

ILLINOIS POWER COMPANY



CLINTON POWER STATION, P.O. BOX 678, CLINTON, ILLINOIS 61727

January 11, 1990

10CFR50.36

Docket No. 50-461

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555

Subject: Special Report: Test Failure of Division I  
Diesel Generator at Clinton Power Station (CPS)

Dear Sir:

CPS Technical Specification 4.8.1.1.3 requires all diesel generator failures, valid or non-valid, to be reported to the NRC within 30 days pursuant to Specification 6.9.2, SPECIAL REPORTS. Due to two valid failures of the Division I Diesel Generator (DG1A) during surveillance testing on December 11, 1989 and December 27, 1989, and a non-valid failure during troubleshooting on December 27, 1989, this SPECIAL REPORT is being submitted in accordance with the CPS Technical Specifications to provide the information required by Regulatory Guide 1.108, Revision 1, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Regulatory Position C.3.b. This SPECIAL REPORT also provides additional information regarding available results of the DG1A Action Plan as identified in Illinois Power Company's (IP) SPECIAL REPORT dated December 20, 1989.

Description of Event

At 0105 hours on December 11, 1989, during the performance of CPS Procedure 9080.01, "Diesel Generator 1A (1B) Operability - Manual," DG1A failed to reach rated speed in less than or equal to 12.0 seconds as required by Technical Specification 4.8.1.1.2.a.4. The recorded time to reach rated speed was 12.3 seconds. DG1A was declared inoperable and the appropriate Technical Specification ACTION was entered.

As identified in IP's SPECIAL REPORT dated December 20, 1989 in response to a slow start of DG1A during surveillance testing on November 20, 1989, an Action Plan has been developed to identify the root cause

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and resolve those factors which may impact the ability of DG1A to routinely meet its starting requirements. As stated in the December 20, 1989 SPECIAL REPORT, the failure on November 20, 1989 has been attributed to incorrect speed controller settings on the electronic governor for DG1A. However, as further recognized in the December 20, 1989 SPECIAL REPORT, other potential contributing causes needed to be identified, evaluated and resolved to ensure the long term reliability of DG1A. Following the failure of DG1A on December 11, 1989, troubleshooting under the Action Plan was begun.

The first part of this Action Plan consists of gathering technical data on various parameters of diesel generator operation. Troubleshooting conducted under this Action Plan identified a defective speed sensing relay. One function of this relay is to trigger deenergization of the air start system after self-sustaining engine speed is reached. Monitoring of the relay contacts associated with this function revealed an inconsistent response. The potential impact of this condition was to reduce the effectiveness of the air start motors and the governor boost. The speed sensing relay was replaced and at 1410 hours on December 13, 1989, the surveillance run was successfully completed with a resulting start time of 9.5 seconds. DG1A was subsequently declared OPERABLE at approximately 1528 hours on December 13, 1989.

At 1020 hours on December 27, 1989, during the performance of CPS Procedure 9080.01, DG1A again failed to reach rated speed in less than or equal to 12.0 seconds as required by Technical Specification 4.8.1.1.2.a.4. The recorded time to reach rated speed was 12.7 seconds. DG1A was again declared inoperable and the appropriate Technical Specification ACTION entered.

Following the installation of additional recording instrumentation to aid in further troubleshooting under the Action Plan, operators attempted to start DG1A at 2316 hours on December 27, 1989. DG1A cranked but did not start. The failure to start was determined to be caused by the placement of recording instrumentation leads which had been installed to monitor the response of the K19 starting relay during the starting sequence. The jumpers were removed and troubleshooting resumed. Additional troubleshooting under the Action Plan identified no specific problem which would have caused the slow start at 1020 hours.

After further review of the starting history of DG1A, Nuclear Station Engineering Department (NSED) personnel, with the concurrence of the diesel generator unit manufacturer, decided to replace the governor on the 12-cylinder engine (DG1A utilizes tandem 12-cylinder and 16-cylinder diesel engines). This decision centered on the fact that the recent slow starts appeared to be time dependent and were characterized by a marked decrease in acceleration midway up the acceleration curve. This distinct feature began occurring following the replacement of the governor on the 12-cylinder engine during February 1989. Although the governors for the tandem engines were of the same type (Woodward EGB13P), following replacement of the 12-cylinder governor in February 1989 they were different models. The governor manufacturer stated that the two models were interchangeable. Following replacement of the governor, three maintenance troubleshooting starts were conducted. Each

of these troubleshooting starts resulted in start times that were less than 9.1 seconds.

At 0347 hours on December 30, 1989, a start of DGLA was initiated to demonstrate its operability. Again, DGLA cranked but did not start. Investigation into this failure determined that a contact pair on the K19 starting relay had failed. Results of the investigation and further corrective actions for the K19 starting relay failure will be provided in a SPECIAL REPORT for this failure on or before January 29, 1990.

Following replacement of the affected K19 starting relay, the surveillance run was successfully completed at 1335 hours on December 30, 1989 with a resulting start time of 8.9 seconds. DGLA was subsequently declared OPERABLE at approximately 1400 hours on December 30, 1989.

#### Cause of Event

As identified in IP's previous SPECIAL REPORT dated December 20, 1989, the DGLA start times are noticeably more erratic than the start times of the other divisional diesel generators. While the solution to the DGLA slow start events appears to have been the replacement of the diesel generator governor and the defective speed sensing relay, other potential contributing causes continue to be evaluated and resolved.

As also identified in IP's previous SPECIAL REPORT, an Action Plan for resolution of the DGLA slow start times has been developed and is currently being implemented. The objectives of this Action Plan are to identify the root cause and resolve those factors which may impact the ability of DGLA to routinely meet its starting requirements. Evaluation of the design and operating data currently available and observations made during recent troubleshooting tests suggest a number of potential contributors to the problem. Under this Action Plan, Illinois Power will systematically investigate these potential contributors and identify appropriate corrective actions. To the extent plant conditions have allowed, investigation of these potential contributors under the Action Plan has been performed. The investigation has included installation of instrumentation to monitor start control circuitry and governor response. Additional data collection will require scheduling DGLA cutages for testing.

The items under continuing investigation include factors inherent in the design (layout and sizing of air start system piping, and arrangement of the fuel oil day tank/piping), and material conditions (governor performance, fuel system operating characteristics, control system and device operation). Each of these factors (and others as may be identified during implementation of the Action Plan) are being systematically assessed.

To date, several additional actions to correct deficiencies have been identified and recommended for implementation. They include: rerouting and resizing of the air start system piping to improve the air start motor performance, modification of the control circuitry such that the fuel priming pumps operate continuously during diesel generator operation to enhance fuel delivery performance, and revising the



setpoint of the diesel fuel oil day tank level switches to prevent air entrainment into the fuel lines during transfer pump operability testing.

#### Corrective Action

As identified above, replacing the governor on the 12-cylinder engine, the defective speed sensing relay and defective K19 starting relay provided adequate corrective action to restore DG1A to OPERABLE status. Completion of the DG1A Action Plan and identified corrective actions will resolve the DG1A slow start problem and enhance diesel generator reliability. The DG1A Action Plan will be completed and a final report will be submitted on or before March 30, 1990 describing the root cause and corrective actions taken to correct the DG1A slow starting condition.

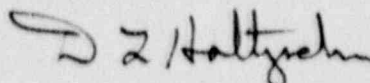
The cause of failure and the corrective actions for the K19 starting relay failure are currently under evaluation. The results of this evaluation will be provided in a SPECIAL REPORT on this failure to be submitted on or before January 29, 1990.

#### Additional Information

The December 11, 1989 event represents the third valid failure in the last 20 valid tests for DG1A (and the sixth valid failure in the 63 valid tests that had been performed for DG1A since receipt of the operating license). The December 27, 1989 event at 1020 hours represents the fourth valid failure in the last 20 valid tests for DG1A (and the seventh valid failure in the 67 valid tests that had been performed for DG1A since receipt of the operating license). The December 27, 1989 event at 2316 hours has been determined to be a non-valid failure in accordance with Regulatory Guide 1.108 Position C.2.e.(7). Therefore, the surveillance frequency for DG1A remains at once per 7 days in accordance with Technical Specification Table 4.8.1.1.2-1.

Additionally, it should be noted that the valid failure on December 30, 1989 represents the seventh valid failure in the last 100 valid tests on a per nuclear unit basis. Therefore, the SPECIAL REPORT required as a result of that event will include the additional information recommended in Regulatory Guide 1.108 Position C.3.b.

Sincerely yours,



D. L. Holtzscher  
Acting Manager -  
Licensing and Safety

DAS/krm

cc: NRC Clinton Licensing Project Manager  
NRC Region III Regional Administrator  
NRC Resident Office  
Illinois Department of Nuclear Safety