Power Systems Division
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September 11, 1975

U.S. Nuclear Regulating Commission
Auxiliary & Power Conversion Systems Branch
Phillips Bldg.
7920 Norfolk Avenue
Bethesda, Md. 20014

Attention: Mr. Fred Clemenson

Dear Mr. Clemenson:

This letter is in reply to your verbal inquiry of our Mr. R. H. Beadle in regard to any problems that could be encountered or limitations we would impose on the operation of our engine generator sets for extended periods (up to 30 days - 720 hrs.) at various levels of load (from no load to full rated conditions) at rated speed for standby conditions. We have made a thorough restudy of this area and come to the following conclusions.

1. There exists no mechanical limitation within the engine or any of its supportive systems which would limit operation over extended periods of time at rated speed between no load and rated load with the exception of the possible accumulation of combustion and lube oil products in the exhaust system, at the lower loads.

2. This limitation can be overcome by the following method of operating the engine when it is necessary to keep it running over extended periods of time.

   a. For the FC2 model engine, we would suggest that if the engine were to be operated for periods of time extending over 24 hours and the loads were such that they did not exceed 20% of the engine rating, the engine should be run at above 50% load for at least one hour in each 24 hour period in order to minimize the accumulation of products of combustion and lubrication in the exhaust tytem. Above the 20% rating, the engine may be run continuously as required, with the recommendation that the engine parameters be monitored closely, and logged at least daily, so as to be able to discover any problems early. Changes in cylinder exhaust temperatures would be of particular interest.

   b. G 1/8 OP models, the statement would read the same as for the FC2 models with the exception that the extended period should be 12 hours when the engine is operated from no load up to 30% load, with a one hour run at 50% load or greater, in each 12 hours. Above 30%

load, the engine would require the same attention as indicated above for the Pielstick engine at above 20% load.

3. The consequences of allowing accumulation of combustion and lube oil products in the exhaust sytem would be primarily twofold:

   a. The possibility of fire hazard on resuming high load operation with exhaust temperatures above the flash point of the products accumulated.

   b. Fouling of the exhaust side of the turbochargers with probable effects on their performance and/or vibration due to upsetting the balance of the rotating assemblies.

4. We are including statements in the operating instruction manuals to cover this extended operation as indicated above.

5. We also recommend in our maintenance manuals, that there be an extensive inspection of the engine power parts after such extended operation to ascertain that all is in order and that the engine stays in readiness for further operations.

We hope this information will satisfy your needs. In the event you need further information, please contact the writer.

Very truly yours,

COLT INDUSTRIES OPERATING CORP.
FAIRBANKS MORSE ENGINE DIVISION

V. T. Stonehocker
Manager Systems Engineering

VTS:b

NRC Letter: May 31, 1983

Question 430.107 (Section 9.5.6)

Diesel generators in many cases utilize air pressure or air flow devices to control diesel generator operation and/or emergency trip functions such as air operated overspeed trips. The air for these controls is normally supplied from the emergency diesel generator air starting system. Provide the following:

a. Expand your FSAR to discuss any diesel engine control functions supplied by the air starting system or any air system. The discussion should include the mode of operation for the control functions (air pressure and/or flow), a failure modes and effects analysis, and the necessary P&ID's to evaluate the system.

b. Since air systems are not completely air tight, there is a potential for slight leakage from the system. The air starting system uses a non-seismic air compressor to maintain air pressure in the seismic Category I air receivers during the standby condition. In case of an accident, a seismic event, and/or L.O.P., the air in the air receivers is used to start the diesel engine. After the engine is started, the air starting system becomes nonessential to diesel generator operation unless the air system supplies air to the engine controls. In this case the controls must rely on the air stored in the air receivers, since the air compressor may not be available to maintain system pressure and/or flow. If your air starting system is used to control engine operation, with the compressor not available, show that a sufficient quantity of air will remain in the air receivers, following a diesel engine start, to control engine operations for a minimum of seven days assuming a reasonable leakage rate. If the air starting system is not used for engine control describe the air control system provided and provide assurance that is can perform for a period of seven days or longer.

Additional concern, Question 430.107

Assess the applicability of IE Information Notice 83-17, "Electrical Control Logic Problem Resulting in Inoperable auto-start of Emergency Diesel Generation Units to the MP-3 Diesel Generators.

Response:

Refer to revised FSAR Sections 9.5.6.3 and 9.5.6.5 for the response to this question.

The Staff's concern on depleting the air in the air start system while trying to start the engine is addressed in the response to NRC Question 430.104 and FSAR Section 9.5.6.2.

Response to Additional Concern

Information Notice 83-17 dealt with the failure of an Emergency Diesel Generator to auto-start due to the premature resetting of the shutdown relay during a test at North Anna II. Resetting the shutdown relay resulted in starting air being admitted to the diesel while a time delay prevented fuel from being injected. When the time delay ran out and fuel was injected, starting air was depleted, and the diesel would not auto-start until the air storage tanks were repressurized.

A through review of the Millstone Unit 3 diesel control scheme has been completed. A time delay relay is used to hold the fuel racks in the minimum fuel position for 140 seconds following a shutdown. This is to allow the engine to come to a complete stop before a restart is attempted. If an emergency start signal is received during this time, the diesel response is dependent on what initiated the shutdown. The two cases to be considered are:

1. Normal shutdown utilizing the local/remote engine control switch. In this case, the time delay is bypassed. Fuel and starting air are both admitted while the engine is still rolling and the restart is accomplished "on-the-run."

2. Shutdown is initiated by emergency stop pushbuttons or a generator differential fault. This picks up and seals in the shutdown relay. The diesel can be restarted after the time delay has expired by depressing the engine reset pushbutton. If an engine reset is attempted prior to 140 seconds, the diesel will remain shutdown and the starting air will not be depleted.

Consequently, the scenario described is IE Information Notice 83-17 is not applicable to the MP-3 Diesel Generators.