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Resident Manager

June 10, 1992
JAFFP-92-0454

United States Nuclear Regulatory Commission
Document Control Desk
Mail Station P1-137
Washington, D.C. 20555

Subject: Docket No. 50-333
Diesel Fire Pump Low Discharge Pressure

Dear Sir:

The New York Power Authority (NYPA) submits the following special report to address inoperability of a fire pump for more than 7 days.

The event requires that a 30-day special report be submitted in accordance with Technical Specifications 3.12.A.1.c and 6.9.B.2.

Summary of Event

Diesel engine driven fire pump 76P-1 was not capable of delivering the Technical Specification required 2,500 gpm at a minimum pressure of 125 psig from October 31, 1991 to May 15, 1992, a period of 197 days, as a result of an improper relief valve setpoint and a low engine speed.

Description and Corrective Action

On October 3, 1991 operating personnel discovered a pin-hole leak in diesel fire pump (76P-1) discharge relief valve (76RV-43) during routine surveillance testing as required by Technical Specification 4.12.A.1.b. Technical Specification 4.12.A.1.b requires a pump start and operation for at least 20 minutes on recirculation flow. The pump was removed from service and the relief valve replaced with a new valve with a setpoint of 150 psig. The fire pump was returned to service and tested to verify satisfactory (leak-free) installation of the new valve.

On October 31, 1991 another test of 76P-1 was conducted. The test results were considered to be unsatisfactory. The high pressure fire water system pressure was 156 psig rather than 125 to 140 psig as stated in the procedure. Maintenance changed the valve setpoint to 135 psig as indicated on pump discharge

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pressure gauge 76PI-103 while the pump was operating. The surveillance test was repeated as a post-work test with satisfactory results on November 1, 1991.

Investigation in May 1992 revealed several deficiencies associated with adjusting the relief valve setpoint and testing conducted on October 31, and November 1, 1991.

1. Adjustment of the relief valve was completed with the valve installed and the pump operating. The pump discharge pressure gauge (76PI-103) was used as an indication of valve set pressure. The valve should have been removed and adjusted using a high accuracy calibrated test gauge.
2. The acceptance criteria for setting the relief valve were inadequate. Work instructions indicated that the valve should be adjusted to result in a system pressure of 125 to 140 psig with the pump operating. No instructions or requirements which required evaluation of overall high pressure fire water system performance were provided.
3. The required system pressure with the pump operating and engine speed range stated in the surveillance test (which was used to demonstrate acceptable pump and relief valve performance) were inappropriate. The pressure and engine speed range had been taken from design data for a newer diesel engine driven fire pump (76P-4) which was installed in 1989. The fire pump of concern (76P-1) is part of the original plant fire protection system which was placed in service in 1973 during plant construction.

From November 1, 1991 to May 10, 1992 the monthly surveillance required by Technical Specification 4.12.A.1.b was completed with satisfactory results (on a weekly basis as required by the insurance carrier).

On May 11, 1992 surveillance testing required by Technical Specification 4.12.A.1.e.3 (which requires a demonstration of pump flow of at least 2,500 gpm at a pressure of 125 psig once per 18 months) was conducted. The pump failed to meet the surveillance test acceptance criteria because pump discharge pressure (at 76PI-103) was only 123.4 psig at a flow of 2,500 gpm. As noted above, an investigation and additional testing was conducted and a number of deficiencies identified. In addition to deficiencies 1, 2, and 3 noted above, the following deficiencies are related to the test conducted on May 11, 1992.

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1. The calibration of the pump discharge pressure gauge (76PI-103) was checked and the gauge was found to be indicating approximately 2 psig higher than actual pressure. As a result, the pump discharge pressure at 2,500 gpm was actually 121.4 psig.
2. Relief valve 76RV-43 lifted (opened) at an indicated pressure of 113 psig following pump start and remained open until pressure decreased to 108 psig. The valve should open to limit pressure to less than or equal to 175 psig and should be fully closed when system pressure decreases to 125 psig due to demand.
3. At a flow of 2,500 gpm to the fire protection system, the relief valve was fully open and passing approximately 1,600 gpm. Pump discharge pressure (as indicated on calibrated pump discharge pressure gauge 76PI-103) was 123.4 psig, measured pump speed was 1,760 rpm, and measured engine speed was 2,035 rpm. While the pump nameplate indicates 1,760 rpm is acceptable, system design indicates 1,770 to 1,800 rpm is the proper pump speed. The proper engine speed would be greater than 2,035 rpm to provide a pump speed of 1,770 to 1,800 rpm.
4. The relief valve was removed for bench testing. The as-found lift pressure was 105 psig. The valve was then set at 150 psig and reinstalled.
5. Preventive Maintenance procedures for the diesel engine (performed annually) and surveillance test procedures for pump performance testing (performed once each 18 months) were reviewed and discrepancies (differences) were discovered. The Preventive Maintenance procedure resulted in engine speed being set at 2,035 to 2,050 rpm while the surveillance test procedure required an engine speed range of 2,014 to 2,114 rpm. Review of plant records indicates that this discrepancy resulted in an adjustment to increase engine speed above 2,050 rpm (to achieve acceptable surveillance test results) followed by an adjustment to decrease engine speed to the 2,035 to 2,050 range when Preventive Maintenance was performed.

On May 15, 1992, based on test data, design data, and maintenance history, the engine speed was set at 2,060 to 2,070 rpm. This corresponds to a pump speed of 1,782 to 1,790 rpm. Actual testing at an engine speed of 2,065 (pump speed of 1,786) resulted in a pump discharge pressure of 129 psig at a pump flow of 2,500 gpm. This test satisfied the requirement of Technical Specification 4.12.A.1.e.4, and pump 76P-1 was returned to service in an operable condition.

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The procedure for annual preventive maintenance of the engine was revised on May 14, 1992 to specify an engine speed of 2,060 to 2,070. The surveillance test procedure was revised on May 15, 1992 to indicate that system pressure should be 125 to 175 psig. Additional changes to the surveillance test procedure will be made by September 1, 1992 to specify an engine speed corresponding to a pump speed of 1,770 to 1,800 rpm. These actions will correct the discrepancies (differences) between the maintenance and surveillance test procedures.


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NRC Region I
J. Gray, WPO
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