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U S Nuclear Regulatory Commission
Attn: Document Control Desk
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PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

Reply to Questions on Design Report for the Station Blackout/Electrical Safeguards Upgrade Project (TAC Nos. 68588 and 68589)

Reference: Letter from Thomas M Parker to U S Nuclear Regulatory Commission dated November 27, 1990 titled "Design Report for the Station Blackout/Electrical Upgrade Project"

On November 27, 1990 we submitted for NRC Staff review the design report for our project: 1) to add two additional safeguards emergency diesel generators, 2) to upgrade the safeguards electrical distribution system, and 3) to upgrade #121 Cooling Water Pump to become a swing safeguards pump. Through phone discussions with NRR Staff personnel, Mr Armando Masciantonio and Dr Saba Saba, we received several questions. These questions can be answered by revising the pertinent pages of the referenced design report. Attached to this letter are marked-up pages of that report. The indicated changes will be incorporated into the next formal revision to the design report.

A050
1/1

Please contact us if you have any questions related to the responses to the questions.

Thomas M Parker
Manager
Nuclear Support Services

c: Regional Administrator - Region III, NRC
Senior Resident Inspector, NRC
NRR Project Manager, NRC
J E Silberg

Attachment: Marked-up pages (pp. 22, 29, 34, 37, 39, 48, 53 and 100) of the Design Report for the Station Blackout/Electrical Upgrade Project

5. Combustion Air and Exhaust System

a. *Intake Air Filter	Safety Related
b. *Exhaust Silencer	Safety Related
c. Interconnecting Piping	Safety Related

* Supplied under Diesel Generator Specification M-870.

3.2.2 Diesel Generator Room Ventilation System

The diesel generator room normal mode ventilation fans and associated ductwork and controls, will be non-safety related. This equipment is provided for human comfort only. | Rev 2

All other components of the diesel generator room ventilation system will be safety related, and support operation of the diesel generator set. | Rev 2

3.2.3 Electrical Power Distribution, Instrumentation and Controls

The electrical power distribution and controls system necessary for operation of safety related equipment is classified as safety related (Class 1E). Diesel generator power is required in the event of a loss of offsite power, and is required to be available when a safety injection (SI) actuation signal is initiated.

Instruments, controls, and associated sensing lines having the function to ensure operation of the diesel generator units, the engine room ventilation, or to maintain integrity of Class 1E circuits, will be designed safety related. Those that are required for alarming, indication and monitoring will be non-safety related.

3.2.4 Fuel Oil Storage and Transfer System

The electrical power supply equipment, including pump controls, instrumentation and cable/raceway will be safety related Class 1E for the equipment associated with the four storage tanks and four transfer pumps. Controls and instrumentation associated with level and leak detection of fuel oil for the purpose of indication, monitoring and alarm will be designated as non-safety related. Power supply equipment, controls, instrumentation and circuits/raceway associated with the receiving tank and recirculating pump will be designated as non-safety related.

A 3-way thermostatic valve regulates flow through the oil cooler based on outlet temperature. Any excess oil from the discharge valve and cylinder block internal bearings are returned to the oil sump.

The lube oil system will be provided with a pre-lube system to maintain constant flow of lubricating oil to critical areas during standby mode to minimize wear during engine starts. To enhance quick engine starts, the pre-lube system maintains lube oil in the "keep warm" temperature through the lube oil standby heat exchanger, heated by the keepwarm portion of the HT cooling water system. The pre-lube system design will include provision for draining lube oil from the engine crankcase. An AC motor-driven pump will be used normally for pre-lube system operation with a DC motor-driven pump for backup operation. Both pumps and the standby heat exchanger will be located in the auxiliaries desk.

A sufficient quantity of lube oil to permit 7 days of continuous operation at rated load will be maintained on site for each diesel generator. The lube oil will be stored in drums or a lube oil storage tank. | Rev 1
delete these words

The lube oil storage tank provided for each diesel generator will be located at an elevation to permit filling of each engine crankcase by means of gravity flow, which will be controlled by a manually-operated fill valve.

3.3.4.2 Diesel Lube Oil System Installation

Installation requirements for the lube oil system will include providing interconnecting piping for the following equipment:

a. From the lube oil storage tank to the manually-operated fill valve.

b. Reservoir fill line (funnel) to the lube oil reservoir.

c. From the engine prelubrication outlet to the auxiliaries desk.

d. From the auxiliaries desk outlet to engine prelubrication inlet connection.

Miscellaneous piping will be required by the diesel engine. This includes providing crankcase relief valve discharge piping to be routed to the building sump.

The intake and exhaust louver frames and blades will be steel, and will be tornado missile proof. The intake and exhaust openings will be located at an elevation higher than the maximum probable flood level.

All components of each ventilation system will be protected from tornado generated missiles.

The diesel generator room vent fans will be vane axial-type with direct-drive totally-enclosed-air-over (TEAO) motors.

Fan-developed pressures will be based on the pressure drop through ductwork, concrete plenums and distribution accessories.

All equipment will be factory inspected and tested in accordance with the applicable equipment specification. Erection and inspection of equipment will be in accordance with the design drawings and manufacturer's recommendation.

System testing and balancing will be performed and evaluated prior to system turnover. Controls on each system will be checked, adjusted and tested to ensure the proper sequence of operations. A final, integrated preoperational test will be conducted with all equipment and controls in operation to verify operation.

3.3.7 Diesel Engine Auxiliary Systems ~~Piping Requirements and Materials~~ | Rev 1

All interconnecting piping unless otherwise noted herein, will be ANSI 150 lb pressure class. All miscellaneous piping such as for drain and vent will be rated for 150 lbs. or greater.

All piping joints and connections will be welded. Where required, such as at pump suction, discharge connections, and flexible connections, flanges will be acceptable.

All piping material will be carbon steel except the following systems:

		Material
a.	Starting Air System	Stainless Steel 304 or 304L
b.	Combustion Air and	Galvanized Carbon Steel
c.	Exhaust System	Carbon Moly Alloy Steel

d.	Interconnecting Piping (except Manufacturer's Standard Piping Sections)	ASME Section III (1986), Class 3**
e.	Vent & Drain Lines (for air receiver, beyond First Isolation Valve)	ANSI B31.1-1967

4. Lube Oil System

a.	Lube Oil Storage Tank	API-650-1984
b.	*Lube Oil Cooler	Manufacturer Std.
c.	AC Motor Driven Transfer Pump	ANSI B31.1-1967
d.	Tank Vent & Drain Lines (beyond First Isolation Valve)	ANSI B31.1-1967
e.	Engine/Aux. Desk Interconnecting Piping	ASME Section III (1986), Class 3**
f.	Lube Oil Storage Tank Fill Line	ANSI B31.1-1967

5. Combustion Air and Exhaust System

a.	*Intake Air Filter	Manufacturer Std.
b.	*Exhaust Silencer	Manufacturer Std.
c.	Piping	
	1. Exhaust	ASME SEC III CLASS 3 ~~ANSI B31.1~~ (1986), fabricated per SA 691 Class ~~10~~ 13. Stress analyzed per ASME Section III Class 3 components using ANSI B31.1 (1986) stress allowables.
	2. Intake	ASME SEC. III CLASS 3 ~~ANSI B31.1~~ (1986), fabricated per SA 134. Stress analyzed per ASME Section III Class 3 components using ~~B31.1~~ ASME SEC III Class (1986) stress allowables.

Rev 1

* Supplied under Diesel Generator Specification M-870.

** With exceptions as listed in Section 3.3.8.1.

The auxiliary desk (one for each engine), located near the diesel generator unit, will include gauges to indicate engine temperatures and pressures.

The bench board control panel, located in the diesel generator control room, will include instruments and controls for the diesel generator and auxiliaries plus the fuel oil transfer pumps, engine room ventilation, and control room ventilation fans.

A vertical panel, located in the diesel generator control room, will be provided to include additional instruments and controls for the diesel generator and auxiliaries.

A generator exciter panel, located in the diesel generator control room, will include excitation, voltage regulation, and field flashing equipment, and current and voltage transformers for protective relays and power measuring instruments.

3.3.10.2 Trips and Interlocks

All protective trips other than engine overspeed and generator differential overcurrent will be bypassed upon receipt of an automatic emergency start signal in response to a safety injection signal and will be annunciated in the main control room. No protective trips will be bypassed upon receipt of an automatic bus undervoltage start signal.

Protective trips will be provided to automatically shut down the diesel engine and/or trip the diesel generator breaker, and protect the diesel generator units from possible damage or degradation during routine testing. Protective trips will be in accordance with vendor recommendations and will consist of, but not be limited to the following: AND LOGIC FOR EACH ENGINE

- Overspeed 1/2
- Engine Lube Oil Low-Low Pressure 2/3
- Jacket Water High-High Temperature 1/1
- Jacket Water Low Pressure 1/1
- Crankcase High Pressure 1/1
- Lube Oil Sump Low Level delete
- Generator Bearing ~~High~~-High Temperature 1/1 | Rev 2
- Engine Bearing High-High Lube Oil Temperature 1/1
- Reverse Power 1/1
- Generator Differential Current 1/1
- Generator Phase Overcurrent 1/1
- Generator Overvoltage 1/1
- Loss of Excitation 1/1
- Electric Governor / Fuel Rack Failure 1/1

Fill inlet connection and vent outlet connection will be protected from flood conditions and will be positioned above the maximum probable flood level.

3.4.2.2 Underground Storage Vault

The emergency storage tanks will be installed in a Seismic Category I reinforced concrete vault enclosure located below seismic grade level and adjacent to the west wall of D5/D6 Diesel Generator Building. The vault will provide the required 3-hour rated fire protection barrier, including D5/D6 west wall penetrations, for enclosed fuel supply tanks, and in addition, will withstand the effects of tornado generated missiles, site flood, and buoyancy force considerations. The vault will be a vital area.

The vault will be divided into two compartments by a concrete partition wall to separate each pair of tanks serving a single diesel generator set and provide fire and flood protection between each diesel generator sets fuel supply equipment.

The vault will be sized to provide a minimum clearance of 15 inches from all tank surfaces, as well as allowing convenient accessibility to the tanks for inspection and repair. Leakproof hatches will be provided on top of the vault for tank internal and external inspection access and to allow removal of tank internal strainers and baffles and other appurtenances. Level instrumentation will be bottom mounted.

The underground storage vault will be insulated sufficiently to protect the fuel oil from reaching a minimum system operating temperature. The vault temperature will be indicated in the respective engine Room and monitored by operations. Rev 1

The vault will be provided for containing leakage of the tank contents and any accumulated seepage water. The vault floor will slope to a sump, which will contain a leak detector. Leak detection instruments will be provided to alert presence of fuel or water in the sump. This will be locally alarmed and a general trouble alarm in the main control Room.

The detailed structural design requirements for the concrete vault structure will be as specified in Section 4.0

The vault's walls and bottom will be provided with a waterproof membrane. All hatches and penetrations on the top slab will be leak-tight.

3.4.2.6.2 Design and Fabrication Codes

	Design & Fabrication Code
1. Tanks	
a. Emergency Storage Tanks	ASME, Section III (1986), Class 3**
b. Receiving Tank	API 650-1984
2. Pumps	
a. Transfer Pumps	Viking Pump Manufacturer's Std.
b. Recirculating Pump	Viking Pump Manufacturer's Std.
3. Piping, Pipe Support Components and Valves	
a. Fuel Oil Transfer Piping System (except vent and drain lines)	ASME Section III (1986), Class 3**
b. Receiving Tank Piping & Recirculating Piping System	ANSI B31.1-1967
c. Storage Tank Vent	ASME Section III (1986), Class 3**
d. Drain Lines after First Isolation Valve	ANSI B31.1-1967

** With exceptions as listed in Section 3.4.2.6.1.

3.5 DESIGN STANDARDS

In addition to the codes and standards listed in the design requirements given above in Section~~s~~ 3.4.2.6, ~~and 3.4.2.7,~~ the following NUREG 0800, IEEE standards, and regulatory guides are adopted in whole as design criteria requirements for the D5 and D6 Diesel Generator and Auxiliary Systems as described in Section 3.0. Rev 2

Within the existing plant boundary the existing design criteria as defined in the USAR will apply except as noted otherwise in this document.

5.3.6 Emergency Response Computer System

The Emergency Response Computer System (ERCS) will serve as an aid to the control room operator in monitoring the status of the D5 and D6 diesel generators. It may replicate some functions of the engine monitoring system, local control panels or the hard-wired control room instrumentation. Instead, it will only monitor specific inputs and provide data to fulfill a specific need for the operator. Areas identified to date include:

- Annunciator system support to identify, on demand, a specific input that generated a group alarm.
- Operations data logging of surveillance testing events.
- Provide analog process information of parameters occasionally required.

5.3.7 D5/D6 Control Scheme Tie-In with Existing Plant

When the local Generator Control Mode switches, located in the D5 and D6 Control Rooms, are in the remote position, control of the D5 and D6 emergency diesel generators is transferred to the Main Control Room. Emergency start, manual start and stop, voltage adjust, speed control, main breaker control and synchronizing are among the controls that will be available in the Main Control Room.

The design of the control circuitry between the D5 and D6 Control Rooms and the Main Control Room will include the intermediate termination of all control cables at terminal cabinets located in the Relay Room and then circuit continuation to the Main Control Room.

The D5 and D6 tie-in to the existing plant will also include all appropriate alarm circuits to the annunciator cabinets.

5.3.8 Main Control Room "G" Panel Modification

The existing controls for the safeguards diesel generators and their associated 4160V buses located on the Main Control Room "G" Panel will be replaced and additional controls for the new diesel generators will be installed. The existing panel will be replaced and smaller controls will be installed to accommodate the additional controls in the original space. Annunciator alarms for the new diesel generators will be installed concurrently with the "G" panel work. Rev 1

All changes have taken human factors into consideration and will be approved by the Control Room Design Review Comittee