REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)
DISTRIBUTION FOR INCOMING MATERIAL 50-220

REC: GOLLER K R
NRC

ORG: DISE D P
NIAGARA MOHAWK PWR

DOCDATE: 02/14/78
DATE RCVD: 02/21/78

DOCTYPE: LETTER NOTARIZED: NO

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LTR 1 ENCL 1

SUBJECT:
ATT COMPLETED COPY OF QUESTIONAIRE CONCERNING THE EMERGENCY DIESEL GENERATORS TO SUPPL PREVIOUS INPUT DTD 01/20/78.

PLANT NAME: NINE MILE PT - UNIT 1

REVIEWER INITIAL: XBT
DISTRIBUTOR INITIAL:

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

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

FOR ACTION: BR CHIEF LEAR**W/3 ENCL

INTERNAL:
REG FILE**W/ENCL
I&E**W/2 ENCL
HANAUER**W/ENCL
F CLEMENSON**W/ENCL
NRC PDR**W/ENCL
OELD**W/ENCL
F ROSA**W/ENCL
DIS SER BR-MC**W/ENCL

EXTERNAL:
LPDR'S
OSWEGO, NY**W/ENCL
TIC**W/ENCL
NSIC**W/ENCL
ACRS CAT B**W/10 ENCL

DISTRIBUTION: LTR 25 ENCL 25
SIZE: 23P

CONTROL NBR: 780520308

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

ma 4

NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

February 14, 1978

Director of Nuclear Reactor Regulation
Attn: Mr. Karl R. Goller
Assistant Director of Operating Reactors
Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Re: Nine Mile Point Unit 1
Docket No. 50-220
DPR-63

Gentlemen:

Our letter of January 20, 1978 submitted a partially-completed questionnaire concerning the emergency diesel generators at Nine Mile Point Unit 1. Attached is a completed copy of that questionnaire. Changes and additions are denoted by vertical marginal markings.

Please contact Mr. W. R. D'Angelo should further information regarding this questionnaire be desired.

Very truly yours,

NIAGARA MOHAWK POWER CORPORATION

Donald P. Dise

Donald P. Dise
Vice President-Engineering

MGM/szd

Attachment

A014
S
1/1

780520308

Questionnaire

for

NUCLEAR REGULATORY COMMISSION
RELIABILITY STUDY

of

Standby Diesel Generator Units

Date Questionnaire Completed: February 7, 1978

Plant Name: Nine Mile Point Unit No. 1

Diesel Manufacturer: Electro-Motive Model: 20-645-E4

Number of Units: 2

Size Kw/Unit: 2560 KW @ .8 PF Rated Speed: 900 RPM

Average Operating Hours Per Unit to Date: 510 hours

DIESEL GENERATOR STATUS

A. Engine:

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

   a. Defective parts X (10)
   b. Installation errors: _____
   c. Failure of system to respond properly in function or sequence: _____
   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. _____
   Air cranking motor X Mfr. Ingersol Rand Model No. D89RH-46
   Electric cranking motor ____ Mfr. _____ Model No. _____

2. If air cranking, then:

Give size of starting air tank: Length 84" Diameter 24"

Normal standby air tank pressure 220 psi.

Is pressure reducer used? Yes X No ____
Reducer pipe size? 1.5 inches.

Starting air control admission valve pipe size in air piping system, 1.5 inches.

Minimum air tank pressure for engine cranking 175 psi.

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

Number of air tanks per engine 5.

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

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 X No ____

Is starting air piping horizontal? Yes X No ____

Does it slant toward drain? Yes ____ No X*

If water condensate drains are provided, then is draining:

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

*Drops vertically 3' to air starting motors.

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

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

If provided, where installed? At the suction end of the air motors.

How is it cleaned? Air blow off

How often and when? Upon routine check

Give pipe size of filter: 1.5 inches.

How is it known whether filter is plugged or has high pressure drop? low air pressure to starting motors.

Is starting air pipe to engine positioned:

a. Below floor? ___
b. On the floor? ___
c. Overhead? X

What is air pressure drop from air tank to engine during cranking 15 psi

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

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

Diameter of starting air pipe from:

a. Air tank to starting valve 1.5 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? 600 volt A.C. supply to motor driven comp.

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

What is the time required to recharge one air tank? less than 30 minutes

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

If yes, then by:

a. Gasoline engine? ___
b. Motor driven? ___
c. Other? (Specify) _____

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

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) _____

C. Fuel Oil System: Bulk Tank to Day Tank

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

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

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

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

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

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

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

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

   If yes,

   Give approximate amount inches ____ feet ____

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

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

   a. Warm? X
   b. Hot? ____ (above 130°F)

What is fuel oil return line size (nominal)?

a. Pipe size .75 inches
b. Tubing size ____ inches

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

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

a. By gravity ____
b. Engine driven pump X
c. Electric motor driven pump X
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 ____ No X

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

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

9. Approximate bulk tank capacity, 10,000 gallons.

10. Typical frequency of refilling (weekly, monthly, etc.) twice/year.

11. Typical refill (gallons), 4000 approximately.

D. Lube Oil System

1. Lube oil

a. Type Mobil Guard 440
b. Viscosity SAE 40
c. Specification number ASTM-1000
d. Oil change determined by:

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

2. Lube oil filters are:

   a. Full flow X
   b. Bypass _____
   c. Combination _____

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

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

4. Oil Pressure Monitoring

   a. Normal operating pressure 55 psi
   b. Alarm 43 psi
   c. Shutdown 17 psi

5. Oil temperature control:

   a. By standby heater in engine sump 120 °F.
   b. Heating means for maintaining standby temperature:

      Direct in oil _____
      Oil-to-water heat exchanger X
      Other (Specify)_____

E. Cooling System - Engine Water

1. Temperature control by:

   a. By thermostat in water? Yes X No ____

      If yes, then:

      Bypass thermostat? Yes X No ____
      Throttle thermostat? Yes ____ No ____

b. By radiator shutter: N.A.

Automatic ____
Manual ____
Other (give type) _____

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

If yes, give chemical additive or name of compound.

Sodium Cromate ($Na_2 Cr O_4$)

Proportion or concentration control:

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

3. Engine cooling water cooled by:

a. Radiator? No
b. Heat exchanger from sea, river or other water? X
c. Other? (give type) _____

4. Engine cooling water temperature-monitoring

a. Standby temperature 120 °F
b. Normal operating temperature 155 °F
c. Alarm temperature 195 °F
d. Shutdown temperature N.A. °F
e. Water circulation during standby:

Thermo-syphon X
Pump _____

5. Water Pressure Monitoring: Yes X No ____

a. Alarm N.A.
b. Shutdown 35 psig falling
c. Both _____

6. Water temperature Sensor Position:

   a. In piping from engine ____
   b. In engine piping __X__
   c. In engine direct ____

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

   If yes, then bottom connected to:

   a. Water pump suction? Yes __X__ No ____
   b. Top of system? Yes __X__ No ____
   c. Both of above? Yes __X__ No ____
   d. Is bottom of surge tank above top of engine system? Yes __X__ No ____
   e. Does engine have constant air bleed from top of engine water piping to surge or supply tank? Yes __X__ No ____
   f. Give size of bleed or vent line, __1__ inches.
   g. Manual air bleed only? Yes ____ No __X__

F. Governor - Speed Control

Manufacturer __Woodward__
Electric (speed sensing) ____
Hydraulic __X__
Type or code (such as EGB-35, LSG-10, etc.) __UG8__
Automatic load sharing? Yes __X__ No ____

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

   If yes, adjusted by:

   a. Eye and ear?
   b. Test and specification? __X__
   c. Other? (Specify) ____.

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

Is the engine stopped:

a. Manually? Yes ____ No X*

If yes, then:

Directly at engine? Yes ___ No ___
Through local control panel? Yes ___ No ___

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

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

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

e. Other means. Describe briefly. _____

_____

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

a. Full fuel or maximum fuel position? Yes
b. Full off or no fuel position? No
c. Intermediate? No
d. Random? No

(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, 10 seconds.

*Normally it started and stopped from the Control Room.

G. Governor - Overspeed (shutdown)

1. Speed sensing?

   a. Electrical ____
   b. Flyball X
   c. Other (Specify) _____

2. Fuel shutoff force generated by:

   a. Spring? X
   b. Air? ____
   c. Hydraulic? ____
   d. Electrical? X
   e. Other? (Specify) _____

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

   a. 115% ____
   b. 110% ____
   c. Other (Specify) 118%

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

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

H. 1. Generator Mfr. Electro Motive Model No. A-20-C1
   Single bearing or two bearings? Single Bearing
   Does generator have damper windings? Yes X No ____

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

   Is problem repetitive? Yes ____ No ____

   If yes, then describe briefly. _____

I. Exciter and Voltage Regulator

1. Exciter Manufacturer: Vickers Model _____

   Type: Rotating _____ Static X

   If rotating drive? Direct ____
   Belt or Chain _____
   DC with field control _____
   Brushless with rectifier _____

2. Voltage Regulator: Manufacturer Vickers Model 35D870-2

   Type: Mechanical _____ Static X

3. Are paralleled units of automatic load sharing control of fully automatic type? Yes ____ No X
   We do not parallel the diesel generators
   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. Have engine governor and voltage regulator/exciter adjustments been made on the site or under any conditions since any of the units have been placed in service? Yes ___ No X

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

   _____

5. If any difficulties have occurred, give approximate number of problems. No Difficulties

   a. Components ____
   b. Wiring ____
   c. Other (damage in service or dropping of miscellaneous hardware into switchboard, etc.) _____.

J. Paralleling: Engine-Generator Units See I.3.

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

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

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

   If no, approximate percent difference. _____

4. Synchronizing

   a. In automatic synchronizing do circuit breakers close 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 _____
      Never _____

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

1. If any difficulties have occurred, then give approximate number of problems. No Difficulties

   a. Components _____
   b. Wiring _____
   c. Other (damage in service or dropping of miscellaneous hardware into switchboard, etc.) _____
   d. Design concept faults. That is, does the switch 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. Two 125 V.D.C. station batteries

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

If no, briefly describe. ___

d. Is there a ~~DG~~ station battery maintenance program? Yes X No ___

L. Safety Shut downs

Give safety shut down settings compared to equilibrium operating conditions.

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

a. Synchronous and usual 900 rpm or 60 Hz
b. Overspeed shutdown setting 1060 rpm or ___ Hz

2. Engine cooling water (see E.4)

a. Equilibrium 155 °F
b. Alarm 195 °F
c. Shut down No Trip °F

3. Lube oil pressure (see D.4)

a. Equilibrium 55 psi
b. Alarm 43 psi
c. Shut down 17 psi

4. Lube oil temperature

   a. Equilibrium 150 °F
   b. Alarm 52 °F
   c. Shutdown No Trip °F

5. Indicate all other protective interlocks (give name and;)

   a. Usual or proper condition Low water pressure switch, closes 45 psig rising pressure, generator lock relay.
   b. Shutdown condition opens 35 psig. Falling pressure, generator lockout relay operated.

6. a. What source of power is provided to operate alarms and shutdown controls? (See G.2) 125 V.D.C.

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

M. Emergency or Alert Conditions

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

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

   low water pressure switch*, bearing oil pressure switch*, overspeed switch*. The differential relay and direction ground relay are not bypassed.

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

   If yes, is it testable? Yes ___ No ___

N. Maintenance

1. Does plant have regularly scheduled maintenance procedures? Yes

   If so, return copy of these procedures with questionnaire. Request procedure N1-PM-C6 from Nine Mile Point, T. J. Perkins-Superintendent.

*These are bypassed for 2 minutes under emergency starting conditions.

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

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

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

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

      immediate or early action? X
      as scheduled only? _____

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

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

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

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

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

      Yes X No _____

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

0. Starting Conditions

   1. Give starting or necessary cranking time as experienced.

      a. Starting time per specification 10 seconds
      b. Usual starting time 5 seconds
      c. Maximum starting time observed 8 seconds

2. Give usual time intervals as follows:

   a. Time from start-to-crank to first firing of any cylinder. 3 seconds

   b. Time from start-to-crank to approximate full firing of all cylinders. 5 seconds

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

   a. Usual conditions _____ rpm
      _____ Hz

   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 _____ seconds
   b. Maximum _____ seconds
   c. As specified _____ seconds.

5. Give briefly the most troublesome problems in starting. No problems in starting.

   a. Most troublesome _____.

   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 X

*This information is not obtained during surveillance testing.

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

   a. Oil bath ___X___ Make Electro Motive
   b. Oil wetted screen _____ Make _____
   c. Paper _____ Make _____
   d. Other _____ Make _____
   e. Precleaner: Yes ____ No ____

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

   a. Instrument such as:

      manometer ___X___
      If other give type _____
   b. Personal judgement by appearance, etc. ___X___
   c. By smoking exhaust _____
   d. Time schedule _____
   e. Other (Specify) _____

4. Are climatic extremes normally experienced such as:

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

5. Are climatic extremes potentially possible such as:

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

Q. Temperature Conditions

1. Ambient outside hottest ___100___ °F.

2. Ambient outside coldest ___-30___ °F.

3. Engine-generator room hottest ___100___ °F.

4. Engine-generator room coldest ___50___ °F.

5. Inside switch gear hottest ___100___

6. Inside voltage regulator or ambient near voltage regulator hottest ___100___ °F

7. Ambient at exciter hottest ___100___ °F

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

1. Minimum education required (check)

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

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

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

3. Operator training

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

4. Licensing required

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

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

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

Gases _____ Volume (ft^3) _____

T. Does control system automatically bypass, in emergency starting, any engine temporarily out of service for maintenance? Yes _____ No X ; There is only one diesel generator on each emergency bus.

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

_____

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

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

If yes, then which part or subsystem? _____

How many failures? _____

Give nature of failure. _____

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

Give brief reasons for the answer. The vendor serviceman is more likely to spot developing troubles. He also has knowledge of current unit problems on similar units.

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

Preoperational test Date 7/69

Engine Serial No.	Surv. Testing & Maintenance Hrs. No Load	Loaded	Emergency and Other Service Hrs.	Total Hours
102	20*	200*	290**	510***
103	20*	200*	290**	510***

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	
1 hr/month per unit	none	24	

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

a. Starting date of surveillance testing (OL date) 8/69
b. Periodic test interval monthly
c. Total number of surveillance tests performed 129
d. Total number of test failures none

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

e. Supply a copy of the surveillance test procedures with this completed questionnaire. Request procedures R2 and N1/S1/M4 from Nine Mile Point, T. J. Perkins-Superintendent.

* These are estimated hours.

** Units were used for peaking prior to operation.

*** Actual elapsed times.

Additional Comments

none

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.

none