VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

W. L. STEWART
VICE PRESIDENT
NUCLEAR OPERATIONS

September 28, 1984

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
Attn: Mr. Darrell G. Eisenhut, Director
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Serial No. 439A
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Docket Nos. 50-280
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License Nos. DPR-32
DPR-37
NPF-4
NPF-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
RESPONSE TO GENERIC LETTER 84-15
PROPOSED STAFF ACTIONS TO IMPROVE AND MAINTAIN
DIESEL GENERATOR RELIABILITY

Our letter of August 16, 1984 provided our schedule for response to Generic Letter 84-15. This letter is to provide you with our response (attached) to items 1a, 2b and 3a that were scheduled for September 28, 1984, submittal.

Very truly yours,

W. L. Stewart

W. L. Stewart

Attachment

cc: Mr. James P. O'Reilly
Regional Administrator
Region II

Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
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Mr. James R. Miller, Chief
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Mr. Don J. Burke
NRC Resident Inspector
Surry Power Station

Mr. M. W. Branch
NRC Resident Inspector
North Anna Power Station

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RESPONSE FOR GENERIC LETTER 84-15

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

NRC Request 1a

Licensees are requested to describe their current programs to avoid cold fast start surveillance testing or their intended actions to reduce cold fast start surveillance testing for diesel generators.

North Anna Response 1a

North Anna Power Station Emergency Diesel Generators (EDG) utilize the following methods and equipment to avoid cold fast starts for surveillance testing.

A prelube pump is provided to inject lube oil into the upper lube oil header and lubricate the upper bearings. Prelube of the engine for 2 minutes prior to manual-remote (control room), manual-local (EDG Room), and simulated emergency (except SI/Blackout test) initiation of a start signal is required by diesel operating procedures and periodic tests procedures for both units. The prelube pump starts automatically for manual-remote signal initiation and runs for 2 minutes prior to the diesel starting. Prior to simulated emergency starts and manual-local starts of the diesel, the prelube pump must be manually started and run for 2 minutes. The prelube pump is 1) used for all modes of EDG starting (except actual emergency starts and the SI/Blackout test), 2) powered from a reliable DC power supply, 3) installed to operate in parallel with the engine driven lube oil pump, and 4) provided with a manual start and automatic start capability.

A lube-oil electric heater maintains lube-oil viscosity by keeping the oil at 130-135°F with a thermostatic switch, when the diesel generator is idle. The lube-oil circulating pump provides heated lube-oil flow to a point downstream of the engine-driven lube-oil pump continuously lubricating all of the bearings on the engine lower crank-shaft line. A 2-gallon capacity booster/accumulator ties into the upper lube oil header and is filled during normal engine operation. During the next start the lube-oil accumulated in the booster cylinder assembly is forced by starting air pressure acting on the opposite side of the piston into the bearings along the upper crank-line.

During the post operational check, starting air is momentarily admitted to turn the EDG to remove oil trapped in the upper piston/cylinder area, which prevents lube oil from draining into the exhaust manifold and creating a fire. The diesel is rolled up to approximately 200 rpm and pressurizes the starting air header, which may discharge the booster/accumulator leaving it dry for the next start. A revision to the design change which originally installed the booster/accumulator, has been approved to install an isolation valve in the booster air supply line. This modification will prevent operation of the booster/accumulator during the post operational check.

A check valve is located in the keep-warm line near the point where the line enters the main lube-oil piping. A time-delay relay prevents overfilling of the upper crank by delaying the lube-oil circulating pump start for 10 minutes after the engine is stopped. The time delay allows some drainback from the upper crankline when the engine comes to rest.

Surry Response 1a

Surry Power Station EDG monthly surveillance testing does not utilize "Fast Starts or Cold Starts". The monthly testing is done by starting the diesel in the exercise mode, idling the engine at 400 rpm, and then slowly increasing the speed to 900 rpm in manual. During refueling outages the EDG is subjected to a fast start (simulated SI and Loss of Offsite Power) as required by Surry Technical Specifications. This test is performed to demonstrate the diesel's ability to start and assume load for an emergency condition.

An auxiliary oil system is provided to supply warmed oil to the turbo-charger and the engine sump when the engine is not operating. The auxiliary oil system operates continuously and upon engine shutdown maintains engine oil temperature and lubrication.

When the engine is shut down, water warmed by an immersion heater flows through the lube oil cooler by thermo-syphon action. During shutdown, the lube oil cooler actually operates as a lube oil heater, the heat first being supplied to the water by the immersion heater and then transferred to the lube oil. A temperature control switch operates to control power to the immersion heater elements during engine shutdown.

A circulating pump draws oil from the engine sump and forces part of it through the lube oil filter to the lube oil cooler, with the remainder of the lube oil going through the auxiliary turbo lube oil filter. Oil from the auxiliary turbo lube oil filter flows to the turbo bearing and then drains back to the engine sump. Oil from the cooler drains back to the engine-mounted strainer and from there to the engine sump.

EDG operating procedures require that the circulating oil pump must be in operation for at least 30 minutes prior to starting the engine or placing it in Auto.

Item 2 Diesel Generator Reliability Data

NRC Request 2b

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.

North Anna Response 2b

North Anna EDG operating procedures and periodic test procedures require that personnel complete the attached Record of Emergency Diesel Generator Start whenever an EDG is operated. This record sheet covers when and why the EDG was started, how long the Diesel was run, the amount of load carried, and any problems encountered and the reasons for these problems. If a problem is encountered the STA is contacted and an investigation is made to identify the source and recommend corrective actions.

The information on the record sheet is transferred to a log, which is maintained for each EDG independently. From this information it is possible to statistically determine the reliability of each EDG. However, no yearly data report is maintained for each diesel generator's reliability.

Surry Response 2b

Surry presently does not maintain a record which itemizes the demands and failures experienced by each EDG unit.

Surry's EDG operating procedures and periodic test procedures will be revised to include a requirement to complete a form similar to North Anna's Record of Emergency Diesel Generator Start. The information on this form will be transferred to an individual EDG data log for generation of statistical reports.

Item 3 Diesel Generator Reliability

NRC Request 3a

Licensees are requested to describe their diesel generator reliability improvement program, if any, for attaining and maintaining a reliability goal. The program description should address the surveillance and testing the licensee performs to demonstrate the selected diesel generator reliability.

North Anna Response 3a

North Anna does not have a formal EDG Reliability Improvement Program. However, EDG reliability is maintained by routine surveillance testing, inspection, and maintenance.

North Anna Units 1 and 2 are required by Technical Specifications to demonstrate the operability of the EDG's at least once per 31 days for Unit 1 and for Unit 2 EDG's according to the following schedule.

No. 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

Periodic Test Procedures (PT) are performed to verify the operability of the EDG according to the Technical Specifications surveillance requirements. All of the EDG PT's have acceptance criteria which must be met for an acceptable test. If any of the acceptance criterion are not met, an analysis is conducted to determine corrective action(s) and potential reportability.

Unit 1 and 2 Technical Specifications requires that at least once per 18 months during Unit shutdown the diesel is to be subjected to an inspection in accordance with procedures that are consistent with manufacturer's recommendations.

Surry Response 3a

Surry does not have a formal EDG Reliability Improvement Program. However, EDG reliability is maintained by routine surveillance testing, inspection, and maintenance. In addition, Diesel Generator improvements are currently under evaluation. These improvements include modifications to the lube-oil system and the turbo-charger.

Surry Technical Specifications require performance of a monthly surveillance test (PT) to demonstrate the operability of the EDGs. The EDG PT has acceptance criteria which must be met for a successful test. If any of the criteria are not met, an analysis is conducted to determine corrective action(s) and potential reportability.

The Surry Technical Specifications also require that each EDG be given a thorough inspection during each refueling outage utilizing procedures that are consistent with the manufacturer's recommendations. Also, during refueling outages the redundant systems functional test is performed to insure that the start air supply systems and redundant start sequences operate properly.