Commonwealth Edison
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Address Reply to: Post Office Box 767
Chicago, Illinois 60690

September 28, 1984

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Dresden Station Units 2 and 3
Quad Cities Station Units 1 and 2
Zion Station Units 1 and 2
LaSalle County Station Units 1 and 2
Response to Generic Letter 84-15
NRC Docket Nos. 50-237/249, 50-254/265
50-295/304, 50-373/374

Reference (a): Generic Letter 84-15 - D. G. Eisenhut letter to All OLs and CPs dated July 2, 1984

Dear Mr. Denton:

Reference (a) requested that all operating plants furnish information and comments concerning diesel generator reliability and proposed staff actions within ninety days of Generic Letter's 84-15 issuance.

Attached are responses for Dresden, Zion and LaSalle County Stations. We consider the responses for these stations to be complete; the Quad Cities' response will be submitted by October 15, 1984.

To the best of my knowledge and belief the statements contained in the Attachment are true and correct. In some respects these statements are not based on my personal knowledge but upon information furnished by other Commonwealth Edison employees, contractor employees and consultants. Such information has been reviewed in accordance with Company practice and I believe it to be reliable.

Please address any questions that you or your staff may have concerning our response to this office.

A056
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One signed original with Attachment and forty copies are being provided for your use.

Respectfully,

Greg Alexander

Greg Alexander
Nuclear Licensing Administrator

cc: RIII Inspectors - D/Z/LSC

SUBSCRIBED and SWORN to
before me this 1st day
of October, 1984

Rosalie A. Prenta
Notary Public

9253N

ATTACHMENT

COMMONWEALTH EDISON COMPANY

Ninety day response to Generic Letter 84-15 "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability".

Part I Dresden Station Units 2 and 3

Part II Quad Cities Station Units 1 and 2

Part III Zion Station Units 1 and 2

Part IV LaSalle County Station Units 1 and 2

9253N

ATTACHMENT PART 1
DRESDEN STATION UNITS 2 AND 3

The following documents Dresden Station's responses to Generic Letter No. 84-15. The responses do not consider Unit 1 since it has been retired.

Question 1, Enclosure 1, Paragraph 3: Licensees are requested to describe their current programs to avoid cold fast starts or their intended actions to reduce the number of cold fast start surveillance tests from ambient conditions for diesel generators, Licensees are encouraged to submit changes to their Technical Specification to accomplish a reduction in the number of such fast starts.

Response: Dresden's Nos. 2, 2/3 and 3 diesel generators are each equipped with a 15 kW immersion heater, and a circulating oil pump. Natural circulation caused by the cooling water heater transfers heat to the circulating oil system in the oil cooler. The circulating oil pump provides warm lube oil to the turbocharger and during shutdown conditions a small flow returns to the main oil system. The engine low oil temperature alarm setpoint is 85°F. When engine oil temperature reaches 85oF a diesel generator trouble alarm annunciates in the Control Room. The heating system normally maintains engine temperature above 100°F. The circulating oil pump and the heater maintain the engine in standby readiness. Consequently, cold fast starts are not performed at Dresden. Therefore the statement proposing a reduction in the number of cold fast starts is not applicable to Dresden.

Question 1, Enclosure 1, Paragraph 4: In order to make those few plants consistent with the majority of the plants, it is the staff's position that the requirements for testing diesel generators while emergency core cooling equipment is inoperable, be deleted from the Technical Specifications for such plants. The affected Licensees are encouraged to propose Technical Specifications to make such changes.

Response: For the three full years from 1981 to 1983, each of the 3 Dresden diesel generators averaged 29.7 starts per year. If the requirements for emergency core cooling system inoperable, unit diesel inoperable, and swing diesel inoperable surveillances are removed the average number of starts per diesel would be reduced to approximately 15 per year. Dresden Station recommends that both ECCS inoperable and diesel inoperable surveillance

requirements be removed. The basis for the recommendation is the belief that diesel generator reliability will be improved by reducing the number of surveillances. The applicable Technical Specifications are as follows:

Core Spray Subsystem inoperable - 3.5.A.2/4.5.A.2
LPCI Pump inoperable - 3.5.A.4/4.5.A.4
LPCI Subsystem inoperable - 3.5.A.5/4.5.A.5
CCSW Subsystem inoperable - 3.5.B.3/4.5.B.3
Diesel Generator or associated Bus inoperable - 3.9.2

Question 3, Enclosure 2, Paragraph 1: To assist the staff in assessing the current reliability of diesel generators at operating plants, Licensees are requested to report the reliability of each diesel generator at their plant for its last 20 and 100 demands. This should include the number of failures in the last 20 and 100 demands indicating the time history for these failures.

Response: The reliability and time history of failure data which follow, are based on the valid test and failure criteria of Regulatory Guide 1.108 position C.2.e. Documentation of the last 100 valid tests for each diesel, failure dates and reasons are included in Attachment 1.

DIESEL GENERATOR RELIABILITY FOR PAST 20 DEMANDS

Diesel Generator	Number of Failures Per Past 20 Demands	Reliability
#2	1	95%
#2/3	0	100%
#3	1	95%

DIESEL GENERATOR RELIABILITY FOR PAST 100 DEMANDS

Diesel Generator	Number of Failures Per Past 100 Demands	Reliability
#2	3	97%
#2/3	2	98%
#3	8	92%

TIME HISTORY OF FAILURES FOR PAST 100 DE.@@NDS

Year	Diesel Gen. #2	Diesel Gen. #2/3	Diese@ Gen. #3
1984	1	0	1
1983	0	1	2
1982	0	1	1
1981	2	0	4
1980	0	See Note 1	See Note 1

(Note 1) - The interval for the past 100 demands on the #2/3 and #3 diesel generators did not include any demands performed in 1980.

Question 4, Enclosure 2, Paragraph 1: Licensees are requested to indicate whether they maintain a record which itemizes the demands and failures experienced by each diesel generator unit, in the manner outlined in Regulatory Guide 1.108 Position C.3.a, for each diesel generator unit. Licensees should also indicate whether a yearly data report is maintained for each diesel generator's reliability.

Response: Dresden does not currently maintain a running record which itemizes diesel generator demands and failures. However, hard copies of diesel generator surveillance tests for the current year are kept in the Surveillance Coordinator's file. At the end of each year the hard copies are microfilmed and stored in the central filing system. Diesel generator failures are reported in accordance with 10 CFR 50.72 and 50.73. Hard copies and/or microfilmed copies of LER/DVR/DIR reports documenting diesel generator and/or associated system failures are maintained at Dresden.

Dresden does not currently maintain a yearly data report for each diesel generator's reliability.

Question 53 Enclosure 3, Paragraph 2: In view of the above, Licensees are requested to describe their diesel generator reliability program, if any, for attaining a reliability goal. The program description should address the surveillance and testing the Licensee performs to demonstrate the selected diesel generator reliability.

Response: Dresden does not have a diesel generator reliability program and consequently does not perform surveillance tests other than those required by the Technical Specifications. However, Dresden Station has an extensive preventive maintenance program for the diesel generators which is directed towards improved reliability. The diesel generators at Dresden are inspected by the Mechanical and Electrical Maintenance Departments on a monthly, quarterly, semi- annual, annual and biannual basis. The Mechanical Maintenance Department also performs a 5 year/8000 hour inspection. The applicable procedures for these maintenance inspections are DMP 6600-1,2,3,4,5,6,7,8 and 9. These inspections, along with the inspections (Appendix D) performed by the equipment operator on a per shift basis, have allowed Dresden to achieve the reliability as documented in response to the Question 3 of Enclosure 2 of the subject Generic Letter.

Question 6, Enclosure 3, Paragraph 2: All Licensees have received the staff's previous letter transmitting the findings of NUREG/CR-0660, "Enhancement of On-Site Emergency Diesel Generator Reliability, February, 1979" identifying areas where diesel generator operational

problems were occurring in general. Licensees should consider the recommendations of NUREG/CR-0660 in their reliability program.

Response: A response to each of the recommendations of NUREG/CR-0660 follows:

Recommendation #A1: Refrigerated or desicant type air driers should be used on diesel generator air starting systems to prevent moisture from accumulating in air lines.

Response: Dresden blows down all four air receivers on each diesel generator on a daily basis. The air line strainers between the air pressure regulator and air start relay valve are cleaned and inspected every three months. The air start relay valve is cleaned and inspected once per year. The air pressure regulator is replaced once per year. The air start system filters are replaced once per year. The air intake filter on the starting air compressors is cleaned once per year. The air start motors are replaced every two years.

Recommendation #A2: Electrical contacts and relays (directly related to diesel generator functions) should be enclosed within air-tight fixtures. Electrical cabinets should be equipped with gasketed doors and filtered louvers to prevent dust, dirt, and foreign material from entering between the electrical contact surfaces.

Response: Every three months the Electrical Maintenance Department at Dresden inspects all "push-on" connectors in the engine control cabinet to ensure that they are tight and in good condition. Every three months all terminal blocks, relays and miscellaneous equipment in the engine control cabinet that use screw or bolt type connections are inspected for tightness. Every six months all cabinet mounted relays are cleaned and inspected; all diesel cabinet relays are verified to be in the normal condition and cleaned. Every six months the diesel start HFA relay is inspected; all electrical connections in the exciter panel are verified to be in the normal condition. Every year the top of the exciter panel is blown out, thereby cleaning the surge supressor

assemblies. Each year all wiring is inspected for terminal tightness and lug condition, the voltage check auxiliary relays are also inspected. Rubber stripping has been installed on the electrical cabinet doors of all emergency diesel generators to prevent oil, dirt, and fumes from entering the cabinets.

Recommendation #A3: Changeout turbochargers to the heavy duty gear type.

Response: Dresden loads its diesel generators within a few minutes of the manual start signal, and runs its diesels unloaded for a 5-minute cooldown period. Conse- quently, extended low load or idling runs are not performed at Dresden. For this reason, Dresden has chosen not to install heavy duty gear type drives.

Recommendation #A4: Training of operators, maintenance personnel, direct supervisors and Q.A. personnel in an intensive and continuing program should be established for diesel generator operation.

Response: Dresden's personnel are trained to all applicable procedures and personnel error has not significantly affected diesel generator reliability.

Recommendation #B1: Prelube periods prior to engine testing should not exceed 3 to 5 minutes unless manufacturer specifies otherwise.

Recommendation #B2: Incorporate electrically driven lube oil pump to start on the same signal, which initiates the starting of the engine and terminates when the engine stops cranking. Alternative: Start electrically driven pump as stated above; and stop pump when pressure in lube oil header reaches a pre- determined level.

Response to #B1 and #B2: The Dresden diesel generators are required to reach 200 rpm within 15 seconds, therefore they are equipped with a circulating oil pump. The circulating oil pump provides warm lube oil flow to the turbocharger and a small flow back to the main oil system during shutdown conditions. Therefore, the circulating oil pump eliminates the need for prelubrication.

Recommendation #B3a: No load and light load operation causing incomplete combustion should be minimized as much as possible.

Response: The diesel generator surveillance tests at Dresden load the diesel to approximately 100% of rated capacity for one hour.

Recommendation #B3b: The surveillance tests should be within the NRC guidelines. The frequency of testing, size of the test load and duration should generally follow the recommendations of the respective engine manufacturers.

Response: Dresden diesel generator surveillance tests are performed a minimum of once per month, at full load for one hour. These tests meet or exceed Dresden's NRC approved Technical Specifications.

Recommendation #B3c: Better recognition should be given to the need and advisability of doing: investigative testing, replacement and adjustment as part of preventative maintenance.

Response: Dresden's diesels are inspected monthly, quarterly, semiannually, annually, bianually and every 5 years/8000 hours. These inspections include a combi- nation of manufacturer's recommended tasks, NRC mandated tasks and tasks which Dresden has considered necessary to perform based on operating experience.

Recommendation #B3d: The final step after any "corrective action", adjustment, change, etc. should be an actual "check- off test" of start, run and load before considering a diesel generator unit to be in a condition of readiness for any emergency.

Response: All Dresden diesel generator inspection Maintenance Inspection Procedures incorporate "check-off" lists and mechanic and foreman sign-off. All daily inspections incorporate equipment operator "check-offs". The diesel generator surveillance test requires data taking and "check-offs".

Recommendation #B4a: It is recommended that the obvious cause always be suspect as the root cause.

Response: Dresden reports all failures in accordance with 10 CFR 50.73 which requires that the Station determine the root cause of failure.

Recommendation #B4b: It is recommended that closely spaced component failures not be acceptable unless accompanied by specific assurance of absence of contributing cause and that alternate improved components are unavailable.

Response: Diesel generator failures require that the diesel generator be declared inoperable until the problem is corrected. Inoperable diesel generators create a limiting condition for operation. The limiting condition for operation with a diesel generator inoperable is seven days. An inoperable diesel generator is not returned to service prior to performing full loaded, one hour operability tests. These tests are performed to verify corrective actions. Repeat repetitive failures are not acceptable to Dresden.

Recommendation #B4c: It is recommended that reliance be continued on the LER records as a partial basis for evaluation of reliability.

Response: Dresden is required by law to comply to 10 CFR 50.73 of which contains requirements for reporting LER's.

Recommendation #C1a: Engine combustion air intake should come from outside the building and at least twenty feet above ground level through proper filters.

Response: The twenty foot requirement is met on the Dresden #2 and #3 diesel generators. The #2/3 diesel intake is eleven feet above ground level. No failures to date have been documented because of this condition. Engine combustion air intake filters are used at Dresden and are cleaned every year.

Recommendation #C1b: Room ventilation air should also be taken from outside of building about 20 feet above ground level through filters, but should be separate from engine combustion air.

Response: Dresden's #2 and #3 diesel room ventilation is supplied from the Turbine Building when diesel room air temperature is 75°F or less. The Turbine Building supply air is filtered before being distributed in the building. When room air temperature is 85°F or greater supply air is taken from the Turbine Building penthouse. When diesel room air temperature is between 76 and 84°F the room ventilation air is a combination of Turbine

Building and outside air. The Dresden #2/3 diesel generators room ventilation air is supplied from 100% outside air.

Recommendation #C1c: Room ventilation air, hot cooling system air, and/or engine exhaust gas should not be permitted to circulate back into the diesel generator room, fuel storage room, or to any other part of the power plant building.

Response: Dresden's #2 and #3 diesel room's ventilation air exhausts back to the Turbine Building. The #2/3 diesel room's ventilation air exhausts through the 2/3 diesel room's roof. It is unlikely the #2 and #3 diesel room ventilation exhaust air will be recycled back into the diesel rooms, since start signals initiate the diesel room ventilation fan which pressurizes the diesel room with outside or Turbine Building air. Dresden's diesels are water cooled, therefore hot cooling system air is not a concern. All of Dresden's diesel engines exhaust combustion air through a stack to the atmosphere.

Recommendation #C2a: It is recommended that all bulk fuel tanks have a gravity drain from the very bottom of the tank, or else in buried fuel tanks a pipe extending next to the bottom of the tank arranged so that any water can be pumped out.

Response: The primary fuel line and fill lines on the buried bulk fuel storage tanks extend to approximately 3 inches from the bottom of the tanks at Dresden. No bulk fuel storage tank drain lines are installed at Dresden. The bulk fuel storage tank is sampled quarterly to detect the presence of water.

Recommendation #C2b: Fuel supply pumps for the engine fuel system should be engine driven and fuel supply to this engine driven pump should either be an assured gravity fed supply or else by a booster pump powered from a Class 1-E station battery for assured priming, and not by an A.C. powered pump.

Response: Dresden's fuel priming pump are fed from the 125 volt DC system. The engine driven fuel pump starts at greater than 200 rpm.

Recommendation #C3: It is recommended that the electrical insulation and generator construction be such as to withstand 105°C temperature rise (resistance method) for an ambient temperature of 40°C. Also, Class H insulation is suggested in the standard frame size

normally used for 50°C to 60°C temperature rise (resistance method) at 40°C ambient with special attention given to resistance to fire possibly induced by electrical overload.

Response: Dresden's generators have Class F insulation which meets the mentioned maximum 105°F temperature rise. The insulation is not fireproof but has the capability of withstanding high temperatures.

Recommendation #C4: It is recommended that all engine cooling water temperature control be by means of 3-way thermostat for directing the engine water to bypass or cooler as required and of the "Amot" brand or equal with an expanding wax type temperature sensitive element.

Response: Dresden's diesel engine's cooling water system uses the 3-way "Amot" type temperature regulating valve with a bypass line for fast engine warm-up.

Recommendation #C5: It is that the floors be painted with concrete or masonary type paint in all rooms of the diesel generator units which house any electrical contactors, relays, circuit breakers, or other devices having electrical devices which are part of the diesel generator systems.

Response: Dresden's diesel generator room floors are painted, therefore concrete skin crumble is not a problem.

Recommendation #C6: It is recommended that the instruments, control, monitoring, or indicating elements be supported in/or on a free standing, directly floor mounted panel to the extent functionally practical, except for the necessary sensors in piping, etc.

Response: Dresden's diesel generators local control cabinets are free standing and floor mounted. The Electrical Maintenance Department inspects electrical connections for tightness on a periodic basis.

Recommendation #C7: It is recommended that attention be given to the brief comments in Appendix H which are particularly relevant to the program.

Response: In general, all of the documents listed in appendix H provide historical diesel generator operating experience and guidelines. Individual comments are not necessary since significant findings via operating experience would have initiated a NRC and/or INPO document requiring a Dresden response or action.

Recommendation #C8: It is strongly recommended that a program of selection, evaluation, and implementation of this report be expedited.

Response: Dresden does not feel that any additional action is necessary on any of the mentioned recommendations since all significant items have already been incorporated in the original design through NRC requirements, or based on previous operating experience.

Question 7, Enclosure 3, Paragraph 2: Licensees are requested to comment on and/or compare their program with the performance specification and provide comments for staff consideration in finalizing surveillance testing requirements for diesel generators.

Response: Dresden does not agree with the intent of the reliability program which we believe implies that surveillance tests would be made more frequently for the purpose of discovering potential failures after a few failures have occurred. Dresden feels that increasing the number of surveillances create the potential for failure because of engine wear. Dresden feels that the only necessary engine surveillances are the monthly operability test and the test after a diesel is returned to service from maintenance and inspection outages.

Attachment 1

DRESDEN DIESEL GENERATOR #2 SURVEILLANCE TESTS

Date	Valid Start #	Failed Valid Start #	Nonvalid Start #
09-05-84	1		
09-04-84	2	1 (See Failure #2-1)	
08-31-84	3		
08-21-84	4		
08-20-84	5		
07-25-84	6		
07-25-84	7		
06-28-84	8		
06-18-84	9		
05-14-84	10		
04-17-84	11		
04-16-84	12		
03-17-84	13		
03-16-84			1 (See Nonvalid Start #2-1)
02-24-84	14		
02-23-84	15		
02-22-84	16		
02-21-84	17		
02-20-84	18		
02-19-84	19		
02-13-84	20		
01-29-84	21		
01-08-84	22		
12-09-83	23		
11-10-83	24		
11-09-83	25		
11-08-83	26		
10-31-83	27		
10-06-83	28		
09-19-83	29		
08-18-83	30		
07-18-83	31		
07-01-83	32		
06-15-83	33		
05-16-83	34		
04-14-83	35		
04-03-83	36		
03-24-83	37		
03-19-83	38		
03-14-83	39		
02-22-83	40		
02-07-83	41		
02-05-83	42		
01-09-83	43		
01-03-83	44		
12-26-82	45		
11-27-82	46		
11-16-82	47		

Attachment 1 - (Continued)

Date	Valid Start #	Failed Valid Start #	Nonvalid Start #
11-09-82	48		
10-27-82	49		
10-13-82	50		
09-27-82	51		
08-25-82	52		
08-24-82	53		
07-29-82	54		
06-22-82	55		
05-18-82	56		
04-23-82	57		
03-21-82	58		
02-19-82	59		
01-22-82	60		
01-21-82	61		
01-20-82	62		
01-19-82	63		
01-18-82	64		
12-22-81	65		
12-14-81	66		
12-04-81	67		
12-02-81	68		
12-01-81	69		
11-20-81	70		
11-19-81	71		
11-06-81	72		
11-05-81	73		
10-29-81	74		
10-23-81	75		
10-05-81	76		
09-28-81	77		
09-27-81	78		
08-29-81	79		
08-12-81	80		
08-11-81	81		
07-24-81	82		
07-21-81	83		
07-17-81	84		
07-15-81	85		
06-28-81	86		
05-21-81	87	2 (See Failure #2-2)	
05-21-81	88		
05-21-81	89		
05-20-81	90		
05-19-81	91		
05-02-81	92		
04-04-81	93		
03-09-81	94		
02-26-81	95		
02-24-81	96		

Attachment 1 - (Continued)

Date	Valid Start #	Failed Valid Start #	Nonvalid Start #
01-25-81	97		
01-22-81	98	3 (See Failure #2-3)	
12-26-80	99		
11-19-80	100		

DRESDEN DIESEL GENERATOR #2 FAILURE DESCRIPTION

Failure #2-1

During Equipment Operators diesel generator room inspection the air start pressure regulator was found failed. The failure was caused by a blown diaphragm. The regulator was repaired and diesel returned to operable status. The #2/3 diesel generator was operable at this time. Nonreportable Occurrence #12-2-84-84.

Failure #2-2

During Equipment Operator's diesel generator room inspection the continuous lube oil pump motor was found not running and local breaker tripped. Upon attempting to reset the breaker the oil pump motor sparked and smoked. The failure was caused by a short in the oil pump motor windings. The #2/3 diesel generator was also out-of-service for quarterly inspection at this time. Reportable Occurrence #81-27 on Docket #237.

Failure #2-3

During refueling outage, upon opening bus 24 to 24-1 tie breaker with bus 24-1 being backfed from bus 28/29, Unit 2 diesel generator auto start alarm was received followed by a trouble and fail to start alarm. The Unit 2 diesel was not yet returned to service after a breaker modification. The #2/3 diesel was operable at this time. The event was caused by a lose wire in shutdown solenoid circuitry. The #2/3 diesel generator was operable at the time of this event. Nonreportable Occurrence #12-2-81-11.

Nonvalid Start #1

While performing the diesel generator surveillance test the engine tripped on high crankcase pressure. This trip would have been bypassed on an emergency start signal. Criteria 2 of NUREG 1.108, Section C.2.e indicates that this type of failure should not be considered a valid test or failure. The switch was replaced and successfully bench tested, therefore the failure was caused by a spurious signal. The #2/3 diesel was operable at the time of this event. Nonreportable Occurrence #12-2-84-26.

Attachment 1 - (Continued)

DRESDEN DIESEL GENERATOR #2/3 SURVEILLANCE TESTS

Date	Valid Start #	Failed Valid Start #	Nonvalid Start #
09-05-84	1		
08-31-84	2		
08-29-84	3		
08-21-84	4		
08-20-84	5		
07-30-84	6		
07-25-84	7		
06-30-84	8		
06-18-84	9		
05-17-84	10		
04-17-84	11		
04-16-84	12		
03-16-84	13		
02-25-84	14		
02-13-84	15		
01-29-84	16		
01-28-84	17		
01-27-84	18		
01-26-84	19		
01-25-84	20		
01-24-84	21		
01-13-84	22		
01-07-84	23		
12-02-84	24		
11-10-83	25		
10-31-83	26		
10-11-83	27		
10-06-83	28		
09-19-83	29		
08-19-83	30		
07-18-83	31		
06-29-83	32		
06-17-83	33		
06-16-83	34		
06-15-83	35		
06-14-83	36		
06-13-83	37		
05-16-83	38		
04-25-83	39		
04-03-83	40		
03-22-83	41		
03-21-83	42	1 (See Failure #2/3-1)	
03-19-83	43		
03-15-83	44		

Attachment 1 - (Continued)

Date	Valid Start #	Failed Valid Start #	Nonvalid Start #
02-24-83	45		
02-21-83	46		
02-12-83	47		
01-30-83	48		
01-09-83	50		
01-08-83			1 (See Nonvalid Start #2/3-1)
01-03-83	51		
12-15-82	52		
12-14-82	53		
11-16-82	54		
11-09-82	55	2 (See Failure #2/3-2)	
11-10-82	56		
11-09-82	57		
10-13-82	58		
09-14-82	59		
08-25-82	60		
08-17-82	61		
08-03-82	62		
08-03-82	63		
07-16-82	64		
06-13-82	65		
06-12-82	67		
06-11-82	68		
06-10-82	69		
06-09-82	70		
06-08-82	71		
06-07-82	72		
05-18-82	73		
04-29-82	74		
04-23-82	75		
04-22-82	76		
04-21-82	77		
04-20-82	78		
04-19-82	79		
04-15-82	80		
03-31-82	81		
03-26-82	82		
03-22-82	83		
03-03-82	84		
02-19-82	85		
02-17-82	86		
01-28-82	87		
01-22-82	88		
01-05-82	89		
12-29-81	90		
12-28-81	91		
12-22-81	92		
12-08-81	93		

Attachment 1 - (Continued)

Date	Valid Start #	Failed Valid Start #	Nonvalid Start #
12-02-81	94		
11-24-81	95		
11-23-81	96		
11-22-81	97		
11-21-81	98		
11-20-81	99		
11-19-81	100		

DRESDEN DIESEL GENERATOR #2/3 FAILURE DESCRIPTION

Failure #2/3-1

Equipment Operator's diesel generator room inspection found #2/3 continuous lube oil pump running with no discharge pressure. Diesel generators #2 and #3 were operable at the time of this event. The event was caused by loosening of allenscrews which maintain pump internal clearances. Reportable Occurrence #83-21 on Docket #237.

Failure #2/3-2

During normal power operation of both reactors, diesel generator trouble alarm was received. Inspection by Unit Foreman and Equipment Operator revealed that continuous lube oil pump had tripped. Attempts to reset breaker failed. The #2 and #3 diesel generators were operable at the time of this event. Event was caused by worn pump motor bearings. Reportable Occurrence #82-44 on Docket #237.

Nonvalid Start #2/3-1

While performing diesel generator surveillance test #2/3 diesel generator did not complete 5-minute cooldown run. Engine did not complete cooldown run because of a failed cooling water pressure switch. Unit 2 reactor was shutdown at the time of this event, while Unit 3 reactor was in run mode. This trip would have been bypassed on an emergency start signal. Criteria 2 of NUREG 1.108, Section C.2.e indicates that this type of failure should not be considered a valid test or failure.

DRESDEN DIESEL GENERATOR #3 SURVEILLANCE TESTS

Date	Valid Start #	Failed Valid Start #	Nonvalid Start #
08-29-84	1		
08-21-84	2		
08-20-84	3		
07-25-84	4		
06-25-84	5		
05-17-84	6		
04-17-84	7		
03-14-84	8		
02-22-84	9		
02-21-84	10		
02-20-84	11		
02-16-84	12		
02-03-84	13		
02-02-84	14		
01-23-84	15		
01-19-84	16	1 (See Failure #3-1)	
01-11-84	17		
12-16-83	18		
11-16-83	19		
10-29-83	20		
10-28-83	21	2 (See Failure #3-2)	
09-19-83	22		
08-19-83	23		
08-18-83	24		
08-02-83	25		
07-18-83	26		
06-16-83	27		
05-16-83	28		
04-14-83	29		
03-31-83	30		
03-19-83	31		
03-15-83	32		
03-15-83	33		
03-14-83	34		
02-28-83	35		
02-23-83	36		
02-21-83	37		
02-11-83	38		
02-10-83	39		
02-09-83	40		
02-08-83	41	3 (See Failure #3-3)	
02-07-83	42		
01-09-83	43		
12-15-82	44		

Attachment 1 - (Continued)

Date	Valid Start #	Failed Valid Start #	Nonvalid Start #
12-15-82	45	4 (See Failure #3-4)	
11-16-82	46		
11-12-82	47		
11-11-82	48		
11-11-82	49		
11-09-82			1 (See Nonvalid Start #3-1)
10-14-82	50		
09-14-82	51		
08-25-82	52		
08-24-82	53		
08-08-82	54		
07-13-83	55		
06-13-82	56		
05-18-82	57		
05-01-82	58		
04-17-82	59		
04-16-82	60		
03-14-82	61		
02-23-82	62		
01-22-82	63		
01-21-82	64		
01-20-82	65		
01-19-82	66		
01-18-82	67		
01-10-82	68		
12-29-81	69		
12-19-81	70		
12-14-81	71		
12-08-81	72		
12-02-81	73		
12-01-81	74		
11-25-81	75		
11-25-81	76		
11-23-81	77		
11-23-81	78		
11-09-81	79	5 (See Failure 3-5)	
11-06-81	80		
11-05-81	81		
11-03-81	82		
10-26-81	83		
10-23-81	84	6 (See Failure 3-6)	
10-14-81	85	7 (See Failure 3-7)	
10-01-81	86		
09-28-81	87		
09-27-81	88		

Attachment 1 - (Continued)

Date	Valid Start #	Failed Valid Start #	Nonvalid Start #
09-18-81	89		
09-17-81	90	8 (See Failure 3-8)	
08-12-81	91		
08-11-81	92		
07-27-81	93		
06-25-81	94		
05-21-81	95		
05-20-81	96		
05-19-81	97		
04-22-81	98		
04-21-81	99		
03-18-81	100		

DRESDEN DIESEL GENERATOR #3 FAILURE DESCRIPTION

Failure #3-1

While performing diesel generator surveillance tests, engine failed to start due to air start relay valve mechanically sticking. Unit 3 reactor was in refuel mode, the #2/3 diesel generator was operable at the time of this event. The cause of this event was the build-up of crud in the air start relay valve. Nonreportable Occurrence #12-3-84-1.

Failure #3-2

While performing diesel generator surveillance test, diesel generator did not close onto bus 34-1. The breaker tripped in the trip-free condition. Unit 3 reactor was in the refuel mode, the #2/3 diesel generator was operable at the time of this event. The cause of this event was dirt build-up on the 52H contact on bus 34-1. Reportable Occurrence #83-40 on Docket #249.

Failure #3-3

While performing diesel generator surveillance test, engine failed to start. The Unit 3 reactor was in the run mode, while the #2/3 diesel generator was out-of-service for annual inspection. Probable cause of the event was failure of air start motor rotor to fully engage. Additionally, more than the expected amount of grease may have inhibited vane movement. Reportable Occurrence #83-05 on Docket #249.

Failure #3-4

While performing diesel generator surveillance test for the purpose of returning the engine back to service after semiannual inspection, the

Attachment 1 - (Continued)

diesel generator failed to start. The Unit 3 reactor was in the run mode and #2/3 diesel generator was operable at the time of this event. This failure was caused by a worn-out cylinder and an accumulation of dust inside the air starter. Reportable Occurrence #82-049 on Docket #249.

Failure #3-5

While performing diesel generator surveillance test, the engine was manually shutdown due to high temperature. Unit 3 reactor was in the run mode, and #2/3 diesel generator was operable. Failure was caused by a defective check valve on the discharge of the diesel generator cooling water pump. Reportable Occurrence #81-37 on Docket #249.

Failure #3-6

While performing diesel generator surveillance test, the engine was manually stopped due to high water temperature read locally at the diesel. The Unit 3 reactor was in the run mode at the time of this event, the #2/3 diesel generator was inoperable at the time of this event. Original cause was believed to be an air bound pump. However, cause was later attributed to a defective check valve which was discovered after failure #3-5 above. Reportable Occurrence #81-33 on Docket #249.

Failure #3-7

During Equipment Operator's inspection of the #3 diesel generator room it was discovered that the emergency fuel cutoff valve was in the cutoff position. Unit 3 reactor was in the run mode at the time of this event, and the #2/3 diesel generator was operable. Cause was unknown. Reportable Occurrence #81-30 on Docket #249.

Failure #3-8

While performing diesel generator surveillance test, the engine failed to start. Unit 3 reactor was in the refuel mode and #2/3 diesel generator was operable. The failure was caused by a seal leak in the air start pressure regulating valve. Reportable Occurrence #81-27 on Docket #249.

Nonvalid Start #3-1

While performing diesel generator surveillance test the engine tripped on low cooling water pressure. Unit 3 was in the run mode at the time of this event, and #2/3 diesel generator was inoperable. The failure was caused by a bad low cooling water pressure switch. This trip would have been bypassed on an emergency start signal. Criteria 1 of NUREG 1.101, Section C.2.e indicates that this type of failure should not be considered a valid test or failure. Reportable Occurrence #82-45 on Docket #249.

ATTACHMENT - PART II
QUAD CITIES UNITS 1 AND 2

TO BE SUBMITTED BY 10-15-84.

ATTACHMENT - PART III
ZION STATION UNITS 1 and 2

1. Reduction in Number of Cold Fast Start Surveillance Tests for Diesel Generators.

   Zion Station does not fall into the category of cold fast starts. The Cooper-Bessemer KSV-16-T engines have a continuous pre-lube system which maintains engine lube oil at an elevated temperature (135-155°F).

   These engines are not equipped for anything but fast starts, however an excessive frequency of starts presents the same concerns of excessive stress and wear on the engines. In addition, the method of loading has been changed to a gradual loading during surveillance to minimize thermal stress. Attachment "A" is an overview of the maintenance activities to improve reliability and ultimately reduce the number of starts due to improved reliability.

   A letter dated August 17, 1983 from F. G. Lentine to H. R. Denton; Proposed Tech Spec change, covers the intended actions to reduce fast starts.

2. Diesel Generator Reliability Data

   The reliability of the diesel generator is furnished on Table 2.1. The reliability for the last 20 and 100 demands is also furnished on Table 2.1.

   The manner of record keeping maintained by the station has not been exactly as outlined in Reg. Guide 1.108 position C.3.a because the Confirmatory Order only stated "testing" was to be done in accordance with Reg. Guide. The station does maintain informal records on Diesel Generator Reliability as shown in Tables 2.1. thru 2.5 plus a current DVR/LER summary.

Table 2.1

Engine	# Starts	# Failures	Time Frame	% Reliability
1A	20	0	3-14-84 to 6-30-84	
	100	3	10-12-82 to 6-30-84	97
1B	20	0	3-11-84 to 6-30-84	
	100	0	11-21-82 to 6-30-84	100
0	20	0	3-2-84 to 6-30-84	
	100	5	5-11-83 to 6-30-84	95
2A	20	0	1-6-84 to 6-30-84	
	100	3	11-2-82 to 6-30-84	97
2B	20	0	12-8-83 to 6-30-84	
	100	1	8-23-82 to 6-30-84	99

Table 2.2

As of 6/20/84

Engine #	Starts Required To Erase Failure on Date	Cause of Failure
"1A"	32 For 6-13-83	Water Leak Flooding Inter Cooler
	55 For 12-23-83	Turning Gear
	60 For 01-18-84	Unknown (Tripped While Running Loaded-Restarted With No Problem)
"0"	8 For 5-25-83	Unknown
	11 For 6-25-83	Unknown
	14 For 7-27-83	AMOT Master Shut Down Unrepeatable - (Probable Cause of Two Previous Trips)
	16 For 8-1-83	30 #PRV and Tubing Leak (Due to Repair of AMOT)
	16 For 1-15-84	Unknown (Suspect D.C. Spike)
"2A"	25 For 2-24-83	Output Breaker Trip
	33 For 6-25-83	AMOT Master Shut Down Unrepeatable
	44 For 9-12-83	Unknown (Breaker Trip)
"2B"	27 For 1-31-83	Lube Oil Filter Gasket Leak Test Terminated
"1B"	NO FAILURES IN THE LAST ONE HUNDRED STARTS.	

THIS TABLE IS BASED ON A PER DIESEL FAILURE.

Table 2.3

DIESEL GENERATORS

VALID FAILURES

	1A	1B	2A	2B	0	Total
1980 4-1/12-31	0	1	0	2	2	5
1981	0	0	0	0	2	2
1982	0	2	0	1	2	5
1983	2	0	3	1	5	11
1984 6-30	1/3	0/3	0/3	0/4	1/12	2/25

VALID STARTS (PT-11 only)

1980 4-1/12-31	64	67	47	47	90	315
1981	55	57	55	56	63	286
1982	59	56	40	34	74	263
1983	47	47	70	69	88	321
1984- 6-30	44/269	48/275	20/232	12/218	42/357	166/1351

98.19% Station Reliability since incorporation of Reg. Guide 1.108

98.8% Station Reliability 1/1/84 to 6/30/84

Table 2.4

DIESEL GENERATOR OUT OF SERVICE

DURING UNIT OPERATION

AVG	1A	1B	2A	2B	O
*1976	32 days	14 days	19 days	16 days	26 days	21.4
*1977	11 days	15 days	19 days	19 days	11 days	15
1978	19.9 days	12.7 days	8 days	3 days	16 days	11.92
1979	16.45 days	21.5 days	14.5 days	12.2 days	37.25 days	20.38
1980	*22 days	11.5 days	11.1 days	9 days	12 days	13.12
1981	11.6 days	9.2 days	10.1 days	13.85 days	29.6 days	14.87
1982	18.06 days	9.45 days	6.6 days	9 days	14.6 days	11.54
1983	7.25 days	6.75 days	6.9 days	.2 day	22.1 days	8.64
1984	0.8 days	0.0 days	0.33 days	6.4 days	44.7 days**	1.85
AVG/YR	17.3 days	12.5 days	11.9 days	10.3 days	19.2 days	Last 8 years
AVG/DG	14.24 DAYS/YR					

* Hours not available - rounded off to days

** "O" DG overhaul took 43 days, required temporary tech. spec. change

13.0 DAY/YR AVG. 1A, 1B, 2A, 2B - last 8 years

19.2 DAY/YR AVG. O - last 8 years

1.9 DAY/YR AVG. 1A, 1B, 2A, 2B - 1984

1.7 DAY/YR AVG. O - 1984

Data Thru 6/30/84

Table 2.5

DIESEL GENERATOR

NUMBER OF OUT OF SERVICE PER YEAR

	1A	1B	2A	2B	0	AVG
1976	14	6	9	9	13	10.2
1977	6	10	8	7	7	7.6
1978	16	15	6	5	9	10.2
1979	19	13	13	8	20	14.4
1980	9	9	9	9	7	8.6
1981	9	5	11	5	14	8.8
1982	18	11	5	5	13	10.4
1983	6	4	5	2	16	6.6
AVG.	12.1	9.1	8.3	6.3	12.4	9.6

3) Diesel Generator Reliability

Attachment "A" is an overview of the station program for attaining and maintaining the reliability goal for the diesels generators. The letter dated August 17, 1983 from F. G. Lentine to H. R. Denton; Proposed Tech Spec change for auxiliary electric power (diesel generators) covers the majority of the material in Generic Letter 84-15.

The differences between our proposed Tech Spec change and the example furnished as well as comments on those differences are as follows:

1) 10 second start only once every 184 days. Our scheme at present does not allow for any other method of starting. Any change would require major modifications.

2) Draining water from fuel oil day tank. Zion has no facilities to accomplish draining. Modifications would be required to fuel oil system. Water in fuel oil has not been a problem.

3) Sampling of new fuel prior to addition to storage tank. Zion has fuel oil holding tanks, and would require major modifications to allow this capability. Fuel is sampled prior to addition but results are determined afterward.

4) Remedial actions table has not previously discussed disqualification and requalification.

5) 72 hour clock versus 7 day clock. Yearly limit on cummulative time limit. What happens if yearly limit is met or exceeded? These type limitations are counter productive to a good preventative maintenance program and do not contribute to improved public safety.

6) Action statements a. from 3.8.1.1 of S.T.S. states one hour to perform requirement and once per 8 hours thereafter Ref. A. 3.15.1.A. action a. states 2 hours and once per 24 hours thereafter.

7) Action statement a. from S.T.S. states start Diesel within 24 hours and restore inoperable component within 72 hours or shutdown. Ref. A. 3.15.1.A. action statement a. States 12 hours unless such surveillance has been performed within previous 7 days.

Conclusions: Zion Station has implemented a program as outlined in attachment "A" to improve reliability thru preventative maintenance. Short term success has already demonstrated itself by the decrease in the number of work request being written due to problems with the diesels. The proposed Tech Spec change submitted Aug. 17, 1983 was in part designed to minimize the number of starts on diesel generators.

A decrease in the allowable outage time would force repairs to be rushed. This type of program would only produce repeat type repairs, not allowing for though inspections and testing without forcing unit shutdowns.

A limit on yearly outage time would cause an attitude of "what if it breaks down later, we better save all the maintenance time we can".

Our existing program clock and efforts to improve reliability will decrease the require outage time. Zion Station, by company policy, samples its fuel oil tanks on a quarterly basis and completely drains and cleans each tank on a ten year basis. No problems to date justify a change in policy.

The changes necessary to accomodate a slower start are not justifiable at this time.

The conditions of the remedial action table are not without merit but could stand a more explicit set of instructions. Zion Station's record for the last eleven years speaks for itself, while striving for improvement in reliability many changes have taken place, some procedural, some equipment modification. The efforts required to maintain and improve reliability are never ending. There are two full time Tech Staff Engineers working to improve diesel reliability. The fact that Zion Station submitted a request to change its Tech spec almost a year ahead of the issuance of Generic Letter No. 84-15 is evidence of our desire for excellence.

It is requested that the staff seriously reconsider placing a yearly limit on diesel generator inoperability.

ATTACHMENT "A"

RELIABILITY CHECKING AND MAINTENANCE INSPECTION OVERVIEW

Annual Inspection

1. With engine running loaded and up to operating temperatures, and by using an "engine analyzer" record pressure/time, compression pressure and vibration diagrams for each power cylinder (photographically record results). Run should not be less than four hour's continuous loaded operation. Analyze records for possible unusual running conditions and take appropriate remedial action.

2. Make a vibration survey of the diesel generator during test run. Compare with previously recorded data.

3. Measure and record hot and cold crankshaft web deflection. Ensure all foundation bolts in engine and generator are correctly tightened before making any measurements.

4. Measure and record main and rod bearing clearances (by jacking method).

5. Remove fuel injection nozzles and check opening pressure and spray pattern.

6. Borescope inspect all power cylinder liners.

7. Inspect the following inside the crankcase.

   a. Cylinder liners for scuffing and expansion seal at bottom of liner for water leaks.
   b. Piston skirts for wear.
   c. All bolts and nut locking devices.

8. Replace fuel oil filter elements if inspection indicates this is necessary.

9. Check lube oil system full flow filter and strainers for dirt and metal particles.

10. Replace elements in lube oil filter and clean strainer as necessary.

11. Crankcase breather air filters and cylinder head breather filter must be checked and cleaned as necessary.

12. Inspect rocker arm assemblies (without disassembly).

13. Check operation and calibration of all control and safety shutdown devices. Inspect tubing.

14. Check main drive at aft end for:

    a. Condition of gears.
    b. Idler gear endplay and bearing for wear.
    c. Camshaft gears for tightness and roller bearings for wear.
    d. Inspect turning gear - forward end.

15. Check valve timing and tappet clearance.

16. Check turbocharger rotor for freedom to turn. Check during analysis and record spin down time.

17. Inspect air inlet system (filters, etc.).

18. Check auxiliary drive at the aft end for:

    a. Condition of gears and roller bearings.
    b. Vibration damper for dents and mounting.

19. Measure and record generator rotor to stator air gap.

20. Inspect outboard bearing externally for signs of oil leaks.

21. Clean air inlet casing to generator stator.

22. Clean insulated generator windings by blowing out with dry air, brushing (soft brush), wiping, vacuum cleaning or any method described in the generator manufacturer's manual. Observe all relevant safety precautions.

    Prior to running engine and after its systems have been filled with oil and water, open indicator cock on cylinder heads and roll through four complete turns. Check for moisture at indicator cocks. If moisture found, investigate cause and remedy.

    Run engine loaded and up to operating temperature for a minimum of four hours following annual inspection. Using the "engine analyzer" record pressure/time and vibration diagrams for each power cylinder.

Every Five Years - Inspection

The following procedures should be followed in addition to those quoted in "Annual Inspection".

1. Remove cylinder heads and check and if required re-seat all valves. Replace all head gaskets and "O"-ring seals.

2. Replace all crackcase door gaskets, and all gaskets of any part number determined to be chronic "leakers".

3. Disassemble turbocharger. (Refer to Turbocharger Manual).

   a. Check blower bearing, which include the thrust bearing, for wear.
   b. Check turbine bearing for wear.
   c. Check all bearing clearances.
   d. Clean turbine rotor and diffuser.

4. Remove air aftercoolers and clean tubes if logged data indicates excessively high pressure drop on air side.

5. Disassemble water pumps, inspect mechanical seals and replace if necessary. Inspect "O"-ring on the shaft, and impeller wear rings for wear.

6. Dismantle, clean and inspect the lubricating oil pumps. (main & pre-lube)

7. Clean lubricating oil and jacket water coolers and check for leaks.

8. Replace main bearing hoses.

9. Disassemble, clean, and inspect fuel booster pump.

10. Replace main and connecting rod bearing temperature sensor elements.

11. Generator. The following is intended as a guide and to highlight various areas. In no way is this to conflict with the generator manufacturer's recommendations.

    a. Check rotor pole bolts (or keys) for tightness.
    b. Check insulation resistance of windings to ground. Repair in accordance with generator manufacturer's specifications.
    c. General inspect generator frame and all fasteners for unusual signs of distress.
    d. When reassembling any part of the generator ensure that any insulation provided to prevent stray shaft currents is installed.

<u>DANGER</u>! WHENEVER WORKING ON THE GENERATOR, MAKE SURE THAT IT IS STATIONARY AND ALL WINDINGS ARE DE-ENERGIZED. FAILURE TO COMPLY MAY RESULT IN INJURY OR DEATH.

    e. Inspect exciter as per manufacturer's instructions.

12. Check mechanical condition of all switch gear and relays. Follow the respective manufacturer's instructions for cleaning relay contacts and other maintenance items.

After 3,000 Completed Starts Or Ten Year Inspections - Inspection

The following procedure should be followed in addition to those quoted in "Every Five Years - Inspection".

1. Remove four pistons (in pairs) at random and inspect piston, piston ring, piston pin and bush, articulated pin and bush, piston rings and liner condition. Determine from such an inspection the extent to which other pistons should be removed and any necessary rework.

2. Remove connecting rod bearings from rods attached to pistons removed per paragraph 1 and inspect. Determined from such an inspection the extent to which other rod bearings should be removed and any necessary rework.

3. Remove two main bearings at random. Inspect. Determine from such an inspection the extent to which other main bearings should be removed and any necessary rework.
4. Remove inlet air manifolds and replace all gaskets.

5. Remove exhaust manifold and replace all gaskets.

6. Completely disassemble and rebuild turbo-charger.

7. Remove air aftercoolers, clean and replace all gaskets.

8. Dismantle, inspect, and repair if needed, all lube oil pumps.

9. Inspect and repair where necessary all electric motors.

10. Remove and inspect generator outboard bearing.

11. Replace gaskets in any gasketed pipe flange.

ATTACHMENT - PART IV

LASALLE COUNTY STATION

1. Reduction in Number of Cold Fast Start Surveillance Tests for Diesel Generators

   The Unit 2 Technical Specifications were issued with the guidance of enclosure 1 incorporated. Diesel generator starts from ambient conditions shall be performed at least once per 184 days. All other engine starts for the purpose of surveillance testing shall be preceded by an engine prelube period and/or other warmup procedures recommended by the diesel engine is minimized.

   Amendment 16 to Unit 1's Technical Specifications has a similar requirement.

2. Diesel Generator Reliability Data

LaSalle County Station maintains records for each diesel generator unit, which itemize the demands and failures as described in Regulatory Guide 1.108. No yearly data report is presently maintained for diesel generator reliability.

The reliability data is based on starts since Unit 1 fuel load for deisel generators 0, 1A, 2A, and 1B (April 1982). The data is based on starts since Unit 2 fuel load for diesel-generator 2B (December 1983). Table 1.1 is LaSalle's diesel-generator reliability history, as of September 17, 1984.

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Table 1.1

LaSalle County Nuclear Station
Diesel Generator Reliability History

Diesel Generator Unit	Number of Valid Demands	Failures And Their Date	Reliability	
			Last 20 Valid Demands	Last 100 Valid Demands
0	51	0	100%	100% Based on 51 Demands
1A	51	0	100%	100% Based on 51 Demands
1B	56	1, Feb. '83	100%	98% Based on 56 Demands
2A	38	0	100%	100% Based on 38 Demands
2B	10	0	100% Based on 10 Demands	100% Based on 10 Demands

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LASALLE COUNTY STATION

3. Diesel Generator Reliability Reliability Program

LaSalle maintains the diesel generators in accordance with the attached Technical Specifications and they are periodically inspected per the manufacturer's recommendations (4.8.1.1.2.d). All diesel failures, valid or non-valid, are reported to the NRC and include corrective action to prevent recurrence. This ensures that reliability is maintained and improved. LaSalle's Technical Specification Surveillance requirements are similar to Enclosure 3.

Comments on example diesel generator Performance Technical Specification

It is not clear what Technical Specification Action is required during the requalification program. Table 4.8-2 for 5/20 or 11/100 failures requires a requalification test problem but states "declare the diesel generator inoperable". Other portions of the text (Enclosure 3 Item 5) state the diesel "would be disqualified from nuclear service". Then under item 6: "If the diesel generator is not requalified as defined above, the unit would be declared inoperable and the action statement in the plant Technical Specification for one diesel generator inoperable should be followed immediately". We believe that if a failure requires a requalification program, that once the problem which caused the failure is repaired the diesel is operable until such time that it fails again or fails the requalification program. Otherwise the diesel is operable. This is the same as the statement at the bottom of page 1 of Enclosure 3.

We agree that the current 72 hour limit (also described in Reg. Guide 1.93) allows very little flexibility and should be revised to a number of hours per year.

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments and indicated power availability, and

b. Demonstrated OPERABLE at least once per 18 months during shutdown by manually transferring unit power supply from the normal circuit to the alternate circuit.

4.8.1.1.2 Each of the above required diesel generators shall be demonstrated OPERABLE:

a. In accordance with the frequency specified in Table 4.8.1.1.2-1 on a STAGGERED TEST BASIS by:

1. Verifying the fuel level in the day fuel tank.

2. Verifying the fuel level in the fuel storage tank.

3. Verifying the fuel transfer pump starts and transfers fuel from the storage system to the day fuel tank.

4. Verifying the diesel starts from ambient condition and accelerates to 900 rpm + 5%, -2% in less than or equal to 13 seconds.* The generator voltage and frequency shall be 4160 ± 150 volts and 60 + 3.0, -1.2 Hz within 13 seconds* after the start signal.

5. Verifying the diesel generator is synchronized, loaded to greater than or equal to 2600 kw within 60 seconds,* and operates with this load for at least 60 minutes.

6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.

7. Verifying the pressure in all diesel generator air start receivers to be greater than or equal to 200 psig.

b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the day fuel tanks.

c. At least once per 92 days and from new fuel oil prior to addition to the storage tanks by verifying that a sample obtained in accordance with ASTM-D270-1975 has a water and sediment content of less than or equal to 0.05 volume percent and a kinematic viscosity @ 40°C of greater than or equal to 1.9 but less than or equal to 4.1 when tested in accordance with ASTM-D975-77, and an impurity level of less than 2 mg. of insolubles per 100 ml. when tested in accordance with ASTM-D2274-70.

*These diesel generator starts from ambient conditions shall be performed at least once per 184 days in these surveillance tests. All other engine starts for the purpose of this surveillance testing shall be preceded by an engine prelube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the diesel engine is minimized.

d. At least once per 18 months during shutdown by:

1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.

2. Verifying the diesel generator capability to reject a load of greater than or equal to 1190 kw for diesel generator 0, greater than or equal to 638 kw for diesel generators 1A and 2A, and greater than or equal to 2381 kw for diesel generator 1B while maintaining engine speed less than or equal to 75% of the difference between nominal speed and the overspeed trip setpoint or 15% above nominal, whichever is less.

3. Verifying the diesel generator capability to reject a load of 2600 kw without tripping. The generator voltage shall not exceed 5000 volts during and following the load rejection.

4. Simulating a loss of offsite power by itself, and:

a) For Divisions 1 and 2 and for Unit 2 Division 2:

1) Verifying de-energization of the emergency busses and load shedding from the emergency busses.

2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 13 seconds, energizes the auto-connected loads and operates for greater than or equal to 5 minutes while its generator is so loaded. After energization, the steady state voltage and frequency of the emergency busses shall be maintained at 4160 ± 150 volts and 60 ± 1.2 Hz during this test.

b) For Division 3:

1) Verifying de-energization of the emergency bus.

2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency bus with its loads within 13 seconds and operates for greater than or equal to 5 minutes while its generator is so loaded. After energization, the steady state voltage and frequency of the emergency bus shall be maintained at 4160 ± 150 volts and 60 ± 1.2 Hz during this test.

5. Verifying that on an ECCS actuation test signal, without loss of offsite power, diesel generators 0, 1A and 1B start on the auto-start signal and operate on standby for greater than or equal to 5 minutes. The generator voltage and frequency shall be 4160 + 416, -150 volts and 60 + 3.0, -1.2 Hz within 13 seconds after the auto-start signal; the steady state generator voltage and frequency shall be maintained within these limits during this test.

6. Simulating a loss of offsite power in conjunction with an ECCS actuation test signal, and:

   a) For Divisions 1 and 2:

      1) Verifying de-energization of the emergency busses and load shedding from the emergency busses.

      2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 13 seconds, energizes the auto-connected emergency loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After energization, the steady state voltage and frequency of the emergency busses shall be maintained at 4160 ± 416 volts and 60 ± 1.2 Hz during this test.

   b) For Division 3:

      1) Verifying de-energization of the emergency bus.

      2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency bus with its loads within 13 seconds and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After energization, the steady state voltage and frequency of the emergency bus shall be maintained at 4160 ± 416 volts and 60 ± 1.2 Hz during this test.

7. Verifying that all diesel generator 0, 1A and 1B automatic trips except the following are automatically bypassed on an ECCS actuation signal:

   a) For Divisions 1 and 2 - engine overspeed, generator differential current, and emergency manual stop.

   b) For Division 3 - engine overspeed, generator differential or overcurrent, and emergency manual stop.

8. Verifying the diesel generator operates for at least 24 hours. During the first 2 hours of this test, the diesel generator shall be loaded to greater than or equal to 2860 kw and during the remaining 22 hours of this test, the diesel generator shall be loaded to 2600 kw. The generator voltage and frequency shall be 4160 + 420, -150 volts and 60 + 3.0, -1.2 Hz within 13 seconds after the start signal; the steady state generator voltage and frequency shall be maintained within these limits during this test. Within 5 minutes after completing this 24 hour test, perform Surveillance Requirement 4.8.1.1.2.d.4.a).2) and b).2).*

SURVEILLANCE REQUIREMENTS (Continued)

9. Verifying that the auto-connected loads to each diesel generator do not exceed the 2000 hour rating of 2860 kW.

10. Verifying the diesel generator's capability to:

    a) Synchronize with the offsite power source while the generator is loaded with its emergency loads upon a simulated restoration of offsite power,

    b) Transfer its loads to the offsite power source, and

    c) Be restored to its standby status.

11. Verifying that with diesel generator 0, 1A and 1B operating in a test mode and connected to its bus:

    a) For Divisions 1 and 2, that a simulated ECCS actuation signal overrides the test mode by returning the diesel generator to standby operation.

    b) For Division 3, that a simulated trip of the diesel generator overcurrent relay trips the SAT feed breaker to bus 143 and that the diesel generator continues to supply normal bus loads.

12. Verifying that the automatic load sequence timer is OPERABLE with the interval between each load block within ± 10% of its design interval for diesel generators 0 and 1A.

13. Verifying that the following diesel generator lockout features prevent diesel generator operation only when required:

    a) Generator underfrequency.

    b) Low lube oil pressure.

    c) High jacket cooling temperature

    d) Generator reverse power.

    e) Generator overcurrent.

    f) Generator loss of field.

    g) Engine cranking lockout.

*If Surveillance Requirement 4.8.1.1.2.d.4a)2) and/or b)2) are not satisfactorily completed, it is not necessary to repeat the preceding 24 hour test. Instead, the diesel generator may be operated at 2600 kW for 1 hour or until operating temperature has stabilized.

SURVEILLANCE REQUIREMENTS (Continued)

e. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting diesel generators 0, 1A and 1B simultaneously, during shutdown, and verifying that all three diesel generators accelerate to 900 rpm + 5, -2% in less than or equal to 13 seconds.

f. At least once per 10 years by:

1. Draining each fuel oil storage tank, removing the accumulated sediment and cleaning the tank using a sodium hypochlorite or equivalent solution, and

2. Performing a pressure test of those portions of the diesel fuel oil system designed to Section III, subsection ND, of the ASME Code in accordance with ASME Code Section 11, Article IWD-5000.

4.8.1.1.3 Reports - All diesel generator failures, valid or non-valid, shall be reported to the Commission pursuant to Specification 6.6.B. Reports of diesel generator failures shall include the information recommended in Regulatory Position C.3.b of Regulatory Guide 1.108, Revision 1, August 1977. If the number of failures in the last 100 valid tests, on a per nuclear unit basis, is greater than or equal to 7, the report shall be supplemented to include the additional information recommended in Regulatory Position c.3.b of Regulatory Guide 1.108, Revision 1, August 1977.

TABLE 4.8.1.1.2-1

DIESEL GENERATOR TEST SCHEDULE

Number of Failures in Last 100 Valid Tests*	Test Frequency
≤ 1	At least once per 31 days
2	At least once per 14 days
3	At least once per 7 days
≥ 4	At least once per 3 days

*Criteria for determining number of failures and number of valid tests shall be in accordance with Regulatory Position C.2.e of Regulatory Guide 1.108, Revision 1, August 1977, where the last 100 tests are determined on a per nuclear unit basis. With the exception of the semi-annual fast start, no starting time requirements are required to meet the valid test requirements of Regulatory Guide 1.108.

LIMITING CONDITION FOR OPERATION

3.8.1.2 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. One circuit between the offsite transmission network and the onsite Class IE distribution system, and

b. Diesel generator 0 or 1A, and diesel generator 1B when the HPCS system is required to be OPERABLE, and diesel generator 2A when the offsite power source for standby gas treatment system subsystem B or control room and auxiliary electric equipment room emergency filtration system train B is inoperable and either or both systems are required to be OPERABLE, with each diesel generator having:

1. For diesel generator 0, 1A and 2A:

a) A separate day fuel tank containing a minimum of 250 gallons of fuel.

b) A separate fuel storage system containing a minimum of 31,000 gallons of fuel.

2. For diesel generator 1B, a separate fuel storage tank/day tank containing a minimum of 29,750 gallons of fuel.

3. A fuel transfer pump.

APPLICABILITY: OPERATIONAL CONDITIONS 4, 5, and *.

ACTION:

a. With all offsite circuits inoperable and/or with diesel generators 0 or 1A inoperable, suspend CORE ALTERATIONS, handling of irradiated fuel in the secondary containment and operations with a potential for draining the reactor vessel.

b. With diesel generator 1B inoperable, restore the inoperable diesel generator 1B to OPERABLE status within 72 hours or declare the HPCS system inoperable and take the ACTION required by Specification 3.5.2 and 3.5.3.

*When handling irradiated fuel in the secondary containment.

4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments and indicated power availability, and

b. Demonstrated OPERABLE at least once per 18 months during shutdown by manually transferring unit power supply from the normal circuit to the alternate circuit.

4.8.1.1.2 Each of the above required diesel generators shall be demonstrated OPERABLE:

a. In accordance with the frequency specified in Table 4.8.1.1.2-1 on a STAGGERED TEST BASIS by:

1. Verifying the fuel level in the day fuel tank.

2. Verifying the fuel level in the fuel storage tank.

3. Verifying the fuel transfer pump starts and transfers fuel from the storage system to the day fuel tank.

4. Verifying the diesel starts from ambient condition and accelerates to 900 rpm + 5%, -2% in less than or equal to 13 seconds.* The generator voltage and frequency shall be 4160 ± 150 volts and 60 + 3.0, -1.2 Hz within 13 seconds* after the start signal.

5. Verifying the diesel generator is synchronized, loaded to greater than or equal to 2600 kW within 60 seconds,* and operates with this load for at least 60 minutes.

6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.

7. Verifying the pressure in all diesel generator air start receivers to be greater than or equal to 200 psig.

b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the day fuel tanks.

c. At least once per 92 days and from new fuel oil prior to addition to the storage tanks by verifying that a sample obtained in accordance with ASTM-D270-1975 has a water and sediment content of less than or equal to 0.05 volume percent and a kinematic viscosity @ 40°C of greater than or equal to 1.9 but less than or equal to 4.1 when tested in accordance with ASTM-D975-77, and an impurity level of less than 2 mg of insolubles per 100 mL when tested in accordance with ASTM-D2274-70.

*These diesel generator starts from ambient conditions shall be performed ~~only~~ at least once per 184 days in these surveillance tests. ~~and~~ All other engine starts for the purpose of this surveillance testing shall be preceded by an engine prelube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the diesel engine is minimized.

d. At least once per 18 months during shutdown by:

1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.

2. Verifying the diesel generator capability to reject a load of greater than or equal to 1190 kW for diesel generator 0, greater than or equal to 638 kW for diesel generators 1A and 2A, and greater than or equal to 2381 kW for diesel generator 2B while maintaining engine speed less than or equal to 75% of the difference between nominal speed and the overspeed trip setpoint or 15% above nominal, whichever is less.

3. Verifying the diesel generator capability to reject a load of 2600 kW without tripping. The generator voltage shall not exceed 5000 volts during and following the load rejection.

4. Simulating a loss-of-offsite power by itself, and:

a) For Divisions 1 and 2 and for Unit 1 Division 2:

1) Verifying deenergization of the emergency busses and load shedding from the emergency busses.

2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 13 seconds, energizes the auto-connected loads and operates for greater than or equal to 5 minutes while its generator is so loaded. After energization, the steady-state voltage and frequency of the emergency busses shall be maintained at 4160 ± 150 volts and 60 ± 1.2 Hz during this test.

b) For Division 3:

1) Verifying deenergization of the emergency bus.

2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency bus with its loads within 13 seconds and operates for greater than or equal to 5 minutes while its generator is so loaded. After energization, the steady-state voltage and frequency of the emergency bus shall be maintained at 4160 ± 150 volts and 60 ± 1.2 Hz during this test.

5. Verifying that on an ECCS actuation test signal, without loss-of-offsite power, diesel generators 0, 2A, and 2B start on the auto-start signal and operate on standby for greater than or equal to 5 minutes. The generator voltage and frequency shall be 4160 + 416, -150 volts and 60 + 3.0, -1.2 Hz within 13 seconds after the auto-start signal; the steady-state generator voltage and frequency shall be maintained within these limits during this test.

6. Simulating a loss-of-offsite power in conjunction with an ECCS actuation test signal, and:

   a) For Divisions 1 and 2:

      1) Verifying deenergization of the emergency busses and load shedding from the emergency busses.

      2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 13 seconds, energizes the auto-connected emergency loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After energization, the steady state voltage and frequency of the emergency busses shall be maintained at 4160 ± 416 volts and 60 ± 1.2 Hz during this test.

   b) For Division 3:

      1) Verifying deenergization of the emergency bus.

      2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency bus with its loads within 13 seconds and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After energization, the steady state voltage and frequency of the emergency bus shall be maintained at 4160 ± 416 volts and 60 ± 1.2 Hz during this test.

7. Verifying that all diesel generator 0, 2A, and 2B automatic trips except the following are automatically bypassed on an ECCS actuation signal:

   a) For Divisions 1 and 2 - engine overspeed, generator differential current, and emergency manual stop.

   b) For Division 3 - engine overspeed, generator differential or overcurrent, and emergency manual stop.

8. Verifying the diesel generator operates for at least 24 hours. During the first 2 hours of this test, the diesel generator shall be loaded to greater than or equal to 2860 kW and during the remaining 22 hours of this test, the diesel generator shall be loaded to 2600 kW. The generator voltage and frequency shall be 4160 + 420, -150 volts and 60 + 3.0, -1.2 Hz within 13 seconds after the start signal; the steady-state generator voltage and frequency shall be maintained within these limits during this test. Within 5 minutes after completing this 24 hour test, perform Surveillance Requirement 4.8.1.1.2.d.4.a).2) and b).2).*

9. Verifying that the auto-connected loads to each diesel generator do not exceed the 2000-hour rating of 2860 kW.

10. Verifying the diesel generator's capability to:

    a) Synchronize with the offsite power source while the generator is loaded with its emergency loads upon a simulated restoration of offsite power,

    b) Transfer its loads to the offsite power source, and

    c) Be restored to its standby status.

11. Verifying that with diesel generator 0, 2A, and 2B operating in a test mode and connected to its bus:

    a) For Divisions 1 and 2, that a simulated ECCS actuation signal overrides the test mode by returning the diesel generator to standby operation.

    b) For Division 3, that a simulated trip of the diesel generator overcurrent relay trips the SAT feed breaker to bus 243 and that the diesel generator continues to supply normal bus loads.

12. Verifying that the automatic load sequence timer is OPERABLE with the interval between each load block within ± 10% of its design interval for diesel generators 0 and 2A.

13. Verifying that the following diesel generator lockout features prevent diesel generator operation only when required:

    a) Generator underfrequency.

    b) Low lube oil pressure.

    c) High jacket cooling temperature.

    d) Generator reverse power.

    e) Generator overcurrent.

    f) Generator loss of field.

    g) Engine cranking lockout.

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*If Surveillance Requirements 4.8.1.1.2.d.4.a)2) and/or b)2) are not satisfactorily completed, it is not necessary to repeat the preceding 24 hour test. Instead, the diesel generator may be operated at 2600 kW for 1 hour or until operating temperature has stabilized.

SURVEILLANCE REQUIREMENTS (Continued)

e. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting diesel generators 0, 2A, and 2B simultaneously, during shutdown, and verifying that all three diesel generators accelerate to 900 rpm + 5, -2% in less than or equal to 13 seconds.

f. At least once per 10 years by:

1. Draining each fuel oil storage tank, removing the accumulated sediment and cleaning the tank using a sodium hypochlorite or equivalent solution, and

2. Performing a pressure test of those portions of the diesel fuel oil system designed to Section III, subsection ND, of the ASME Code in accordance with ASME Code Section 11, Article IWD-5000.

4.8.1.1.3 Reports - All diesel generator failures, valid or non-valid, shall be reported to the Commission pursuant to Specification 6.6.B. Reports of diesel generator failures shall include the information recommended in Regulatory Position C.3.b of Regulatory Guide 1.108, Revision 1, August 1977. If the number of failures in the last 100 valid tests, on a per nuclear unit basis, is greater than or equal to 7, the report shall be supplemented to include the additional information recommended in Regulatory Position c.3.b of Regulatory Guide 1.108, Revision 1, August 1977.

TABLE 4.8.1.1.2-1

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3	At least once per 7 days
≥ 4	At least once per 3 days

*Criteria for determining number of failures and number of valid tests shall be in accordance with Regulatory Position C.2.e of Regulatory Guide 1.108, Revision 1, August 1977, where the last 100 tests are determined on a per nuclear unit basis. With the exception of the semiannual fast start, no starting time requirements are required to meet the valid test requirements of Regulatory Guide 1.108.

LIMITING CONDITION FOR OPERATION

3.8.1.2 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and

b. Diesel generator 0 or 2A, and diesel generator 2B when the HPCS system is required to be OPERABLE, and diesel generator 1A when the offsite power source for standby gas treatment system subsystem A or control room and auxiliary electric equipment room emergency filtration system train A is inoperable and either or both systems are required to be OPERABLE, with each diesel generator having:

   1. For diesel generator 0, 1A, and 2A:

      a) A separate day fuel tank containing a minimum of 250 gallons of fuel.

      b) A separate fuel storage system containing a minimum of 31,000 gallons of fuel.

   2. For diesel generator 2B, a separate fuel storage tank/day tank containing a minimum of 29,750 gallons of fuel.

   3. A fuel transfer pump.

APPLICABILITY: OPERATIONAL CONDITIONS 4, 5, and *.

ACTION:

a. With all offsite circuits inoperable and/or with diesel generators 0 or 2A inoperable, suspend CORE ALTERATIONS, handling of irradiated fuel in the secondary containment and operations with a potential for draining the reactor vessel.

b. With diesel generator 2B inoperable, restore the inoperable diesel generator 2B to OPERABLE status within 72 hours or declare the HPCS system inoperable and take the ACTION required by Specifications 3.5.2 and 3.5.3.

c. With diesel generator 1A inoperable, declare standby gas treatment system subsystem A and control room and auxiliary electric equipment room emergency filtration system train A inoperable and take the ACTION required by Specifications 3.6.5.3 and 3.7.2.

d. The provisions of Specification 3.0.3 are not applicable.

*When handling irradiated fuel in the secondary containment.