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RECIP.NAME RECIPIENT AFFILIATION
SCHWENCER,A. Licensing Branch 2

SUBJECT: Forwards info re diesel generator dir start sys,per request. Info will be included in Amend 17 to FSAR.

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NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

November 30, 1984
(NMP2L 0269)

Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Schwencer:

Re: Nine Mile Point Unit 2
Docket No. 50-410

Attached is the information requested by Mr. Tomlinson on the diesel generator air start system.

This information will be included in Final Safety Analysis Report Amendment No. 17.

Very truly yours,

C. V. Mangan
Vice President
Nuclear Engineering & Licensing

DS:ja
Attachment
xc: R. A. Gramm, NRC Resident Inspector

Project File (2)

A001
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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Niagara Mohawk Power Corporation	)	Docket No. 50-410
	)	
(Nine Mile Point Unit 2)	)	

AFFIDAVIT

C. V. Mangan, being duly sworn, states that he is Vice President of Niagara Mohawk Power Corporation; that he is authorized on the part of said Corporation to sign and file with the Nuclear Regulatory Commission the documents attached hereto; and that all such documents are true and correct to the best of his knowledge, information and belief.

C. V. Mangan

Subscribed and sworn to before me, a Notary Public in and for the State of New York and County of Onondaga, this 30 day of November, 1984.

Janis M. Macro
Notary Public in and for
Onondaga County, New York

My Commission expires:

JANIS M. MACRO
Notary Public in the State of New York
Qualified in Onondaga County No. 4784555
My Commission Expires March 30, 1986

9.5.6.2.1 Division I and II Diesel Generator Starting System

The starting system for each of the Division I and II standby diesel generators consists of two independent, redundant subsystems either of which is capable of starting the diesel generator. Each subsystem consists of the following basic equipment with interconnecting piping, valves, filters, or strainers: 1) an air compressor, 2) an air receiver tank, 3) a moisture separator, 4) a starting air control valve, with its associated check valve. Beyond this point there is a common header which serves the two starting air distributors and the two sets of starting air valves (one distributor and one set of air start valves per engine bank). The air compressor, receiver, and moisture separator are skid mounted whereas the starting air control valve, the starting air distributor, and the air starting valves are located on the engine.

Each air compressor in each starting subsystem is a two-stage, motor driven compressor that delivers 32 scfm of air to its 130-cu.ft. air receiver tank. The driving motor is a 15-hp 575-V 3-phase, Class 1E induction motor fed from the respective Division I or II emergency motor control center. Each compressor is capable of recharging its air receiver from 240 psig minimum operating pressure to 250 psig maximum operating pressure in less than 45 min.

Each air compressor supplies compressed air to its air receiver through a check valve and a gate valve. The check valve prevents depressurization of the loop back through the compressor when it is not operating. A relief valve protects against system overpressurization. The gate valve is provided for isolating the compressor from the rest of the system. A crossover pipe interconnects the air receivers of the two subsystems within a division to provide the capability for charging both the air receivers from either compressor. The cross-over pipe has a normally closed gate valve that must be manually opened to perform this function.

Each subsystem has a volume of 130 cu. ft. This volume of air is enough for five consecutive starts of the engine without recharging. During each of the first three of these five consecutive starts, the engine will accelerate to rated speed and voltage within 10 sec. The Cooper Energy Services test report for Division I and Division II standby diesel generators indicates that each standby diesel generator had three 10-second starts from one subsystem air receiver tank while the other subsystem air receiver tank was completely isolated. The air receiver tank in service fed both starting air headers. Starting capability tests with both the air receiver tanks in service was not done by Cooper Energy Services. However, from the above test results, it can be inferred that each standby diesel generator starting system will have five 10-second starts capability when fed from both air receiver tanks.

The air receivers are mounted vertically on the starting air skid. Each air receiver has a top mounted pressure relief valve for protection against overpressurization and a bottom-mounted gate valve for manual moisture blowdown. A panel on the air receiver contains a pressure gauge, a pressure switch to start and stop the compressor automatically, test valves, and shutoff valves. The pressure switch on each air receiver starts the compressor when the air receiver pressure decreases to 240 psig and stops when the air receiver pressure increases to 250 psig. The relief valves are set

at 265 psig. The minimum air receiver pressure required to allow five normal starts without recharging is 240 psig. The air receiver pressure can drop to 175 psig and still provide a single start of the diesel generator. The compressors can also be started manually. The air receivers are designed, fabricated, and tested in accordance with the requirements of ASME Boiler and Pressure Vessel Code, Section III, Class 3.

A successful engine cranking cycle begins at the engine start signal and ends when the engine reaches 280 rpm. If the engine fails to start, it will continue to crank for a total period of 10 sec from the receipt of start signal. Following this 10-sec time limit, the air start solenoids are deenergized, the following alarms are annunciated, and the engine stops cranking.

1. Standby diesel generator starting sequence incomplete - local.

2. Emergency diesel generator system trouble - control room.

From the air receiver, compressed air flows through a butterfly valve and then a moisture separator. Any remaining moisture in the air is removed by the separator, which has a water level indicator and drain. The butterfly valve, which acts as a manual isolation valve for maintenance purposes, is alarmed in the closed position. The alarm is provided since closure of the isolation valves in both subsystems would preclude starting of the diesel generator.

Compressed air is then supplied to the starting air control valve. This valve has two outlets: the main outlet and the vent outlet. The vent outlet is constantly open to provide a source of air to the pneumatic controls; the main outlet is opened on demand to provide starting air to the engine. Air is supplied to the starting air solenoids through the manual shutoff valves and the turning gear interlock valves when the turning gear is disengaged. When the engine receives a start signal, the starting air solenoids (left and right banks) are energized through shuttle valves to the respective starting air control valve. With the starting air valve open, air then flows through the filters to the respective starting air distributors. The shuttle valves provide control air for the starting air control valves and for the engine control and shutdown, from either or both of the control air headers. The shuttle valves provide output air with pressure balance on both sides, as well as with air

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9 pressure unbalance on either side of the valves. With balanced pressure from both air sources, the shuttle valves provide an output airflow derived from both sources. Air from the starting air main outlet then flows through the air filters to the starting air distributors. The starting air distributors act as timers to open and close the starting air valve in each cylinder head according to the firing order of the engine. When the starting air valves open, air is admitted into the cylinders and the engine is cranked. Either of the dual sets of the starting air control valve, air distributor, and starting air valves will crank the engine even though both sets are normally energized for reliability of starting. When the starting signal is turned off, air vents from the distributors and cylinder heads through the orificed check valve and out the starting air control valves.

The piping associated with the starting systems is designed, fabricated, and erected in accordance with ASME Boiler and Pressure Vessel Code, Section III, Class 3 with all com-

ponents fabricated from carbon steel. The piping on the engine is fabricated from stainless steel. The entire starting air system is designed to Category I requirements.

9.5.6.2.2 Division III Diesel Generator Starting System

The Division III standby diesel generator starting system consists of two independent, redundant subsystems, either of which is capable of starting the diesel generator. Each subsystem consists mainly of the following equipment with interconnecting piping, valves, filters, or strainers: 1) an air compressor, 2) an aftercooler, 3) an air receiver tank, 4) a starting air relay valve, and 5) two starting air motors. The air compressor, air receiver tank, and aftercooler are located on the starting air skid, whereas the starting air relay valve, and starting air motors are located on the engine.

The Division III diesel generator starting system has one motor-driven air compressor and one diesel engine-driven air compressor. Each air compressor is a two stage, air-cooled compressor with a 20 scfm rating and is capable of recharging the associated 64-cu ft air receiver from 150 psig minimum operating pressure to 250 psig maximum operating pressure in less than 30 min. One of the compressors is driven by a 7 1/2-hp, 575-V, 3-phase ac motor fed from the Division III emergency 600-V ac bus. The other compressor is engine driven with a 125-V dc starting circuit. The 125-V dc power is drawn from the Division III emergency 125-V dc bus.

The air compressor supplies compressed air to the air receiver through an aftercooler, a check valve, a relief valve, and a service valve. The check valve prevents depressurization of the loop back through the compressor when it is not operating. The relief valve protects against system overpressurization. The service valve is provided for isolating the compressor from the rest of the system. The air-cooled aftercooler ensures dry air in the air receiver.

Each air receiver has a volume of 64 cu ft. The starting air system for the Division III standby diesel generator, when initially charged to 250 psig, has adequate air storage capacity to start the engine five consecutive times without recharging when operated in its normal configuration using both redundant trains through all air start motors. At receivers pressure of 225 psig, three-start capacity is available. The air ceiver's pressure can drop to 100 psig and still provide a single start of the diesel generator. The air receivers are mounted vertically on the starting air skid. Each air receiver has a top-mounted pressure-relief valve for protection against over-pressurization and a bottom-mounted drain valve for

manual moisture blowdown. A panel on the air receiver contains a pressure gauge, a pressure switch to start and stop the compressor automatically, and a service