (weekly, monthly, etc.) <u>2 month</u> 11. Typical refill (gallons), <u>4000</u> D. <u>Lube Oil System</u> 1. Lube oil a. Type <u>Amoco Alkalube #1540</u> b. Viscosīty <u>SAE 40</u> c. Specification number <u>API Service CD</u> d. Oil change determined by: Time interval: Yes <u>No</u> <u>Give interval</u> <u>Yes XX</u> No <u>Analysis every 4 months</u>	8	8.	Type of fuel (e.g., #1, #2, #3, JP-4, etc.) <u>#1</u> .
<pre>10. Typical frequency of refilling (weekly, monthly, etc.) 2 month 11. Typical refill (gallons), 4000 D. Lube Oil System 1. Lube Oil a. Type Amoco Alkalube #1540 b. Viscosity SAE 40 c. Specification number API Service CD d. Oil change determined by: Time interval: Yes No Give interval monthly, yearly By Oil analysis: Yes XX No</pre>	9	9.	Approximate bulk tank capacity, <u>40,000</u> gallons.
<pre>11. Typical refill (gallons), 4000 D. Lube Oil System 1. Lube oil a. Type Amoco Alkalube #1540 b. Viscosity SAE 40 c. Specification number API Service CD d. Oil change determined by: Time interval: Yes No Give interval monthly, yearly By oil analysis: Yes XX No Analysis every 4 months</pre>		10.	Typical frequency of refilling (weekly, monthly, etc.) $\frac{2 \text{ month}}{2}$
D. Lube Oil System Lube Oil Type Amoco Alkalube #1540 Viscosity SAE 40 Specification number API Service CD Oil change determined by: Time interval: Yes No Give interval monthly, yearly By oil analysis: Yes XX No Analysis every 4 months 		11.	Typical refill (gallons), 4000
<pre>1. Lube oil a. Type Amoco Alkalube #1540 b. ViscositySAE 40 c. Specification number _API Service CD d. Oil change determined by: Time interval: Yes No Give interval monthly, yearly By oil analysis: Yes XX No Analysis every 4 months</pre>	D. <u>I</u>	Lube	e Oil System
 a. Type <u>Amoco Alkalube #1540</u> b. Viscosity <u>SAE 40</u> c. Specification number <u>API Service CD</u> d. Oil change determined by: Time interval: Yes <u>No</u> Give interval <u>monthly</u>, yearly By oil analysis: Yes <u>XX</u> No <u>Analysis every 4 months</u> 		۱.	Lube oil
Time interval: Yes No Give interval monthly, yearly By oil analysis: Yes <u>XX</u> No Analysis every 4 months			 a. Type <u>Amoco Alkalube #1540</u> b. Viscosity <u>SAE 40</u> c. Specification number <u>API Service CD</u> d. Oil change determined by:
Analysis every 4 months			Time interval: YesNo Give interval monthly, yearly By oil analysis: Yes <u>XX</u> No
			Analysis every 4 months

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			-/-
	2.	Lùbe	e oil filters are:
		a. b. c.	Full flow XXwith internal bypass valves Bypass Combination
	3.	Inte	erval and/or basis for changing filter cartridge:
		a. b. c. d. e. f.	Monthly Yearly By running time hours By oil analysis. Yes No By pressure drop. Yes X No Checked monthly Does provisions exist for changing cartridges during engine operation? Yes No \underline{XX}
	4.	0i1	Pressure Monitoring
		a. b. c.	Normal operating pressure <u>30</u> - Alarm <u>20</u> psi Shutdown <u>18</u> psi
	5.	0 i 1	temperature control:
		a. b.	By standby heater in engine sump <u>130-135</u> °F. Heating means for maintaining standby temperature:
E.	Coc	oling	Direct in oil Oil-to-water heat exchanger Other (Specify) <u>System functions</u> by taking oil from the rear of the engine and circulating it thru the tubes of an electric System - Engine Water heater
	1.	Tem	perature control by:
		a.	By thermostat in water? Yes $\chi\chi$ No
	•		If yes, then:
			Bypass thermostat? Yes $\chi\chi$ No Throttle thermostat? Yes No $\chi\chi$,

-7-

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	-8-
	b. By radiator shutter: Not applicable
	Automatic Manual Other (give type)
2.	Corrosion control (water additive)? Yes <u>XX</u> No
	If yes, give chemical additive or name of compound.
	Nalco 39-1
	Proportion or concentration control:
	a. By additive measurement? Yes <u>X</u> No b. By water coolant analysis? Ye <u>s X</u> No
3.	Engine cooling water cooled by:
	a. Radiator? b. Heat exchanger from sea, river or other water? X c. Other? (give type)
4.	Engine cooling water temperature-monitoring
	a. Standby temperature <u>100-11</u> 0°F b. Normal operating temperature <u>170-185</u> °F c. Alarm temperature <u>195</u> °F d. Shutdown temperature <u>200</u> °F e. Water circulation during standby:
	Thermo-syphon Pump _ <u>XX</u>
5.	Water Pressure Monitoring: Yes <u>XX</u> No
· .	a. Alarm b. Shutdown c. Both_XX

6.	Water temperature Sensor Position:
	 a. In piping from engine XX Between engine and heat exchanger b. In engine piping c. In engine direct
7.	Water surge or supply tank in system. Yes <u>$\chi\chi$</u> No
	If yes, then bottom connected to:
	 a. Water pump suction? Yes XX No b. Top of system? Yes No XX c. Both of above? Yes No XX d. Is bottom of surge tank above top of engine system? Yes XX No e. Does engine have constant air bleed from top of
	<pre>engine water piping to surge or supply tank? Yes XX_No</pre>
Gove	ernor - Speed Control
Manı Elec Hydı Type Auto	ufacturer <u>Woodward</u> ctric (speed sensing) <u>Yes</u> raulic <u>Yes</u> e or code (such as EGB-35, LSG-10, etc.) <u>EG-B10</u> omatic load sharing? Yes <u>No X</u>
1.	Is compensation or stability control and/or speed of response manually adjustable? Yes No $\chi\chi$
	If yes, adjusted by:
	 a. Eye and ear? b. Test and specification? c. Other? (Specify)
2.	Engine - generator normal shutdown or stopping means and method.

F.

-9-

Is the engine stopped:

a. Manually? Yes ^{XX} No

If yes, then:

Directly at engine? Yes ^{XX} No Through local control panel? Yes No XX

- b. Automatically through the controls in the control room? Yes XX No ____
- c. By setting governor to "fuel-off" position? Yes ____ No XX___
- d. By over-ride of governor settings and control position directly to fuel injection pumps? Yes <u>XX</u> No _____

e. Other means. Describe briefly.

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

- a. Full fuel or maximum fuel position?
- b. Full off or no fuel position? XX
- c. Intermediate?
- d. Random?

(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, seconds.

Data not available

G.	Gov	ernor - Overspeed (shutdown)		
	1. Speed sensing?			
		 a. Electrical b. Flyball c. Other (Specify) Centrifugal force on a weight opposed by 		
	a spring 2. Fuel shutoff force generated by:			
		a. Spring? <u>XX</u> b. Air? c. Hydraulic? d. Electrical? e. Other? (Specify)		
	3.	Overspeed sensing setting? (in terms of full speed)		
		a. 115% b. 110% <u>xx</u> c. Other (Specify)		
	4.	Is overspeed tripping set point tested periodically? Yes No \underline{XX}		
		If yes, then how often? (yearly, monthly, etc.)		
Η.	1.	Generator Mfr. <u>Fairbanks Morse Model No. TGZJ</u> Single bearing or two bearings? <u>single bearing</u> (spherical roller Does generator have damper windings? Yes <u>XX</u> No <u>oil</u>		
	2.	Does generator have any obvious fault or difficulty? Yes No _XX		
		Is problem repetitive? Yes No		
		If yes, then describe briefly.		

-11-

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۱.	Exciter Manufacturer: Basler Elect. Co.Model
•	Type: Rotating Static _X
	If rotating drive? Direct Belt or Chain DC with field control Brushless with rectifier
2.	Voltage Regulator: Manufacturer <u>Basler Elect. C</u> oModel <u>SBHV</u>
	Type: Mechanical StaticXX
3.	Are paralleled units of automatic load sharing control Not applicable of fully automatic type? Yes No operated in parallel
	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
4.	of the generators? Yes <u>No</u> Have engine governor and voltage regulator/exciter adjustments been made on the site or under any con- ditions since any of the units have been placed in service? Yes <u>No XX</u>
4.	of the generators? Yes No
4.	of the generators? Yes <u>No</u> Have engine governor and voltage regulator/exciter adjustments been made on the site or under any con- ditions since any of the units have been placed in service? Yes <u>No XX</u> If yes, by means of what tests and what standards? Give name or very brief description. If any difficulties have occurred, give approximate number of problems.

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- Paralleling: Engine-Generator Units Not applicable. Diesels will Do all units consistently have the proper voltage output? 1. Yes No ____ Do all units automatically share both the "real" or 2. in-phase load and also the reactive load reasonably well? Yes No At the same Kw load, are both the field and the armature 3. line currents of the several units consistently close to the same value? Yes ____ No ____ If no, approximate percent difference. 4. Synchronizing In automatic synchronizing do circuit breakers close a. immediately after reaching full synchronous speed? Yes No b. If "no" above then, does speed of some units drift slowly while failing to synchronize and close circuit breakers? How many seconds? Occasionally Always _____
- Switch Gear and Electrical Con (other than exciter/ κ. voltage regulator)
 - If any difficulties have occurred, then give approximate 1. number of problems.
 - Components 1 a.
 - Wiring ь.

Never

J.

- Other (damage in service or dropping of miscellaneous c. hardware into switchboard, etc.) 0
- Design concept faults. That is, does the switch d. gear and its controls perform the proper functions and in proper sequence and timing.

	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. 125 V DC (2) Control Power 12 V DC Starts diesel driven air compressor
			On starting air system (back-up)
		с .	Does each system identified above adequately fulfill the service requirements for which it is intended? Yes <u>XX</u> No
			If no, briefly describe.
		d.	Is there a DG battery maintenance program? Yes XX No
L.	<u>Saf</u>	ety	Shut downs
	Giv ope	e sa rati	fety shut down settings compared to equilibrium ng conditions.
	1.	Eng	ine and generator speed. Give rpm or hertz:
		a. b.	Synchronous and usual <u>900</u> rpm or <u>60</u> Hz Overspeed shutdown setting <u>990-1010</u> rpm or <u>Hz</u>
	2.	Eng	ine cooling water (see E.4)
		a. b. c.	Equilibrium <u>185</u> °F Alarm <u>195</u> °F Shut down <u>200</u> °F
	3.	Lub	e oil pressure (see D.4)
		a. b. c.	Equilibrium <u>30-35</u> psi Alarm <u>20</u> psi Shut down <u>18</u> psi

- 4. Lube oil temperature 195
 - a. Equilibrium 215 °F
 - <u>230</u> °F High 105⁰ Low ______°F Not used b. Alarm
 - Shutdown с.
- 5. Indicate all other protective interlocks (give name and;)
 - a. Usual or proper condition <u>Crankcase Vacuum</u>
 - <u>.5 2.0" H_oO : Cooling Water Pressure > 18 psi</u>
 - b. Shutdown condition Crankcase vacuum <.5" H₂0' Cooling Water Pressure 12 psi
- 6. a. What source of power is provided to operate alarms and shutdown controls? (See G.2) 125 VDC from batteries
 - Do the generator units automatically shutdown in ь. case of the electrical power loss to its control system? Yes No X
- Emergency or Alert Conditions Μ.
 - Are all safety shutdown and safety interlocks bypassed 1. during emergency conditions? Yes ____ No XX___
 - 2. If "no" above, then which are not bypassed. Name items.

Mechanical Overspeed Trip

3. For each interlock not bypassed is coincident logic used? Yes <u>No XX</u>

If yes, is it testable? Yes No

- N. Maintenance
 - Does plant have regularly scheduled maintenance pro-1. cedures? Yes

If so, return copy of these procedures with questionnaire.

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

- a. Is remedial action taken immediately or at earliest practical opportunity? Yes XX No
- b. Is remedial action taken only at periodic prescheduled or programmed times and conditions? Yes <u>No XX</u>
- c. For best performance record which of above appears better:

- d. Must permission for minor maintenace be obtained from some higher out-of-plant authority? Yes _____ No <u>XX</u>___
- e. Is maintenance referred to above allowed and encouraged? Yes <u>X</u> 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 χ No
- h. Are efforts to remedy marginal or questionable conditions as mentioned above encouraged by plant management?

Yes XX 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 XX No _____

0. Starting Conditions

- 1. Give starting or necessary cranking time as experienced.
 - a. Starting time per specification ≤ 10 seconds
 - b. Usual starting time 7-8 seconds
 - c. Maximum starting time observed <u>9.9</u> seconds

- 2. Give usual time intervals as follows:

 - b. Time from start-to-crank to approximate full firing Data not available of all cylinders. ______ seconds
- 3. Give maximum speed surge when starting; use both tachometer and frequency meter if possible.
 - a. Usual conditions _____ rpm
 b. Maximum observed _____ rpm
 Hz
- 4. During a surveillance test, give time from start-to-crank to when steady synchronous speed is attained and maintained.
 - a. Usual <u>7-8</u> seconds
 - b. Maximum 9.9 seconds
 - c. As specified ≤ 10 seconds.
- 5. Give briefly the most troublesome problems in starting.
 - a. Most troublesome _ We have experienced no starting problems
 - b. Next to most troublesome
- 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
 - b. Outdoors XX

			-18-
		2.	Give type and make of air cleaners or air filters:
			a. Oil bath Make b. Oil wetted screen Make
			c. Paper X Make Farr Dynacell DH-68 d. Other Make
			e. Precleaner: Yes No <u>XX</u>
		3.	Excessive air flow restriction and servicing need determined by?
			a. Instrument such as:
			manometer
			b. Personal judgement by appearance, etc.
			<pre>c. By smoking exhaust</pre>
`			e. Other (Specify)
		4.	Are climatic extremes normally experienced such as:
		•	a. Air heavily loaded with water mist, high humidity
			b. Blowing sand and dust? Yes X No
			d. Other-Name Thunderstorms
		5.	Are climatic extremes potentially possible such as:
			a. Air heavily loaded with water mist, high humidity
			b. Blowing sand and dust? Yes X No
			<pre>c. Blowing snow (blizzards)? Yes X No d. Other-Name Thunderstorms</pre>
	0.	Tem	perature Conditions
		1	Ambient outside hottest 100 °F.
		••	Ambient outside coldest
		۷.	
		3.	Engine-generator room hottest <u>140</u> F.
		4.	Engine-generator room coldest <u>68</u> °F.
		5.	Inside switch gear hottest <u>104</u> °F design maximum
	•	6.	Inside voltage regulator or ambient near voltage regulator hottest <u>104°</u> F design maximum
	•	7.	Ambient at exciter hottest <u>104⁰ F</u> design maximum

<u>,</u>

Minimum education required (check)

		Existing	Suggested
a.	High School Trade School	XX	
c.	Technical School	· · · · · · · · · · · · · · · · · · ·	
d.	No minimum		•

Minimum Years of operating experience (diesel electric generator)

		Existing	Suggested
a. b. c. d.	0-3 3-6 6-10 10-15		
0pe	erator training		
	•	Existing	Suggested
a. b. c. d.	Military Industrial On-the-job Combination of a, b, and c (indicate which)	a,b,c	
Lic	ensing required		
		Existing	Suggested
a. b.	State Federal	· · · · · · · · · · · · · · · · · · ·	

- c. Utility or self
- d. None

3.

4.

X for operation of diesels

-19-

S. Are any <u>foreign</u> gases such as propane, freon, halon, carbon dioxide, etc. stored in the: Diesel Engine room? Yes _____ No __XX__ or adjacent buildings? Yes ____ XX_ No ____

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

Gases	CO ₂ -C a rdox	Volume (ft)	10 tons-liquid

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

If yes, then how many failures to bypass have occured? None

U. Does the control system automatically override the test mode under emergency conditions? Yes <u>XX</u> No _____

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

If yes, then which part or subsystem? Journal Bearings

How many failures? 2

Give nature of failure. Possible oil problems causing

bearing failure

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

Give brief reasons for the answer. Colt Industries currently participates in our annual maintenance inspection. We feel that this contributes to the reliability of the diesels.

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

Preoperational test Date August, 1973

: Engine	: Surv.	Testing &	: Emergency	: Total :
:Serial No.	: Mainte	nance Hrs.	: and Other	: Hours :
:	: No Load	: Loaded	: Service Hrs.	: :
:38D871077	:	:	:	: :
:TDSM12	:~ 14.8	:∼_81.5	· ~ 402.2	: 498.5 :
:38D871078	:	:	:	: :
:TDSM12	:~12.7	:~~ 80	: ~ 320.1	: 412.8 :
•	•	:	•	: :
•	•	:	•	•
•	•	•	•	: :

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 :	•	:
: 30 hours each	none	: : 30 hours :	•	•

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

Starting date of surveillance testing (OL date) 3/2/74a.

- ь.
- Periodic test interval <u>monthly</u> Total number of surveillance tests performed <u>Unit A-105;</u>Unit B-112 с. d.
 - Total number of test failures _____

failure to start	failure to accept load 🛛 🕦
failure to carry load	failures due to operator error
failure due to equipment not	being operative during emergency
conditions _O	

Supply a copy of the surveillance test procedures with this e. completed questionnaire.

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.

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۵	•					- Page 2	2 of 13	•
2.8	Personnel	required	for this p	rocedure:	Re	ference (Only	
•	Group			- محميقيونية بريد يوجي 	Num	ber		
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	operació	13	<u></u>	······································				•
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2.10	the Opera Refer to	tions Supe Operating	rvisor for Instructio	review an ns 3C and	d approval 23/24 befo	re proceed	ing with	. ·
	this proc	edure.		Ч ,	•			
<u>יי</u> וו כ	<u> </u>				formed co	ocurrent ly	with this	test.
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4.0	Procedure
	The Test Data Sheets must be completed as each step and/or substep is completed.
	NOTE: All steps are performed at Panel 1008 and verified by indicating lights, unless otherwise stated.
4.1	Complete Steps 2 through 16 in Table 1.0 of Inspection Procedure IP-24.
4.2	Place the UNIT/PARRELLEL switch to the PARALLEL position on Panel **.
4.3	Under the platform near the air start solenoid valves, unlock and close the air supply valve from the diesel driven air supply **.
4 .4	Start and run the Prelube Pump for two (2) minutes.
4-5-	Start Standby Diesel Generator ** and start the stop watch.
4.6.	Verify that rated frequency and voltage is reached at \leq 10 seconds.
4.7.	Verify that annunciator D GEN ** RUNNING, window ** is activated.
4.8	Verify Diesel Gen ** Frequency Meter indicates 60 Hz. Adjust the frequency as necessary.
4.9	Verify Diesel Gen ** Voltmeter indicates 4160 volts. Adjust the volt- age as necessary.
4.10	Verify, at Panel 1023, that the diesel generator room vent fan, for the diesel generator under test, is running.
4.11	Verify, at Panel 1006, that the emergency service water pump, for the diesel generator under test, is running.
4.12	Stop the diesel generator under test and record the run time.
4.13	Under the platform near the air start solenoid valves;
	a. Open and lock the air supply valve from the diesel driven air supply.
	b. Unlock and close the air supply valve from the AC driven air supply **.
4.14	Run the Prelube Pump for two (2) minutes.
4.15	Restart the Standby Diesel Generator under test and start the stop watch.
4.16	Verify that rated frequency and voltage is reached at \leq 10 seconds. Record the starting time.
4 • 1 /	frequency as necessary.

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4.18	Verify Diesel Gen ** Voltmeter indicates 4160 volts. Adjust the volt- age as necessary.
4.19	Verify, at Panel 1023, that the diesel generator room vent fan, for the diesel generator under test, is running.
4.20	Verify, at Panel 1006, that the emergency service water pump, for the diesel generator under test, is running.
4.21	Place the 4KV Bus ** Auto -Manual transfer switch in the MAN position.
4.22	Synchronize the diesel generator under test to the essential bus and close the circuit breaker.
4.23	Increase the diesel generator load to 2850 KW and run the diesel gen- erator under test for one hour.
4.24	Complete the remaining items in TAble 1.0 of Inspection Procedure IP-24.
9. 7	NOTE: To ensure the diesel will not motorize do not trip the engine before tripping the associated generator breaker.
4.25 4.26	Decrease the diesel generator load to approximately 50 KW, trip the diesel generator circuit breaker, and allow the engine to run unloaded for 5 minutes. Place the 4KV Bus ** Auto-Manual transfer switch in the AUTO position.
4.27	Stop the diesel generator under test and record the run time.
4.28	Verify the annunciator DIESEL GEN ** RUNNING, window **, is reset.
4.29	Verify that the diesel generator voltage decreases to zero, and the frequency meter goes to mechanical zero.
4.30	Trip the injection pump control racks on the engine under test by depressing the Emergency Stop Pushbutton (overspeed trip) at the engine.
4.31	Utilizing the manual override of the normal air start solenoid, admit starting air to the engine under test for 10 seconds.
4,32	Return the diesel generator under test to a standby status as follows:
	a. Place the UNIT/PARRALLEL switch in the UNIT position on Panel **.
، مریحہ ر	b. Verify that all fluid inventories are at the proper levle i.e.; engine lube oil, jacket water and governor oil.'
4 19 19	c. Verify that all diesel generator subsystem annunciators at Panel 1008 and local Panel ** are reset.
	d. Under the platform near the air start solenoid valves, open and lock the air supply valve from the AC driven air supply.
	e. Reset the overspeed trip

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Page 5 of 13

- Open the diesel Starting Air Receiver ** & ** valves slightly, and 4.33 reduce the air receiver pressure to < 200 psig as indicated on the receiver mounted pressure gages PI ** and PI **. Close the air receiver drain valves and verify that the Starting 4.34 Air Compressor ** has started. When the air receiver pressure rises to > 240 psig, verify that air 4.35 compressor under test has stopped. Record the run time and compressor oil pressure. Open the Diesel Starting Air Receiver ** drain valve, slightly, and 4.36 reduce the air receiver pressure to 220 psig as indicated on the receiver mounted pressure gage PI ** and close the air receiver drain valve. Start the diesel-driven starting air compressor with the local handswitch. 4.37 When the air receiver under test pressure is > 240 psig, verify that 4.38 the diesel-driven air compressor has stopped. Record the run time, compressor oil pressure and diesel oil pressure. Start the Diesel Oil Transfer Pump ** locally at panel ** by turning HS ** 4.39 to START. After the pump starts, turn HS ** back to STOP. The pump should remain running.
 - Verify that the Diesel oil transfer pump stops automatically when the 4.40 day tank level reaches 850 gallons as indicated on LI **.

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** Identified on the Test Data Sheets for the subsystem under test. - - ⁻

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,	Test Date	Page	6 of 13	·
5.0	Test Completion Criteria	•		
· 1	The surveillance requirements will have be following items have been completed and si	een satisf igned off.	ied when the	· · · · · · · · ·
5.1	This Surveillance Test Procedure was performed reason:	ormed for	the following	
•	a. Standby Diesel Generator Operabilityb. Other (define)	Test	••••••••••••••••••••••••••••••••••••••	~
5.2	The Test Data Sheets have been completed, and attached for each instrument channel.	reviewed,	signed	• • •
	a. Diesel Generator Subsystem Ab. Diesel Generator Subsystem B			
5.3	The Surveillance test results, as document Test Data Sheets, are as follows: a. Diesel Generator Subsystem A b. Diesel Generator Subsystem B	ed by the	Unacceptable Acc	eptable
5.4 പുല്	Were any problems encountered during the t	est?	nonzelely vasi Dis	· ·
	a. Procedural (Related Document Change Fo	orm(s) att	ached)? DCF#	
:-, - ⁻ -	b. Equipment (A ply of related Deviation	Report(s)	_attached)? DR#	·
5.5	If Item 5.3 indicates any unacceptable sur or problems were encountered, has General 2.4 been implemented?	ard rveillance Instructi	results on 	
5.6	Test Comments:		•	
- - -				·. •.
			•	

Operations Supervisor

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rocedure	Date March 24, 1977 Rev. 9 SPP 48A001	•
•	Page 7 of 13	
	Reference Only	· · ·
.0 Test	Data Sheets	•
.l Subs	system Under Test A B	
.2 Test	Date	
rocedure. Step	Required Action	Initials
4.1	Steps 2 through 16 of Inspection Procedure IP-24 completed.	
4.2	UNIT/PARALLEL switch in the Parallel Position on Panel **.	
	Subsystem A: ** = 1C93 Subsystem B: ** = 1C94	
4.3	Air supply valve from the diesel driven air supply ** closed.	
- : - : - :	Subsystem A: ** = 1T-117A Subsystem B: ** = 1T-117B	
4.4	Prelube pump run for two (2) minutes.	
4.5	- Diesel Generator ** started.	
- - - -	Subsystem A: ** = 1G-31 Subsystem B: ** = 1G-21	
4.6	Rated frequency and voltage is reached at \leq 10 seconds.	
	Starting timeseconds.	
4.7	Annunciator DIESEL GEN ** RUNNING, window no. ** activated.	
	Subsystem A: ** = 1G-31, window no. A10 Subsystem B: ** = 1G-21, window no. B3	
4.8	Diesel Gen ** Frequency Meter indicated 60 Hz.	
· · · ·	Subsystem A: ** = Gen 1G31 Subsystem B: ** = Gen 1G21	
4.9	Diesel Gen ** Voltmeter indicates 4160 volts.	
	Subsystem A: ** = Gen 1G31 Subsystem B: ** = Gen 1G21	
4.10	Diesel generator room vent fan running:	
4.11	Emergency service water pump running.	·
4.12	Diesel generator under test stopped.	
(perci	Run time	
		· · · · · ·

Procedure I	Date March 24 977 Rev. 9 Page 8 of 13	••• : •
5.0 Test	Data Sheets	ء مي جيت
.] Subs	Date	, «
		1
Procedure. Step	Required Action	Initial
4.13.a	Air supply valve from the diesel driven air supply opened and locked.	· .
4.13.b	Air supply valve from AC Driven Air Supply ** unlocked and closed.	
	Subsystem A: $** = 1T-115A$ and $1T-116A$ Subsystem B: $** = 1T-115B$ and $1T-116B$	
4.14	Prelube pump run for two (2) minutes.	
4.15	Diesel Generator under test started.	
4.16	Rated frequency and voltage is reached at \leq 10 seconds.	
	Starting Timeseconds.	
- : . -	Time of Start	
4.17	Diesel Gen ** Frequency Meter indicates 60 Hz.	
	Subsystem A: ** = Gen 1G31 Subsystem B: ** = Gen 1G21	
4.18	Diesel Gen ** Voltmeter indicates 4160 volts.	
	Subsystem A: ** = Gen 1G31 Subsystem B: ** = Gen 1G21	
4.19	Diesel generator room vent fan running.	
4.20	Emergency service water pump running.	-
4.21	4KV Bus ** Auto-Manual Transfer switch in the MAN position.	
	Subsystem A: ** = Bus 1A3 Subsystem B: ** = Bus 1A4	.a., and Mara
4.22	Diesel generator synchronized.	
4.23	Diesel generator load 2850 KW and one hour load run complete.	
4.24	Remaining steps of Inspection Procedure IP-24 completed.	
4.25	Diesel generator load approximately 50 KW diesel generator circuit breaker tripped, engine run unloaded for 5 minutes.	

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brocedure D	ate March 24, 9/ Kev. 9 5 48A001	
	Page 9 of 13 Reference	Only
.0 Test	Data Sheets	•
.] Subsy	stem Under Test AB	
.2 Test	Date	
rocedure. Step	Required Action	Initial
4.26.	4KV Bus ** Auto-Manual transfer switch in the AUTO position.	
1. 27	Diesel generator under test stopped.	
4.27	Time of Stop	
4.28	Annunciator DIESEL GEN ** RUNNING, window no. ** reset.	
	Subsystem A: ** = 1G-31, window no. A10 Subsystem B: ** = 1G-21, window no. B3	
4.29	Diesel generator voltage decreases to zero, and frequency meter indicates mechanical zero.	
4.30	Injection pump control racks tripped by depressing the Emergency Stop Pushbutton (overspeed trip) at the engine.	
4.31	Starting air admitted to engine under test for 10 seconds utilizing the manual override of the normal air start solenoid.	•
4.32.a	UNIT/PARALLEL switch in UNIT Position on Panel **.	
and a	Subsystem A: ** = 1C93 Subsystem B: ** = 1C94	
4.32.b	All fluid inventories at the proper level.	
4.32.c	All subsystem annunciators at Panel 1008 and local Panel ** reset.	
•	Subsystem A: ** = Panel 1C93 Subsystem B: ** = Panel 1C94	
4.32.d	Air supply valve from the AC driven air supply opened and locked.	
4.32.e	Overspeed trip reset.	
•		
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· _ · · ·	Aurannen vorstell Infronter Arnoofust 27-14 terratik	
	lassel pedavarda dap eproximacly by A distance periodos dorant distance propiet, sugine ran embraded for i normote.	
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		Page	10 of 13	
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0 Test 1	Data Sheets		leference Only	7
1 Subsys	stem Under Test <u>A B</u>	•		<b>*</b> 5
2 Test	Date	-		1. <u>1</u> . 1. 1.
				Tritio
rocedure. Step	Required Action	) 		
4.33	Diesel starting air receiver ** and and air receiver pressure reduced to	** drain valves <200 psig as in	opened slightly dicated on	
	· ·	<b></b>		-
		Air Receive	r Press. Ind	
	$\mathbf{C}_{\mathbf{r}}$	1T-115A	PI 3221A	
	Sudsystem A:	1T-116A	PI 322A	
	Subsystem B: ** =	1T-115B	PI 3221B	
· .	in an ann a stàite ann an Stàite ann an Anna a Anna an Anna an	1 <b>T-116</b> B	- P1 5222D	
· ·	le and solution in Spansburg - Sea - Marches States - 1975 - Sea - Sea	1T-116B	PI 3222B	-
4.34	Air receiver drain valves closed and Started.	1T-116B  Starting Air Co	pn 52225	-
4.34	Air receiver drain valves closed and Started. Subsystem A: ** = 1K-10A Subsystem B: ** = 1K-10B	1T-116B Starting Air Co	pn 32225	-
4.34 4.35	Air receiver drain valves closed and Started. Subsystem A: ** = 1K-10A Subsystem B: ** = 1K-10B Starting Air Compressor stopped, who	1T-116B Starting Air Co en pressure incr	eased to >240 psi	
4.34 4.35	Air receiver drain valves closed and Started. Subsystem A: ** = 1K-10A Subsystem B: ** = 1K-10B Starting Air Compressor stopped, who : Compressor run timemi 	1T-116B I Starting Air Co en pressure incr nutes. _psig.	pmpressor ** eased to >240 psi	
4.34	Air receiver drain valves closed and Started. Subsystem A: ** = 1K-10A Subsystem B: ** = 1K-10B Starting Air Compressor stopped, who Compressor run timemi Compressor oil pressure	1T-116B Starting Air Co en pressure incr nutes. psig. in valve open s1	pmpressor ** eased to >240 psi ightly and air	
4.34 4.35 4.36	Air receiver drain valves closed and Started. Subsystem A: ** = 1K-10A Subsystem B: ** = 1K-10B Starting Air Compressor stopped, who Compressor run timemi Compressor oil pressure Diesel starting air receiver ** dra receiver pressure reduced to 220 ps air receiver drain valve closed.	1T-116B Starting Air Co en pressure incr nutes. psig. in valve open sl ig as indicated	peased to >240 psi ightly and air on PI ** and	
4.34 4.35 4.36	Air receiver drain valves closed and Started. Subsystem A: ** = 1K-10A Subsystem B: ** = 1K-10B Starting Air Compressor stopped, whe Compressor run time	1T-116B I Starting Air Co en pressure incr nutes. psig. in valve open sl ig as indicated A	pmpressor ** eased to >240 psi ightly and air on PI ** and	
4.34 4.35 4.36	Air receiver drain valves closed and Started. Subsystem A: ** = 1K-10A Subsystem B: ** = 1K-10B Starting Air Compressor stopped, who Compressor run time	1T-116B Starting Air Co en pressure incr nutes. psig. in valve open sl ig as indicated A B	eased to >240 psi ightly and air on PI ** and	
4.34 4.35 4.36 4.37	Air receiver drain valves closed and Started. Subsystem A: ** = 1K-10A Subsystem B: ** = 1K-10B Starting Air Compressor stopped, whe Compressor run timemi Compressor oil pressure Diesel starting air receiver ** dra receiver pressure reduced to 220 ps air receiver drain valve closed. Subsystem A: 1T-117A, PI 3223 Subsystem B: 1T-117B, PI 3223 Diesel Driven Starting Air Compress	<pre>IT-116B I Starting Air Co en pressure incr nutes.    psig. in valve open sl ig as indicated A B for ** started.</pre>	PI 52225 ompressor ** eased to >240 psi ightly and air on PI ** and	
4.34 4.35 4.36 4.37	Air receiver drain valves closed and Started. Subsystem A: ** = 1K-10A Subsystem B: ** = 1K-10B Starting Air Compressor stopped, whe Compressor run timemi Compressor oil pressure Diesel starting air receiver ** dra receiver pressure reduced to 220 ps air receiver drain valve closed. Subsystem A: 1T-117A, PI 3223 Subsystem B: 1T-117B, PI 3223 Diesel Driven Starting Air Compress Subsystem A: ** = 1K-10C Subsystem B: ** = 1K-10D	1T-116B I Starting Air Co en pressure incr nutes. psig. in valve open sl ig as indicated A B oor ** started.	peased to >240 psi ightly and air on PI ** and	
4.34 4.35 4.36 4.37 4.38	Air receiver drain valves closed and Started. Subsystem A: ** = 1K-10A Subsystem B: ** = 1K-10B Starting Air Compressor stopped, who Compressor run time	1T-116B Starting Air Co en pressure incr nutes. psig. in valve open sl ig as indicated A B for ** started. 0 psig.	peased to >240 psi ightly and air on PI ** and	

Page 11 of 13         .1       Subsystem Under Test AB			- •••
0       Test Data Sheets         1       Subsystem Under Test A		Page 11 of 13	
1       Subsystem Under Test A       B         2.2       Test Dute	.0 'Test	Data Sheets	•
2 Test Date       Required Action       Initials         coccdure.       Required Action       Initials         4.39       Diesel oil transfer pump ** started, locally at Panel ** by turning IIS ** to START. After the pump remains running.       Initials         Subsystem A: ** = Pump IP-44a, IC91, HS-3203       Subsystem B: ** = Pump IP-44a, IC92, HS-3204       Initials         4.40       Diesel oil transfer pump stops automatically at 850 gallons as indicated on L1**.       Subsystem A: ** = LI 3208         Subsystem B: ** = LI 3208       Subsystem B: ** = LI 3210       Initials         4.41       Fuel oil level verified > 35, 000 gallons.       Initials         4.42       Completed Table 1.0 of Inspection Procedure IP-24 attached.       Initials         Initials       Initials       Initials         Initials       Initials       Initials         Initials       Initials       Initials         4.40       Fuel oil level verified > 35, 000 gallons.       Initials         Initials       Initials       Initials         Initinitials       Initials	1 Subs	ystem Under Test A B	
Proceedings       Required Action       Initials         4.39       Diesel oil transfer pump ** started, locally at Panel ** by turning HS ** to START. After the pump starts, turn HS ** back to STOP. The pump remains running.       Subsystem A: ** = Pump IP-44a, IC91, HS-3203         Subsystem A: ** = Pump IP-44b, IC92, HS-3204       Subsystem B: ** = Fump IP-44b, IC92, HS-3204         4.40       Diesel oil transfer pump stops automatically at 850 gallons as indicated on LI**. Subsystem B: ** = LI 3208         4.41       Fuel oil level verified ≥ 35, 000 gallons.         4.42       Completed Table 1.0 of Inspection Procedure IP-24 attached.         4.42       Completed Table 1.0 of Inspection Procedure IP-24 attached.         4.42       Fuel oil iser toris automatically starts for attached.         4.44       Fuel oil iser toris automatical for attached.         4.45       Completed Table 1.0 of Inspection Procedure IP-24 attached.         4.46       Fuel oil iser toris automatical for attached.         4.47       Completed Table 1.0 of Inspection Procedure IP-24 attached.         4.48       Fuel oil iser toris automatical for attached.         4.49       Fuel oil iser toris automatical for attached.         4.41       Fuel oil iser toris automatical for attached.         4.42       Fuel oil iser toris automatical for attached.         4.43       Fuel oil iser toris automatical for attached. <td>.2 Test</td> <td>Date</td> <td></td>	.2 Test	Date	
Required Action       Initials         \$tep       Initials         4.39       Dissel oil transfer pump ** started, locally at Panel ** by turning HS ** to START. After the pump starts, turn HS ** back to STOP. The pump remains running.			<del></del>
4.39       Diesel oil transfer pump ** started, locally at Panel ** by turning HS ** to START. After the pump starts, turn HS ** back to STOP. The pump remains running.         Subsystem A: ** = Pump IP-44a, IC91, HS-3203 Subsystem B: ** = Pump IP-44B, IC92, HS-3204         4.40         Diesel oil transfer pump stops automatically at 850 gallons as indicated on L1**.         Subsystem A: ** = LI 3208 Subsystem B: ** = LI 3208         Subsystem B: ** = LI 3200         4.41         Fuel oil level verified > 35, 000 gallons.         As found value         Gompleted Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem A: ** = Life         Subsystem A: ** = Life         Subsystem B: ** = Life         Subsystem B: ** = Life         As found value	rocedure. Step	Required Action	Initials
Subsystem A: ** = Pump IP-44a, 1C91, HS-3203         Subsystem B: ** = Pump IP-44B, IC92, HS-3204         4.40         Diesel oil transfer pump stops automatically at 850 gallons as indicated on L1**.         Subsystem B: ** = LI 3208         Subsystem B: ** = LI 3210         4.41         Fuel oil level verified > 35, 000 gallons.         As found value	4.39	Diesel oil transfer pump ** started, locally at Panel ** by turning HS ** to START. After the pump starts, turn HS ** back to STOP. The pump remains running.	
4.40       Diesel oil transfer pump stops automatically at 850 gallons as indicated on LI**.         Subsystem A: ** = LI 3208         Subsystem B: ** = LI 3210         4.41         Fuel oil level verified > 35, 000 gallons.         4.42         Completed Table 1.0 of Inspection Procedure IP=24 attached.         Subsystem I: ** = Line         Subsystem I: ** = Line         Subsystem I: ** = Line         Completed Table 1.0 of Inspection Procedure IP=24 attached.         Subsystem I: ** = Line		Subsystem A: ** = Pump 1P-44a, 1C91, HS-3203 Subsystem B: ** = Pump 1P-44B, 1C92, HS-3204	
4.41       Subsystem A: ** = LI 3208         Subsystem B: ** = LI 3210         4.41         Fuel oil level verified > 35, 000 gallons.         As found value         4.42         Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem B: ** = 11 - 10         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 attached.         Subsystem Completed Table 1.0 of Inspection Procedure IP-24 a	4.40	Diesel oil transfer pump stops automatically at 850 gallons as	
Subsystem A: ** = LI 3208         Subsystem B: ** = LI 3210         4.41         Fuel oil level verified > 35, 000 gallons.         As found value			
4.41       Fuel oil level verified > 35, 000 gallons.         4.42       Completed Table 1.0 of Inspection Procedure IP-24 attached.         5.11       Subscription Procedure IP-24 attached.         5.11       Subscription Procedure IP-24 attached.         5.11       Subscription Procedure IP-24 attached.         5.11       Subscri		Subsystem A: ** = LI 3208 Subsystem B: ** = LI 3210	
As found value         4.42         Completed Table 1.0 of Inspection Procedure IP-24 attached.         Substantiation attack attached substantiation attached substantiattached substantiation attached substantiation attached	4.41	Fuel oil level verified > 35, 000 gallons.	
4.42       Completed Table 1.0 of Inspection Procedure IP-24 attached.         Superinter draw we = 11-11         Superinter of the set of		As found value	·
Performed by The Provide State Date Time	4.42	Completed Table 1.0 of Inspection Procedure IP-24 attached.	
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4.42

Inspection Procedure IP-24.

Thble 1.0 FRGINZ RUN-UP Unit No. (Reference, Peragraph 1.1)

-	• • ·	• • •	•,	Nanie	Date
Linc No.	Iten	Normal Condition	Actual Condition	Remarks	Reference
1	ITEMS TO BE CHECKED	LEFORE STARTIN	7 ENGINE		•
2	Engine Coolant Level	in.			Ref. 32, Page Ql
• 3	Engine Coolant Temperature	100 - 100°F			-
4_	Engine Lube Oil Level	Full			Ref. 3e, Page P2
5	Engine Lube	130 - 135°F			
6	Lube Oil Circulation Fump	Running 			-
7.	Coolant Circulation Pump	Running psi min		•	-
8	Storting Air Fressure	200 - 240 · psi			
9	Auto Lube Oil Make-up Tank Level	Full		•	-
. 10	Drain Air Starting Lines			•	Ref. 2
n	Generator Bearings Oil Level	เบา			Ref. 30, .Page 6
is	Air Compressor Oil Level [#] - 1K-10A (orB)	Full			• _
13	Air Compressor Oil Level*-1K-100 (orD)	Full	•	••	-
24	Air Compressor Dicse Engine Oil Level **	คาา		•	
15	Covernor Oil Lever	•	·	·	
16	Inspect Air Intake Filter			• • • • • • •	•
•		· ·	·		•
Rev. 9 1977

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Reference Only

	•	(Reference,	Paragraph 1.1	) Nome	Date
Line No.	Item	Normal Condition	Actual Condition	Remarks	Reference
ג 17	ITEMS TO BE CHECKE	) AFTER TEMPER	TURE EQUILIER	UM	
18	Engine Coolant Temperature	170 - 185°F			Ref. 3a, Section Q
·19	Engine Lube Oil Fressure	30 - 35 psi		•••	Ref. 3a, Section P
20	Engine Lube Oil Temperature	195 - 215°F			Ref. 3a Section P
21	Air Cooler Inlet Touperature	Less than 100° F			Ref. 3a Section K
22	Fuel Oil Fressure	12 - 15 psi		•	Ref. 3a ' Section L
23	Pressure Drop, Lube Oil Filters	18 psi max.		•	Ref. 2a Section P
24	Pressure Drop, Fuel Oil Filter	10 psi max.	• •	•	Ref. 3a, Section J.
. 25	Engine Lube Oil Leakage	-	•		• Ref. 3a Section L
• 26	Engine Lube Oil Pump Leakage	- · ·		•	Ref. 3a Section P
27	Exhaust Temperature	850 - 1100°F			Ref. 3a, Section S
28	Crankcase Vacuum	0.4 to 2.0 in. of Water			
29	Engine Coolant Level	in.	•	•	Ref. 3a, Page 23
! _30	Pressure Drop, Lube Oil Strainer	12 psi max.			Ref. 3 Page 14
Continue	·•." .		•	•	
-	* If the oil is below ** If the oil is below	the proper 1	vel, add oil	er LP-14, Faragraph I or LP-15, Paragraph	.3.
•	• • •		•		•

Unit No.

10000	INSPECTION PROCEDURE (I.P.)	NO. IP-24
	ENGINE (DIESEL) GENERATOR SET	PAGE OF
	COLT INDUSTRIES MODEL 38TD8 1/8	REV. 0 DATE1/8/7
APPROVED BY POG	APPROVED BY Chican	Annarca 1/20/101
Maintenance	Supervisor Chairman APPROVED BY Chief H	Engineer

#### 1.0 INSTRUCTIONS

# 1,1 Engine Run-Up (Complete Table 1.0)

- With the engine at standstill and before the engine is started per Surveillance Test Procedure 48A001, perform items 2 through 16 in Table 1.0.
- 2. While STP 48A001 is proceeding and after the diesel and generator reach equilibrium temperature, complete the remaining items in

Table 1.0.

# 1.2 Engine Run-Up, Standby (Complete Table 1.0)

This operation is identical to Paragraph 1.1 except for frequency of test. When one standby diesel generator subsystem is out of service, the operable subsystem must be run-up once every 24 hours.

# 1.3 Annual Engine Test (Complete Tables 1.0 and 1.1)

1; With the engine shut down and prior to engine start per Surveillance Test Procedure 48A004, perform items 2 through 16 in Table 1.0 and complete items 2 through 21 in Table 1.1.

$\sim$	INSPECTION PROCEDURE (I.P.)	NO. IP-24
	ENGINE (DIESEL) GENERATOR SET	PAGE OF _10
	COLT INDUSTRIES MODEL 38TD8 1/8	REV. 0 DATE1/8/7

equilibrium temperature, complete the remaining items 18 through 30 in Table 1.0.

.While STP 48A004 is proceeding and after the diesel and generator reach

1.4 4000 Hour Maintenance (Complete Table 1.2)

· `.

- 1. With the engine shut down, perform the items in Table 1.2, every 4000 hours of engine operation.
- 2. Complete Table 1.2.

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1.5 6000 Hour Maintenance (Complete Table 1.3)

- 1. With the engine shut down, perform the items in Table 1.3 every 6000 hours of engine operation.
- 2. Complete Table 1.3.
- 1.6 8000 Hour Maintenance (Complete Table 1.4)
- 1. With the engine shut down, perform the items in Table 1.4 every 8000 hours of engine operation.
- 2. Complete Table 1.4.

• • • • •

- 1.7 Generator Exciter Inspection
- 1. With the engine shut down, inspect the exciter regulator for general
  - condition.

Clean the air openings per Reference 3h, Page 5-1.

	(	3 ( )	INSPECTION PROCEDURE (1.P.)	NO. IP-24
		2	INGINE (DIESEL) GENERATOR SET	PAGE <u>3</u> OF 10
· 🎧	12		COLT INDUSTRIES MODEL 38TD8 1/8,	REV. 0 DATE1/8/76

# 1.8 Generator 'Electrical Inspection

With the engine shut down, perform insulation resistance testing per

Reference 3.C, Page 4, "Insulation Resistance Testing".

# 1.9 Exhaust Silencer Inspection

1. Inspect the exhaust silencer for general condition.

## 2.0 REFERENCES

° - .

1. IELP Safety Manual.

2. P&ID, Dicsel Generator Systems, Bechtel Corp., Dwg. No. 7884-M-132, Revision 9.

3. Diesel Generator Service Manual, Instructions No. 3542, Colt

Industries, Bechtel Vendor Print Control No. 7884-M15-73-2.

a. Instructions 3800TD8 1/8, Colt Industries.

b. Instruction Manual, Basler Electric Publication No. 90 85100 990.

c. Electrical Tab, Instructions 3562, Colt Industries Power Systems

Division.

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d. Accessories Tab, Part Nos. 11 905 731 and 11 905 732.

e. Accessories Tab, Part No. 11 906 206.

f. Bulletin 37708E, Woodward Governor Company.

g. Instruction Book TC-30E, Elliott Division of Carrier Corporation.

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	INGINE (DIESEL) GENERATOR	PAGE		OF 10
	COLT INDUSTRIES MODEL 38TD8 1/8	REV.	0	DATE1/8/76

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Table 1.0 ENGINE RUN-UP Unit No._____ (Reference, Paragraph 1.1) 11 A T

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•			•	•	Name	Date
	Line No.	Item	Normal Condition	Actual Condition	Remarks	Reference
•. •.	1	ITEMS TO BE CHECKED	EFORE STARTIN	ENGINE '		
	2	Engine Coolant Level	in.			Ref. 3a, Page Ql
· · ·	• 3	Engine Coolant Temperature	100 - 100°F			-
	4	Engine Lube Oil Level	Full			Ref. 3a, Page P2
	5	Engine Lube Oil Temp.	130 - 135°F		· · · ·	
• • • • • • • •	6	Lube Qil Circulation Pump	Runningpsi min.			
	7	Coolant Circulation Pump	Running psi min			
· · · · · · · · · · · · · · · · · · ·	8	Starting Air Pressure	200 - 240 · psi			
3, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5,	9	Auto Lube Oil Make-up Tank Level	Full			•
· · · · · · · · · · · · · · · · · · ·	10	Drain Air Starting Lines			· · · · · · · · · · · · · · · · · · ·	Ref. 2
	11	Generator Bearings Oil Level	Full.	· · ·		Ref. 3c, .Page 6
na ina ang na mananana ang na na na na na na na	12	Air Compressor Oil Level* - 1K-10A (orB)	Full	· · · · · · · · · · · · · · · · · · ·		-
್ಷನ್ ಕಾರ್ಯವ್ ಕ್ರಮ ಕಾರ್	13	Air Compressor Oil Level*-1K-10C (orD)	Full	•	· · ·	-
	14	Air Compressor Diese Engine Oil Level **	I Full			-
	15	Governor Oil Lever				
	16	Inspect & Clean Air Intake Filter			•	·
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		ENG	INE (DIES)	EL) GENERI	ATOR SET	PAGE	ог <u>10</u>
	Į	COL	T INDUSTR	IES MODEL	38TD8 1/8	REV. 0	DATE <u>1/8/</u> 76
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	- - 		Te ENGI	ible 1.0 (Cont'	d)	a a su	
• • • • • • • • • • • • • • • • • • •			Unit (Reference,	No	) Name	Date	
•• • • •	Line No.	Item	Normal Condition	Actual Condition	Remarks	Reference	
	17	ITEMS TO BE CHECKE	D AFTER TEMPER	ATURE EQUILIBR	UM .		
<u> </u>	28	Engine Coolant Temperature	170 - 185°F		· · ·	Ref. 3a, Section Q	-
	19	Engine Lube Oil Pressure	30 - 35 psi			Ref. 3a, Section P	-
· · · · · · · · · · · · · · · · · · ·	20	Engine Lube Oil Temperature	195 - 215°F			Ref. 3a Section P	-
	21	Air Cooler Inlet Temperature	Less than 100° F			Ref. 3a Section K	-
	22	Fuel Oil Pressure	12 - 15 psi			Ref. 3a Section L	- 10 10 10 10 10 10 10 10 10 10 10 10 10
	23	Pressure Drop, Lube Oil Filters	18 psi max.			Ref. 3a Section P	-
	24	Pressure Drop, Fuel Oil Filter	10 psi max.			. Ref. 3a, Section L	- 1
	25	Engine Lube Oil Leakage	· · · · · · · · · · · · · · · · · · ·			Ref. 3a Section L	-

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Engine Lube Oil

Exhaust Temperature

Crankcase Vacuum

Engine Coolant

Pressure Drop,

Lube Oil Strainer

the oil

Level

TP

Pump Leakage

T.P-15

• · ·

* If the oil is below the proper level, add oil per LP-14, Paragraph 1

850-- 1100°F

in. of Water

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in.

12 psi max.

Diction

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cil

Ref. 3a

Section P Ref. 3a,

Section S

Ref. 3a, Page 23

Ref. 3

Page 14

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Paragraph

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INSPECTION PROCEDURE (I.P. ENGINE (DIESEL) GENERATOR SET COLT_INDUSTRIES_MODEL_38TD8 1/8-

NO. _____IP-2.4 PAGE 6 OF 10 REV. 0 DATE1/8/7

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Table 1.1 ANNUAL ENGINE TEST Unit No. (Reference, Paragraph 1.3)

1	•	•		Name	Date
Line No.	Item	Normal Condition	Actual Condition	Remarks	Reference
1	Complete Table 1.0, Items 1-16		•		Para. 1.1
.2	Check Injection Pump Rack Settings	·.		<b>4</b> 17	Ref. 3a. Page L15-
3	Check Injection Pump Rack for freedom of				Ref. 3a, Page L15
4	Inspect, Clean Lube Oil Strainer			•	Ref. 3e
5	Inspect Governor, Check Oil				Ref. 3f Page 10
6	Inspect Air Start Distributor				Ref. 3a, Section R
7	Inspect Pump Drives				Ref. 3a, Page N1
8	Check Governor Linkage				Ref. 31.
9	Inspect Generator Brush Wear				Ref. 3c Page 10-11-
10	Check Generator Brush Holder Tension				Ref. 3c Page 11-12
11	Check Engine Oil Quality*	-			-
12	Inspect Vertical Drive Coupling				Ref. 3a Section F
13	Inspect Blower Drive		,		Ref. 3a Page K-b3
14	Inspect Timing Gears		•		Ref. 3a, Section H
15	Check Injection Noz- zle operation & opening pressure	•			-
16	Check Crankcase Oil Separator Drain Tube			<del></del>	Ref. 3a, Page K-bl
17	Check Timing Chain, Tension	•		· · · · · · · · · · · · · · · · · · ·	Ref. 3s.

	57			INSPECTION PROCEDURE (I.P.)	
			220	NGINE (DIESEL) GENERATOR	NO. <u>IP-24</u>
				COLT INDUSTRIES MODEL 38TD8 1/8	PAGE 7 OF 10
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# ANNUAL ENGINE TEST Unit No. (Reference, Paragraph 1.3)

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)	•			Name	Date
Line No.	Item	Normal Condition	Actual Condition	Remarks	Reference
18	Inspect Pump Drives	-	• •		Ref. 3a, Page Nl
19	Check Fuel Injection Timing	· · · · · · · · · · · ·			Ref. 3a Page L13
20	Check Air Inlet, Exhaust Forts	•			
21	Fuel Oil Pump Seal		•		·
22	Complete Table 1.0, Items 18-30	•	•		
·	* Have a sample of e	gine oil checl	ed for dilution	n & general detergen	d
	quality. If neces	ary, change o	l per LP-16, 1	aragraph 1.1.	
	<u> </u>			· · ·	
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	. 57 575	INS	PECTION PROCED	URE (I.P_)	T		
• • •		PENGINE	(DIESEL) GENI	ERATOR SET	NO.	IP-24	17
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	an e	Tab] 4000 HOUR	Le 1.2 MAINTENANCE	•		•	د. اهمینا، ۲۰
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		(Reference,	Paragraph +	+) • •			
· ·		· · ··································		Name		Date	्रः =
- Line	Item	Normal	Actual Condition	Remarks	A	Reference	••••
1	Inspect Cylinder			1		Ref. 3a,	<b></b>
	Adapters for water Leakage	· · · · · · · · · · · · · · · · · · ·				Page Dl	
	Inspect Pistons.						
.5	Pumps, Cylinder	· · · · · · · · · · · · · · · · · · ·				Rer. Ja, Section D	•
-	Liners through the Ports						-
	Inspect Air Receivers						••••
ر ب	Turbochargers -					Pof Ro	-
4	Clean Impeller and Diffuser					Page 8	• · · · ·
	Diffusci	ster de la francé. Altre de la francé		•			
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	INSPECTION PROCEDURE (I.P.) ENGINE (DIESEL) GENERATOR SET COLT INDUSTRIES MODEL 38TD8 1/8	NO. <u>IP-24</u> PAGE <u>9</u> OF <u>10</u> REV. 0 DATE ^{1/3/76}
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TADLE 1.5 6000 HOUR MAINTENANCE Unit No. (Reference, Paragraph 1.5)

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•		· · · · · · · · · · · · · · · · · · ·	•	Name	Date	
Line No.	Item	Normal Condition	Actual Condition	Remarks	Reference	
1	Drain & Change Governor Oil	-	• • • • • • • • •		Ner. 31, Page 10	
2	Blower - Inspect Immellers and Check'			· · · · · · · · · · · · · · · · · · ·	Page K-b3	
•	Clearances					
3	Check Fuel Oil Relief Valve				Ref. 3a, Page Ll	
			• • • • • • • • • • • • • • • • • • •			
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57	$\langle \gamma \langle \gamma \rangle$	INSPECTION PROCEDURE (I.F	•)
		GINE (DIESEL) GENERATOR	NO. <u>IP-24</u>
		COLT INDUSTRIES MODEL 2007	ET PAGE <u>10</u> OF <u>10</u>
Current a	()	STATES HODEL 38TD8	1/8 REV. 0 DATE1/8/76

Table 1.4 8000 HOUR MAINTENANCE Unit No. (Reference, Paragraph 1.6) .

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	•	· · · · · · · · · · · · · · · · · · ·	•	Name	Date
Line No.	Item	Normal. Condition	Actual Condition	Remarks	Reference
1	Check Lain, Connect- ing Rod Bearings for	See Ref. Ja. Page B2-			· Ref. 3a, Page Ell
	Wear			•	
• 2	Clean Crankcase Oil Separator				Ref. 3a,
	Check Engine Generator Alignment				Ref. 3f, Page 7
<b>9</b> 4	Disassemble, Clean, & Check the Air				Ref. 3a, Page Bl
. The second	Start Check Valves	•		•	
5	Check Camshaft Bearings for Wear	See Ref. 3a, Page B2		•	Ref. 3a, Page HJ
6	Disassemble, Inspect Fuel Pumps				Ref. 3a, Page 12
7	Disassemble, Inspect Lube Pumps			•	Ref. 3a, Page P2
8	Check Torsional Damper Pins,	See Ref.3a, Page B3			Ref. 3a, Page F11
-	bushings for wear	•		•	<u> </u>
9	Disassemble, Inspect Water Pump			9 .	Ref. 3a, Page Oli
10	Check Piston Wear	See Ref.3a, Page B3		•	Ref. 3a,
11	Turbochargers - Clean Turbine Disc,	1	· · · ·		Ref. 3g,
	Nozzle king				PEEE O
				A server Demotore Management of the server	
		-			······································
		- · · · · ·	·····	- <u>-</u>	
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		MOTOR & DIESEL DRIVEN AIR	NO
		AIR COMPRESSOR	PAGE 1 OF 3
		ONAN MODEL DJA DIESEL ENGINE	$REV. _ 0 DATE^{1/8/76}$
9	APPROVED BY Maintenance	APPROVED BY CPC	11. Hammond 1/39/26
	•	APPROVED BY Chief	Engineer

# 1.0 INSTRUCTIONS

# 1.1 Compressor Inspection (Complete Table 1.0)

- 1. With the compressor shutdown, perform the items in Table 1.0.
- 2. Complete Table 1.0.

This maintenance may be coordinated with surveillance testing.

# 1.2 Compressor Diesel Driver Inspection (Complete Table 1.1)

- 1. With the compressor shutdown, perform the items in Table 1.1.
- 2. Complete Table 1.1.

### 2.0 REFERENCES

- 1. Diesel Generator Service Manual, Instructions No. 3542, Colt Industries (7884-M15-73-2).
  - a. Instructions 3800TD8 1/8, Colt Industries.
  - b. Sundry Equipment Tab, Instruction Manual Quincy Compressor
    - Division, Colt Industries.
  - c. Sundry Equip. Tab, Service and Parts Catalog, Onan Company.

	INSPECTION PROCEDURE (I.P.) NOTOR & DIESEL DRIVEN AIR OMPRESSOR QUINCY MODEL D325 AIR COMPRESSOR ONAN MODEL DJA DIESEL ENGINE	NO. <u>IP-25</u> PAGE <u>2</u> OF <u>3</u> REV. <u>0</u> DATE ^{/8/76}
· · · · · · · · · · · · · · · · · · ·		

Table 1.0 COMPRESSOR INSPECTION Unit No. (Reference, Paragraph 1.1)

	, 	·		Name	Date
Line No.	Item	Normal <u>Condition</u>	Actual Condition	Remarks	Reference
1	Visually Inspect Compressor	-			Ref. 1b
2	Drain Air Receiver Noisture			•	Ref. lb
<u>.</u> 3	Check for Air Leakage				Ref. 1b
4	Operate Safety Valves			•	Ref. 1b
9,	Intake Filter				Ref. 1b.
6	Check Belt Tension				Ref. 1b
7	Check Pulley Clamp Bolts	·····			Ref. 1b
8	Filter Felt				Ref. 1b
9	Check VD Pilot			•	Ref. 1b
10	Inspect Valves				Ref. 1b
			•		1.1.1
	•			•	
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INSPECTION PROCEDURE (I.P.)         MOTOR & DIESEL DRIVEN AIR         IOMPRESSOR OUINCY MODEL D325         PAGE 3         ONAN MODEL DJA DIESEL ENGINE	 /8/7¢
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Table 1.1 COMPRESSOR DIESEL DRIVER INSPECTION Unit No. (Reference, Paragraph 1.2)

. . . . . .

. . . . . .

		·		Name	Date
Line No.	Item	Normal <u>Condition</u>	Actual Condition	Remarks	Reference
]	Check Oil Level *				Ref. lc
2	Clean Vent Openings				Ref. lc
• 3	Check Starter Cables				[:] Ref. lc
4	Check Governor Linkage	•			Ref. lc
	Check Battery Level				Ref. lc
6	Check Battery Charger			:	Ref. lc
7	Change Fuel Filter			¢	Ref. lc
8	Clean Crankcase Breather				Ref. lc
9	Drain Condensate Traps	•			Ref. lc
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	* If the oil is below	the proper la	vel, add oil je	r LP-15, Paragraph	1.2.

	· · ·								
•	and Car	INSPECTION PRO	CEDURE (I.P.	)	<b>.</b>	IP-2	225		
	(1)	Diesel Generator	1G-31. 1G-2	1	PAGE	1	OF	4	
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PPROVED	BY Brichard	NBullil	APPROVED BY	e ee	CARA-	Ha	mm	nds	16/7
	Maintenance S	Supervisor	APPROVED BY	Chairm Chief	Engineer		6-76		**

# 1.0 INSTRUCTIONS

## 1.1 External Inspection

- Visually inspect the diesel and associated equipment for evidence of oil leakage or seepage.
- 2. Report all discrepencies to the Mechanical Maintenance Supervisor immediately.

# 1.2 Flange Torque

1. Review system file for discrepencies (MARs) discovered in 1.1. Check bolt torques on the flanges on those discrepencies and record the as found and as left (if applicable) data on the appropriate data sheet (data sheet I or data sheet II). Data sheet to be filed in Maintenance History file.

#### 2.0 REFERENCES

- 1. IELP Safety Manual
- 2. Instructions 3800TD8 1/8, Colt Industries.

	INSPECTION PROCEDURE (I.P.)	0.			
	Diesel Concrator 16-31, 16-21	PAGE	2	OF	
		REV.	0	DATE 8-4-	76
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TABLE #1

TORQUE LIMITS

Part		Torque Limit Ft. Lbs.
 Adapter Collar Stud Nuts		20-25
Blower Flexible Drive Stud Nuts Blower to Block Stud Nuts Blower Bearing Plate Nuts	5	110-120 110-130 80-90
Camshaft Coupling Bolt Nuts Camshaft Sprocket Nuts Camshaft Thrust Bearing Clamp Connecting Rod Bolt Nuts Crankshaft Coupling Bolt Nuts ( Crankshaft Coupling Bolt Nuts ( Crankshaft Flexible Drive Nuts Cylinder Liner Holddown Capso Cylinder Block to Base Rail Bol	p Ring Capscrews. Long)	60-80 80-90 35-40 175-200 500-700 290-300 125 300-350 135-140
Cylinder Liner Adapters 1-1/4 Cylinder Liner Adapters 1-1/2	*	165-180
Exhaust Manifold and Extension 3/8" Thread - Bolts and Ca 1/2" and 9/16" Thread - Bo By-pass Fitting Gland Nuts Exhaust Belt to Cylinder Block	Pipes apscrews olts and Capscrews. Capscrews	30-35 50-55 See Sec.S. 60
Flexible Pump Drive Stud Nuts	• • • • • • • • • • • •	110-120
<b>Injection</b> Pump and Tappet Hous <b>Injection</b> Pump Cage Yoke Stud	sing Bolt Nuts Nuts	80-100 <b>40</b>
Lube Oil Pump Bearing Plate to Lube Oil Pump Housing to Cyliz Lube Oil Header Capscrews . Lube Oil Header Locknut	o Housing Nut	60-80 100-120 35-40 45-60
Main Bearing Bolt Nuts	• • • • • • • • • • • • • • • • • • •	700-1000
<b>Pis</b> ton Retainer Plate Capscrew <b>Piston Insert Capscrews (Fixed</b>	ws (Rotating Pistons) d Pistons)	25-30 60-63
Top Cover to Block Capscrews Top Cover to Blower Capscrew Turbocharger Nozzle Ring (59g	/s b) to Inlet Casing (50p)	40-55 40-55
Bolt (62). (Numbers refer to Part No Book TC 20E)	os. in Elliott Inst.	25





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	Main	tenance	Supervisor Chairma	in, oper	ations	Commit	ttee	
	· .	•	Chief E	<u>A l l/l</u> Ingineer	(mu)			· · ·
	1.0 INS	STRUCTIO	NS		•	•		
•	. 1.]	Month	ly Inspections and Maintenance (Electrical)	)	•		•	
	•	1.1.1	Check the DC control supply - service the as required.	e batter	ies, et	с.		
	1.2	Every	4 Months (Chemist) Water and Oil Samples	<u>s</u>	•			
		1.2.1	Obtain a sample of jacket water and have plant chemist, for required treatment.	it anal	ized by	•	Ţ	· ·
•		1.2.2	Obtain a sample of lube oil and have it a chemist for its condition.	inalized	by pla	nt	•	•
•	1.3	Every	4 Months (Electrical)			- '		
۲	• .	1.3.1	Check the safety and shutdown controls to are set properly and all are working so t will fail safe. Refer to page 22 of Tech	) determ hat the Manual	ine if engine	all		• • • • •
	1.4	Every	4 Months (Mechanical)		•		•	•
· · · ·		1.4.1	Check air and exhaust ports for carbon de as necessary.	posits:	Clear	1		•
•	1.5	Yearly	Maintenance	н	•	а.		
· · · ·	• .	1.5.1	Inspect all the upper and lower pistons f of rings and liners through the exhaust of	or the c	conditio	on C		•
•	•		the visual inspection show suspicious lin Remove all the pistons and repair as nece	er wear ssary.	ports, 1 patterr	.1 15.	,	
•	• •	1.5.2	If the wear is such that pistons are not engine the engine should be water tested any internal water leakage.	removed and insp	from th pected f	ie Ior	•	
•		1.5.3	Inspect the torsional damper and all bear	ings.				•
	•	1.5.4	Check the crank alignmnet and the cranksha	aft end	float.		•	•
••••••••••••••••••••••••••••••••••••••		1.5.5	Check the condition of the blower through	the ins	pection	cover	•	
	· · ·	1.5.6	Check the heat exchangers and coolers for	scale o	or plugg	ing.	• •	•
		1.5.7	Check main and connecting rod bearings for	r wear.		• •		•
		• • •					· · ·	

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EN EN MC	IGINE TIESEL)	GENERATOR SET FOR STANDBY UNITS	ACE _	2	OF	2	•
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2.0 REFERENCES	···· · · · ·	and the second	:			5	
2.1 Maintenance	Program for M	lodel 38TD8-1/8 Standby	Units	е 1 т. – 1		•	e di seri S
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# JANE ARNOLD ENERGY CENTER

UNIT NO. 1

IOWA ELECTRIC LIGHT AND POWER COMPANY

. REV. 4 APPROVAL SURVEILLANCE TEST PROCEDURE NO. 48A004 STANDBY DIESEL GENERATOR ANNUAL INSPECTION

Prepared by: <u>anen Albon</u> Date: <u>10/10/77</u> Varry Nelson

Reproved by: <u>2000</u> For D. RockHill Date: <u>10/13/07</u> Mechanical Maintenance Supervisor

Approved by:  $\frac{1}{Reactor & Plant Performance Engineer}$  Date:  $\frac{10-13-77}{Reactor & Plant Performance Engineer}$ 

David & MM nul Date: 10-13-27 Reviewed by ____ Operations Committee hairman.

Approved by: <u>Chief Engineer</u> Date: 10-14-77

Implementation Date 10/18/77



Reference Only

Procedure Date

1

Page

of

Reference Only

STANDBY DIESEL GENERATOR ANNUAL INSPECTION

#### 1.0 Purpose

The purpose of this test is to demonstrate, by inspection, the operability 1.1 of the Standby Diesel Generator System. In accordance with the surveillance requirements of the DAEC Technical Specifications, Section 4.8.A, this inspection will be performed annually.

#### 2.0 General Instructions

- There are two subsystems to be tested as part of this procedure. The 2.1 instructions of Section 4 are to be performed for each subsystem.
- This procedure contains data sheet (page 5) which is to be used to 2.2 document the instructions of Section 4 and data obtained. The "master" data sheet is to be reproduced and completed for each subsystem.
- All steps of this procedure are to be performed in sequence. Only one 2.3 subsystem is to be tested at a time.
- The ' Mechanical Maintenance Supervisor (or designated alternate) must be 2.4 notified immediately whenever a procedural step cannot be completed as stated or if any other problem develops during the test. No maintenance, adjustment, or replacement is permitted without his authorization.
- The Shift Supervising Engineer should be notified and Section 3.8.A of the 2.5 DAEC Technical Specifications (LCO) immediately referred to whenever problems that are not resolvable are encountered during the test.
- A Deviation Report should be completed for any problems encountered during 2.6 the test.
- Test equipment required for this procedure: 2.7
  - Test equipment as indicated in the Diesel Service Manual, Bechtel a. Vendor Print Control No. 7884-M15-73-2.
- All test equipment required for this procedure should be functional and 2.8 properly maintained; e.g., calibration date should not have expired for test instruments.

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ł	; *0						Page	2 of	5	1.
	2.9	Personnel	required for	this pro	ocedure:		· .	to	S.	
:	· · ·	Group		•	e generatione	Number				
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- 2.10 At the completion of testing, Test Completion Criteria Section 5, the completed Test Data Sheets and Deviation Report(s) should be submitted to the Mechanical Maintenance Supervisor for review and approval.
- 2.11 This test is to be coordinated with Inspection Procedure IP-24 and the results of IP-24 will be included with Section 6 Data Sheets.

## 3.0 Special Precautions

3.1 Insure that the starting air receiver outlet isolation values are closed and engine control switches are in LOCKOUT before starting any mechanical inspection of the diesel.

### 4.0 Procedure

The Test Data Sheets must be completed as each step and/or substep is completed.

4.1 The Standby Diesel Generator is run monthly in a loaded condition (STP 48A001) and maintenance data is recorded on Inspection Procedure No. IP-24. Review this data for the previous 12 months and verify that no trends toward degradation of components or accessories is indicated. Record the review results.

4.2 Complete Steps 2 through 16 of Table 1.0 and Steps 2 through 21 of Table 1.1 of Inspection Procedure IP-24.

Proces	dure Date October 9, 1977 Rev. 4 STP 9, 4004	
Υ.	Test Date Page 4 of 5	
5.0	Test Completion Criteria	
	The surveillance requirements will have been satisfied when the following items have been completed and signed off.	
5.1	This Surveillance Test Procedure was performed for the following reason:	
	<ul> <li>a. Standby Diesel Generator Annual Inspection</li> <li>b. Other (define)</li> </ul>	· · · · · · · · · · · · · · · · · · ·
5.2	The Test Data Sheets have been completed, reviewed signed and attached for each subsystem.	* • . 
	<ul><li>a. Subsystem A</li><li>b. Subsystem B</li></ul>	• <del></del>
<b>5.</b> 3	The surveillance test results, as documented by the Test Data Sheets, are as follows:	
•	Unacceptable	Acceptable
	a. Subsystem A b. Subsystem B	
5.4	Were any problems encountered during the Test?	
	a. Procedural (Related Document Change Form(s) attached)? DCF#	
•	b. Equipment (A ply of related Deviation Report(s) attached)? DR#	
<b>5.</b> 5	If Item 5.3 indicates any unacceptable surveillance results or unresolvable problems were encountered, has General Instruction 2.5 been implemented?	
5.6	Test Comments:	•
5.6	Test Comments:	
5.6	Test Comments:	· · · · · · · · · · · · · · · · · · ·

Mechanical Maintenance Supervisor

Surveillance Program Coordinator

Date

Date

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5.0 Test 5.1 Subs 5.2 Test	Data Sheets ystem A B Date	
Procedure Step	Required Action	Initial
4.1	Previous 12 months data from IP-24 reviewed and the results are:	
	RESULTS	
		•
4.2	Steps 2 through 16 of Table 1.0 and Steps 2 through 21 of Table 1.1	• .
	of Inspection Procedure IP-24 completed.	
		•
	Performed by Date Time	·
	•	ļ

ANE ARNOLD ENERGY CENTER

UNIT NO. 1

Reference Only

IOWA ELECTRIC LIGHT AND POWER COMPANY

. REV. 6 APPROVAL SURVEILLANCE TEST PROCEDURE NO. 45G002 STANDBY DIESEL GENERATOR DAILY OPERABILITY TEST Prepared by: <u>anul lebon</u> Date: <u>10/10/77</u> Larry Nelson Reproved by: <u>BRU/ark</u> Date: <u>10/13/77</u> Operations/Supervisor Approved by: Reactor & Plant Performance Engineer Date: 10-13-77

AILLI A MAUL Date: 10-13-77 Airman, Operations Committee Reviewed by Chairman.

Approved by: <u>Chief Engineer</u> Date: <u>10-14-77</u>

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Implementation Date 10/14/77

Rev. 6 10/10/77 Octobel 10, 1977

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#### STANDBY DIESEL GENERATOR DAILY OPERABILITY TEST

### 1.0 <u>Purpose</u>

The purpose of this test is to demonstrate operability of the operable standby diesel generators on a daily basis (when required). In accordance with the surveillance requirements of the DAEC Technical Specifications Sections 4.5.A, 4.5.C, 4.5.G and 4.5.J, this includes an operability demonstration of the diesel generator.

#### 2.0 General Instructions

- 2.1 There are two standby diesel generators to be tested as part of this procedure. The instructions of Section 4 are to be performed for each operable diesel generator.
- 2.2 This procedure contains Test Data Sheets(Pages 6 and 7) which are to document the instructions of Section 4 and data obtained. The "master" Test Data Sheet is to be reproduced and completed for each subsystem.
- 2.3 All steps of this procedure are to be performed in sequence. Only one subsystem is to be tested at a time.
- 2.4 The Operations Supervisor (or designated alternate) must be notified immediately whenever a procedural step cannot be completed as stated or if any other problem develops during the test. No maintenance, trip setting adjustment, or instrument replacement is permitted without his authorization.
- 2.6 A Deviation Report should be completed for any problems encountered during the test.
- 2.7 Personnel required for this procedure:

Group	· · ·	Number		
Operations		2	•	
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<b></b>		••••••••••••••••••••••••••••••••••••••	···· ··-	
8-9-9-9-9-9-9-9-9-9-9-9-9-9-9-9-9-9-9-9		<u>e.e</u>	•	

2.8 At the completion of testing, Test Completion Criteria Section 5, the completed Test Data Sheets and any Deviation Report(s) should be submitted to the Operations Supervisor for review and approval. Procedure Date October 10, 1977

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Page 2 of 9

- 2.9 Inspection Procedure IP-24 should be performed concurrently with this procedure.
- 2.10 This test was written for SBDG 1G31. The information in parentheses refers to SBDG 1G21.

- 3.0 <u>Special Precautions</u>
- 3.1 There are no special precautions to be observed for this test.

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All stops of this protour. Sudsystem is these test.

2.4 Side Commences one Submitters immediately recommendations and if approximations again in the sectory without the cut gue another recommend.

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2.8 At the completion of testim completed lest late Sheets and 440 sparstings Supervised for

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4.0	Procedure
	The Test Data Sheets must be completed as each step and/or substep is completed.
-	NOTE: All steps are performed at Panel 1C08 and verified by indicating lights, unless otherwise stated.
4.1	Complete Steps 2 through 16 of Table 1.0 of Inspection Procedure IP-24.
4.2	Place the UNIT/PARALLEL switch to the PARALLEL position on Panel 1C93 (1C94)
4.3	Start Emergency Service Water Pump 1P-99A (1P-99B).
4.4	Start and run the Prelube Pump for two (2) minutes.
4.5	Start Standby Diesel Generator 1G31 (1G21). Record the time.
4.6	Verify that annunciator D GEN 1G31 (1G21)RUNNING, window A10 (B3) 1s activated.
4.7	Verify Diesel Gen 1G31 (1G21) Frequency Meter indicates 60Hz. Adjust the frequency as necessary.
4.8	Verify Diesel Gen 1G31 (1G21) Voltmeter indicates 4160 volts. Adjust the voltage as necessary.
4.9	Verify that Supply Fan 1V-SF-20 (1V-SF-21) is running.
4.10	Place the 4KV Bus 1A3 (1A4) Auto-Manual transfer switch in the MAN position.
4.11	Synchronize the diesel generator under test to the essential bus and close the circuit breaker.
4.12	Increase the diesel generator load to 2850 KW, run the diesel generator under test for 30 minutes, and complete the remaining Steps of Table 1.0 of Inspection Procedure IP-24.
	NOTE: To ensure the diesel will not motorize do not trip the engine before tripping the associated generator breaker.
4.13	Decrease the diesel generator load to approximately 50 KW, trip the diesel generator circuit breaker, and allow the engine to run unloaded for 5 minutes.
4.14	Place the 4KV Bus 1A3 (1A4) Auto-Manual transfer switch in the AUTO position.
4.15	Stop the diesel generator under test and record the time.
4.16	Verify the annunciator DIESEL GEN 1G31 (1G21) RUNNING, window no. A10 (B3) is reset.
4.17	Verify that the diesel generator voltage decreases to zero, and the frequency meter goes to mechanical zero.

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	starting air to the engine under test for 10 seconds.
	Return the diesel generator under test to a standby status as follows:
	a. Verify fuel oil level of diesel oil storage tank is > 36,000 gallons. Record the as found value.
	b. Verify that all fluid inventories are at the proper level, e.g., engine luge oil, jacket water and governor oil.
	<ul> <li>Verify that all diesel generator subsystem annumciators at Panel</li> <li>1C08 and local Panel 1C93 (1C94) are reset.</li> </ul>
	d. Reset the overspeed trip.
	Place the UNIT/PARALLEL switch in the UNIT position on Panel 1C93 (1C94).
	Stop the Emergency Service Water Pump of Step 4.3.
	Attach completed Table 1.0 of Inspection Procedure IP-24.
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•	Verify include (Set 17-57-11 Mit-F-11 metric)
•	Place the 48% bus 181 (124) auto-lishual rransis. ()
	Synchronize the diese quemerator under test to
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	lice particular quine all preservations lies of approximate Estado toto culto dal transferencia dal calendaria del construction
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	Test Date	Pag	$e^{5}$ of '9	Ð
5.0	Test Completion Criteria		<u></u>	
··	The surveillance requirements w following items have been compl	ill have been sati eted and signed of	sfied when the f.	Guce
5.1	This Surveillance Test Procedur reason:	e was performed fo	r the following	
· ·	<ul> <li>a. Standby Diesel Generator I Test as required by STP #</li> <li>b. Other (define)</li> </ul>	aily Operability		•()
5.2	The Test Data Sheets have been of signed and attached for each ins	completed, reviewed strument channel.		
	<ul> <li>a. Diesel Generator 1G31</li> <li>b. Diesel Generator 1G21</li> </ul>			
5.3	The Surveillance test results, a the Test Data Sheets, are as fol	as documented by th lows:	e	A
- بین به ۲۰۰۰ - بین به ۲۰۰۰ - ۲۰	<ul> <li>a. Diesel Generator 1C31</li> <li>b. Diesel Generator 1G21</li> </ul>		Un acceptable Ac	ceptable
5.4	Were any problems encountered d	uring the test?		
•	a. Procedural (Related Document	Change Form(s) at	tached? DCF#-	
	b. Equipment (A ply of Related )	Deviation Report(s)	) attached)? DR#	· · · · · · · · · · · · · · · · · · ·
5.5	If Item 5.3 indicates any unacce or unresolvable problems were en Instruction 2.5 been implemented	ptable surveillanc countered, has Gen ?	e results eral 	
5.6	Test Comments:			

**Operations** Supervisor

Date

Surveillance Program Coordinator

Date

* <u>.</u>....

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#### Test Data Sheets 6.0

- Diesel Generator Under Test 1G31 6.1
- ارد. به مصحح المعادية موجود مادية بواصف المريمة مما والا المرك المحمد المالية موالد والمرك ما يوليه ما الارد المحمد م 6.2
  - Test Date _____

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<b>6.2</b> Test	Date Only	MI.
Procedure Step	Required Action	Initials
4.1	Steps 2 through 16 of Table 1.0 of Inspection Procedure IP-24 completed.	
4.2	UNIT/PARALLEL switch in the PARALLEL position.	
4.3	Emergency Service Water Pump 1P-99A (1P-99B) started.	
4.4	Prelube pump run for two (2) minutes.	
4.5	Diesel Generator 1G31 (1G21) started. Time of Start	
4.6	Annunciator DIESEL GEN 1G31 (1G21) RUNNING, window no. A10 (B3) is activated.	
-4 <b>-</b> 7	Diesel Gen 1G31 (1G21) Frequency Meter indicates 60 Hz.	
4.8	Diesel Gen 1G31 (1G21) Voltmeter indicates 4160 volts.	
4.9.	Supply Fan 1V-SF-20 (1V-SF-21) running.	
4.10	-4KV Bus 1A3-(1A4) Auto-Manual Transfer switch in the MAN position.	
4.11	Diesel generator synchronized, breaker closed.	
4.12	Diesel generator load 2850 KW, 30 minute load run complete, remaining Steps of Inspection Procedure IP-24 completed.	
4.13	Diesel generator load approximately 50 KW, diesel generator circuit breaker tripped, engine run unloaded for 5 minutes.	
4.14	4KV Bus 1A3 (1A4) Auto-Manual transfer switch in the AUTO position.	
4.15	Diesel generator under test stopped.	
	Time of Stop	
4.16	Annunciator DIESEL GEN 1G31 (1G21) RUNNING, window no. A10 (B3) reset	•
4.17	Diesel generator voltage decreased to zero, and frequency meter indicates-mechanical zero.	
4.18	Injection pump control racks tripped by depressing Emergency Stop Pushbutton (overspeed trip).	
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Procedure Date Octobe 0, 1977 Rev. 6

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6.0 Test Data Sheets

6.1 Diesel Generator Under Test 1G31 _____ 1G21 ____

6.2 Test Date _

Procedure. Step	Required Action	Initials
4.19	Starting air admitted to engine under test for 10 seconds utilizing manual override of normal air start solenoid.	
4.20.a	Fuel oil level verified > 36,000 gallons.	
	As found value	
<b>4.20.</b> b	All fluid inventories at the proper level.	
4.20.c	All subsystem annunciators at Panel 1008 and local Panel 1093 (1094) reset.	
4.20.d	Overspeed trip reset.	
4.21	UNIT/PARALLEL switch in the UNIT Position on Panel 1C93 (1C94).	
4.22	Emergency Service Water Pump of Step 4.3 stopped.	
4.23	Completed Table 1.0 of Inspection Procedure IP-24 attached.	
•		
-		

Procedure Date October

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## Table 1.0 FIGING RUN-UP Unit No.

•	•	(Reference	Peragraph 1.	1)	Date
Linc	Iten	Normal Condition	Actual Condition	Remarks	Reference
но. 	TTEMS TO BE CHECKED	HFORE STARTIN	; EXGINE		•
2	Engine Coolant Level	<u> </u>			Ref. 32, Page Q1
• 3	Engine Coolant Temperature	100 - 100°F			-
- <u>1</u>	Engine Lube Oil Level	Full			Ref. 32, Pege P2
i 5	Engine Lube Oil Temp.	<u>130 - 135°7</u>			-
6	Lube Oil Circulation Fump	Running	nas InEljan	ernot of Fater e	
<u>۴.</u>	Coolent Circulation Pump	Running Isi min		· · · · · · · · · · · · · · · · · · ·	-
. 8	Sterting Air Fressure	200 - 240 psi			
1	Auto Lube Oil Nake-up Tank Level	Full		·	-
	Drain Air Starting Lines				Ref. 2
11	Generator Bearings Oll Level	Full			Fage 6
12	Air Compressor Oil Level* - 1K-10A (orB)	בנניז		•	• -
13	Air Compressor Oil Level*-1K-1CC (orD)	Full			-
· 🔽	Air Compressor Dies Engine Oil Level **	Pull			
1	Governor Oil Lever				
1	5 Inspect Air Intake Filter	•	· · ·	· · · · ·	
	•				.   .

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	•	Uni (Reference	, Paregraph 1	.1)	Date
Line No.	Iten	Normal Condition	Actual Condition	Remarks	Reference
17	ITEMS TO BE CHECKE	D AFTER TEMPE	VIURE EQUILIE	RUM	
18	Engine Coolant Temperature	170 - 185°F			Ref. 3a, Section Q
19	Engine Lube Oil Pressure	30 - 35 psi		•	Ref. 3a, Section P
20	Engine Lube Oil Temperature	195 - 215°F			Ref. 3a Section P
21	Air Cooler Inlet Temperature	Less than 100° P			Ref. 3a Section K
22	Fuel Oil Pressure	_12 - 15-p:i-		•	Ref. 3a Section L
23	Pressure Drop, Lube Oil Filters	-18-psi-max.			Ref. 3a Section P
24	Pressure Drop, Fuel Oil Filter	10 psi max.			Ref. 3a, Section L
- 25	Engine Lube Oil Leakage		•		Ref. 3a Section L
• 26	Engine Lube Oil Pump Leakage	-			Ref. 32
27	Exhaust Temperature	-850 - 1100°F			Ref. 3a,
28	Crankcase Vacuum	0.4 to 2.0 in. of Water	*		SCCELON S
29	Engine Coolent Level	in.	•		Ref. 3a, Page 23
30	Pressure Drop, Lube Oil Strainer	12 psi-Eax.		· · ·	Ref. 3 Page 14
-	• • •		•		
	• If the oil is below	the proper le	vel, add oil	er LP-14, Paragraph 1	·3.
			<u> scc_oil-</u>	nr 19-15. Paragragh	
	·····			•	•
DUANE ARNOLD ENERGY CENTER

UNIT NO. 1

ICWA ELECTRIC LIGHT AND POWER COMPANY

REV. 9 APPROVAL

SURVEILLANCE TEST PROCEDURE NO. 48A001

STANDBY DIESEL GENERATOR OPERABILITY TEST

Prepared by:

Bresaw

Reproved by: 7 Operations Supervisor Approved by: Reactor & Plant Merformance Engineer

Approved by: Chairman, Operations Committee

Date: Mar 31, 1977

Reference Only

Date: 5

Date:

Date: 4

Approved by: <u>Chief Engineer</u>

emmand Date: 4-1-77

Implementation Date 4/1/77

Rev. 9 3/24/77 Procedure Date

24,

March



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## STANDBY DIESEL GENERATOR OPERABILITY TEST

## 1.0 Purpose

- 1.1 The purpose of this test is to demonstrate operability of the standby diesel generators, including the diesel generator starting air compressor and the diesel fuel oil transfer pump subsystems. In accordance with the surveillance requirements of the DAEC Technical Specifications, Section 4.8.A, this includes a manual start and a one-hour full load operation of the standby diesel generator monthly. The diesel starting time to reach rated voltage and frequency shall be logged.
- 1.2 To demonstrate the capability of each standby diesel generator to be started by either of its air start solenoids by direction of the Operating Committee on April 13, 1974.

## 2.0 General Instructions

- 2.1 There are two standby diesel generator subsystems to be tested as part of this procedure. The instructions of Section 4 are to be performed for each subsystem.
- 2.2 This procedure contains data sheets (pages 7, 8, 9, and 10) which are to be used to document the instructions of Section 4 and data obtained. The "master"_data_sheets_are_to be reproduced and completed for each subsystem.
- 2.3 All steps of this procedure are to be performed in sequence. Only one subsystem is to be tested at a time.
- 2.4 The Shift Supervising Engineer must be notified immediately and Section
  3.8.A of the DAEC Technical Specifications (LCO) referred to whenever problems are encountered during the test.
- 2.5 The Operations Supervisor (or designated alternate) should be notified whenever a procedural step cannot be completed as stated or if any other problem develops during the test. No maintenance, trip setting adjustment, or instrument replacement is permitted without his authorization.
- 2.6 A Deviation Report should be completed for any problems encountered during the test.
- 2.7 Test equipment required for this procedure:

a. Stopwatch

**b.** Keys for air supply valves