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U. S. Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA 19406

Docket Nos. 50-317
50-318
License Nos. DPR-53
DPR-69

ATTENTION: Dr. Thomas E. Murley
Regional Administrator

SUBJECT: Justification for Operability; Number 12 Diesel Generator at Calvert Cliffs Nuclear Power Plant

REFERENCE: (a) Teleconference between Messrs. W. F. Kane and E. C. McCabe (NRC), and Mr. W. J. Lippold (BG&E) on September 30, 1986

Gentlemen:

This letter is in response to specific concerns on your part addressed during reference (a). You expressed concern about the operability of No. 12 Diesel Generator (DG) and our basis for determining as such. This letter justifies the operability of No. 12 DG and hence our continued operation by addressing your specific concerns, and those regarding Technical Specification 3.8.1.1 and the definition of Operability.

We are currently operating No. 12 DG under specific instructions provided by our plant staff. The General Supervisor-Operations has specified in his Night Orders to all operators how No. 12 DG will be monitored. Each shift has been assigned an additional independent operator who is dedicated to monitor No. 12 DG locally and to specifically monitor its Jacket Cooling Water (JCW) pressure during DG operation. These operators are all qualified to operate the DG.

IE01

The DG is currently running loaded at 2500 KW to collect data for monitoring the condition of the engine. The dedicated operator is closely monitoring JCW pressure. Normal operating pressure is 35-40 psig. He is waiting until JCW pressure drops to 30 psig which indicates the beginning of possible air binding of the JCW system but precedes the point at which the system is disabled. At this point he opens the vent on the JCW cooler, releasing the entrapped gases and thereby raising JCW pressure. He is leaving the vent open for one hour, at which time he closes the vent and waits until JCW pressure again reaches 30 psig. He is continually repeating this cycle, timing the duration between closing and opening the vent. The trend of time data will be used to indicate whether or not the condition of the DG is degrading as determined by a decreasing time for JCW pressure to fall to 30 psig with no venting.

After completing the most recent set of repairs to No. 12 DG, we performed comprehensive testing that we feel verified the operability of the engine. We initially conducted a test program designed by the vendor to "break-in" and verify the operability of the new cylinder liners and pistons. A copy of this program is discussed in the attached Service Information Letter provided by Fairbanks-Morse.

Prior to initially removing No. 12 DG from service in early September to effect repairs, and since completing the most recent repairs, the DG has passed all the Surveillance Requirements we have performed. We believe the DG meets the requirements of operability as defined in the Technical Specifications.

As a final step in determining operability, we performed a one-hour load run on No. 12 DG at 3000 KW, the 200 hr rating of the machine. The DG successfully carried the load. Venting the JCW Cooler to maintain 30 psig was not required until 45 minutes into the 3000 KW load run and approximately 55 minutes into the overall run. This action was able to return the JCW pressure to above 30 psig quickly and maintain that pressure until the end of the test run. This procedure was recommended and approved by our Plant Operations & Safety Review Committee.

Additionally, fatigue cycling assuming the worst case (cracked cylinder liner) is being assessed. This evaluation considers a comparison of the number of thermal/stress cycles accrued through the recent testing program as compared to the cycles which would be accrued during operation of the DG following a loss of offsite power (LOSP) of a duration consistent with the recognized industry restoration time (four hours). A comparison indicates that the number of thermal cycles which would accrue during this event are negligible when compared to the total number of thermal cycles induced through testing during September. Furthermore, the additional testing planned between now and the refueling outage will result in a relatively small number of cycles. Our Materials Laboratory is evaluating the significance of the additional cycles on the propagation of a crack.

We have evaluated the effects of gas blanketing of a cylinder in the area of leakage which could result in hot spots. The volumetric flowrate of gas through the leak is much less than 1% of the volumetric coolant flow through a single cylinder jacket. The turbulent coolant flow in a cylinder jacket is in the upward direction. Therefore, we conclude that gas cannot accumulate in the cylinder jackets. These are several feet below the JCW cooler (heat exchanger), where we have observed the gas to accumulate.

Based upon the above discussions and the historical performance of the DG, we believe that no further degradation in the engine has occurred since the original attempts in early September 1986 to make the repairs to the DG. We, along with the Office of Nuclear Reactor Regulation, felt the DG was operable at that time based upon the available information, and since no additional deterioration has apparently occurred, we have determined it still capable of performing its design function.

We have posed a question regarding the test program explained in the attachment to the DG vendor, Fairbanks-Morse. We asked them if they would recommend this or another procedure to ensure that the DG would operate in accordance with our Updated Final Safety Analysis Report. Fairbanks-Morse feels that we have proved that the engine can operate at its load ratings as long as we ensure the jacket water cooling system is adequately vented.

In addition to the current load test of No. 12 DG, all subsequent load runs will be conducted similar to that described above. The dedicated operator will be closely monitoring JCW pressure and recording the time for pressure to drop in the system to 30 psig with the vent closed. This data will be compared with previous test results to ensure the condition of the DG will not degrade undetected.

Our long-term intentions are to identify and repair the cause of the gas leakage by the end of the upcoming Unit 1 outage. During this outage, scheduled to commence on October 25, 1986, we will perform the repairs necessary to the DG as follows:

- No. 12 DG will pass the run-in test described in the attached Service Information Letter with an additional three hours of a 2500 KW load run, and

- No. 12 DG will operate during the Service Information Letter test without requiring a dedicated Operator to vent the JCW system beyond what is required to vent the system after initially refilling.

In reference (a), some concern was expressed about the possible in-leakage of water into the cyclinder while the DG is not in use. We do not believe this is a credible occurrence. We have performed several times over the last few weeks a hydrostatic test of the JCW system at 50 psig. There has been no observed leakage of water into the cylinder. The pressure of the JCW system while the DG is secured is less than when it is operating and when it is undergoing a hydrostatic test. Additionally, when the DG had a cracked cylinder liner and the resulting off-gassing increased, a hydrostatic test did not reveal the crack nor any leakage of water into the cylinder. Therefore, no leakage is to be expected.

In addition, our preliminary data indicates that the off-gassing that has occurred is load dependent. That is, as load on the DG increases, so does the gas leakage. Therefore, in a no load condition, no leakage should be detectable. Furthermore, if the leak degrades to the point that in-leakage does occur, the off-gassing during DG operation would force the DG to be declared inoperable anyway.

Because of any remaining concerns on your part, we are retaining on-site a mobile 1 MW DG for emergency use. In addition, we will maintain No. 23 13 KV electrical bus energized from our 69 KV SMECO line.

Should you have further questions regarding this matter, we would be pleased to discuss them with you.

Very truly yours,

James R. Lemons

JRL/SRC/gla

Attachment

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
S. A. McNeil, NRC
T. Foley, NRC

Service Information Letter

Parts and Service Operation

ENGINE RUN-IN PROCEDURE

Engine break-in after rebuild or major repairs and overhaul require a run-in procedure to properly seat new or refurbished parts. Data should be recorded at one half or one hour intervals on the proper test log sheets and kept as a record for future reference. The following suggestions are being passed on as a guideline during run-in procedure:

Bearing Checks - Bearing inspections are made during the run-in to confirm proper assembly. Upper and lower crankcase inspection covers are removed and the condition of the main and rod bearings/bushings can be confirmed by feel or appearance. If bearings feel excessively hot or bearing caps have a blistered appearance, further checks must be made to determine the cause and the correction made before restarting. Final checks are made with a .002 inch feeler gauge on main bearings at the parting line and between the bearing and cap to confirm that no clearance exists. If bearings have failed there will be a clearance at this point.

Crankcase Checks - Inspection of the crankcase includes the condition of fasteners, fastener locks, rotating parts and alignment of components. The condition of the oil ring travel portion in the cylinder liners should be noted as well as gear tooth pattern. Lube oil should be visually checked for contaminates. The condition of the camshaft and camshaft bearings should be noted.

Piston Checks - The condition of the upper pistons can be inspected through openings provided in the air receiver. The opposite side of the piston can be confirmed by viewing the condition of the cylinder liner walls visable from the inspection openings. Piston skirt scuffing and ring seating as well as ring breakage are the primary purposes for viewing the pistons. On model 38TD8-1/8 engines the condition of the upper pistons could be indicative of the condition of the lower pistons. On the 38D8-1/8 model engines the lower pistons can be inspected through the exhaust manifold inspection openings and the cylinder exhaust parts.

Blower Checks - During the run-in procedure on a model 38TD8-1/8 turbo blower parallel engine with a single wall blower, caution should be exercised during no load running. The air temperature must be monitored to and from the blower and the temperature differential should not exceed 100°F. The new designed or modified blowers with increased radial clearances do not apply to this temperature limitation.

Summary - In addition to the power parts inspection, the operating pressures and temperatures provide the engine operator with data indicating the liquid flows and temperature as well as the engine performance. During the run-in program the operation of auxiliaries and the condition of the accessories should also be noted and recorded. All of the preceding checks and inspections are meaningful to a trained serviceman and engine operator and are documented as a supplement to the engine reference manual and is not to be used as a stand alone guide.

Service Information Letter

Parts and Service Operation

The following is typical run-in schedule and suggested checks that should be made for checking the engine operating condition.

TYPICAL RUN-IN SCHEDULE

SPEED		TIME	LOAD	CHECKS
300	MIN	5 MIN	No Load	B
350	500	15	No Load	B
450	600	15	No Load	
550	700	15	No Load	
650	800	15	No Load	
720	900	15	No Load	A, B
720	900	1 Hour	25%	A, B
720	900	1 Hour	37.5%	A
720	900	2 Hours	50%	A
720	900	3 Hours	62.5%	A
720	900	3 Hours	75%	A
720	900	3 Hours	87.5%	A
720	900	3 Hours	100%	A, B, C

A. Check pistons, rings and cylinder liners through the ports after the runs.

B. Check bearings for overheating after the runs.

C. If 110% overload run is required, this run will be scheduled after the 100% load is completed and necessary inspections made.