Attachment 5
Edited Technical Specification Pages

15.3.0-3
15.3.0-4
15.3.7-1 through 9
Table 15.3.14-1
15.4.6-2

Specification 15.3.0.C delineates additional conditions which must be satisfied to permit operation to continue, consistent with the Limiting Condition for Operation statements for power sources, when a normal or standby emergency power source is not operable. It specifically prohibits operation when one system, subsystem, train, component or device is inoperable because its normal or standby emergency power source is inoperable and a redundant system, subsystem, train, component or device is inoperable for another reason.

The provisions of this specification permit the action statements associated with individual systems, subsystems, trains, components, or devices to be consistent with the action statements of the associated electrical power source. It allows operation to be governed by the time limits of the action statement associated with the Limiting Condition for Operation for the normal or standby emergency power source, not the individual action statements for each system, subsystem, train, component or device determined to be inoperable solely because of the inoperability of its normal or standby emergency power source.

For example, Specifications 15.3.7.~~A~~B.1.~~e~~ f, g, and h allow~~s~~ a 7 day out-of-service time for ~~one~~ the normal or standby emergency ~~diesel generator~~ power source for the appropriate buses. If the definition of operable were applied without consideration of Specification 15.3.0.C., all systems, subsystems, trains, components or devices supplied by the inoperable normal or standby emergency power source would also be inoperable. This would invoke the applicable action statements for each of the applicable LCO. However, the provisions of Specification 15.3.0.C permit the time limits for continued operation to be consistent with the statement for the inoperable normal or standby emergency ~~diesel generator~~ power source instead, provided the other specified conditions are satisfied. In this case, ~~the corresponding normal power source must be operable, and~~ all redundant systems, subsystems, trains, components, and devices must be operable, or otherwise satisfy Specification 15.3.0.C (i.e., be capable of performing their design function and have at least one normal or one standby emergency power source operable). If these conditions are not satisfied, shutdown is required in accordance with Specification 15.3.0.A.

As a further example, Specification 15.3.7.A.1.~~d~~ c requires in parts that 4160-volt buses A03 and A04 be energized for the unit to be taken critical. Specifications 15.3.7.B.1.~~d~~ f, g, and h permits the normal safeguard power source (either bus A03 or A04) to be taken out of service for up to seven days provided ~~both diesel generators~~ normal and standby emergency power to the other required buses are operable and ~~the associated~~ a diesel generator is operating and providing power to the engineered safeguard bus normally supplied by the out-of-service bus. If the definition of operable were applied without consideration of Specification 15.3.0.C, all systems, subsystems, trains, components, and devices supplied by the inoperable normal power sources (i.e., the out-of-service bus A03 or A04) would also be inoperable. This would invoke the applicable action statements for each of the applicable LCOs. However, the provisions of this Specification 15.3.0.C permit the time limit for continued operation to be consistent with the action statement for the inoperable normal power source, in this case seven days, provided the other specified conditions are satisfied. These conditions are that for the engineered safeguards systems on ~~one~~ the other required buses the standby emergency power source must be operable (as must be the components supplied by the standby emergency power source) and all redundant systems, subsystems, trains, components and devices in the other engineered safeguards systems must be operable, or likewise satisfy Specification 15.3.0.C (i.e., be capable of performing their design function and have an emergency power source operable). In other words, ~~both~~ the required standby emergency power sources must be operable and all redundant systems, subsystems, trains, components and devices in both divisions of engineered safeguards systems must also be operable. If these conditions are not satisfied, shutdown is required in accordance with this specification.

In the cold shutdown and refueling shutdown conditions, Specification 15.3.0.C is not applicable, and thus the individual action statements for each applicable LCO in these conditions must be adhered to.

Specification 15.3.0.D addresses the momentary loss of power to a component when immediate action is initiated resulting in reenergization from an alternate source, tripping the channel of logic or initiating operator action as specified in Table 15.3.5-2. Such a situation does not constitute an unsafe condition.

15.3.7 AUXILIARY ELECTRICAL SYSTEMS

Applicability

Applies to the availability of off-site and on-site electrical power for plant power operation and for the operation of plant auxiliaries.

Objective

To define those conditions of electrical power availability necessary (1) to provide for safe reactor operation, and (2) to provide for the continuing availability of engineered safeguards.

Specification

A.1 Under normal conditions neither one nor both reactors shall be made critical unless the following conditions are met:

a. At least two 345 KV transmission lines are in service.

b. The 345/13.8 KV and the 13.8/4.16 KV station auxiliary transformers associated with the reactor(s) to be taken critical are in service; or one 345/13.8 KV station auxiliary transformer and the associated 13.8/4.16 KV station auxiliary transformer(s) are in service with the gas turbine operating.

c. 4160 Volt unit supply buses A03 and A04 for the unit to be taken critical are energized from their normal supply.

d. ~~4160 Volt safeguards buses A05 and A06 for the unit(s) to be taken critical are independently energized from their normal supply and b~~ Both units' A05/A06 bus tie-breakers are removed from their cubicles.

e. ~~480 Volt buses B03 and B04 for the unit(s) to be taken critical are independently energized from their normal supply and b~~ Both units' B03/B04 bus tie-breakers are open with control power removed.

f. A fuel supply of 11,000 gallons is available in each tank which is being relied upon to supply any operable emergency diesel generator(s)~~; and both diesel generators are operable~~.

g. Four of the five safety-related station batteries and all four of the main DC distribution systems are operable.

h. Four battery chargers are operable with one charger carrying the DC loads on each main DC distribution bus: D01, D02, D03 and D04.

i. 120 VAC Vital Instrument Buses Y01, Y02, Y03, Y04, Y101, Y102, Y103, and Y104 for the unit(s) to be taken critical are energized from a safety-related inverter.

j. For both units to be made critical, the normal power supply and a standby emergency power supply to all the 4160/480 Volt safeguards buses shall be operable and the buses are energized from their normal supply.

k. For Unit 1 to be made critical, the normal power supply and a standby emergency power supply to the 4160/480 Volt safeguards buses Unit 1 A05/B03, Unit 1 A06/B04, and Unit 2 A06/B04 shall be operable and the buses are energized from their normal supply.

l. For Unit 2 to be made critical, the normal power supply and a standby emergency power supply to the 4160/480 Volt safeguards buses Unit 2 A05/B03, Unit 2 A06/B04, and Unit 1 A05/B03 shall be operable and the buses are energized from their normal supply.

~~A.2 Under abnormal conditions one reactor may be made critical providing the following conditions are met:~~

~~a. One 345 KV transmission line is in service; or the gas turbine is operating.~~

~~b. The 345/13.8 KV and the 13.8/4.16 KV station auxiliary transformers associated with the unit to be taken critical are in service; or the associated 13.8/4.16 KV station auxiliary transformer is in service and the gas turbine is operating.~~

~~c. Reactor power level is limited to 50% rated power until 2 or more transmission lines are restored to service.~~

~~d. 4160 Volt buses A03 and A04 for the unit to be taken critical are energized from their normal supply.~~

~~e. 4160 Volt safeguards buses A05 and A06 for the unit to be taken critical are independently energized from their normal or emergency power supply and both units' A05/A06 bus tie breakers are removed from their cubicles.~~

~~f. 480 Volt safeguards buses B03 and B04 for the unit to be taken critical are independently energized from their normal or emergency power supply and both units' B03/B04 bus tie breakers are open with control power removed.~~

~~g. A fuel supply of 11,000 gallons is available; and both diesel generators are operable.~~

~~h. Four of the five safety related station batteries and all four of the main DC distribution systems are operable.~~

~~i. Four battery chargers are operable with one charger carrying the DC loads of each main DC distribution bus: D01, D02, D03 and D04.~~

~~j. 120 VAC Vital Instrument Buses Y01, Y02, Y03, Y04, Y101, Y102, Y103, and Y104 for the unit to be taken critical are energized from a safety related inverter.~~

B.1 During power operation of one or both reactors, the requirements of 15.3.7.A.1 may be modified to allow the following arrangements of systems and components:

a. If the 345 KV lines are reduced to only one, any operating reactor(s) must be promptly reduced to, and limited to, 50% power. If all 345 KV lines are lost, any operating reactor(s) will be reduced to supplying its auxiliary load, until one or more 345 KV transmission lines are again available.

b. If both 345/13.8 KV auxiliary transformers are out of service and only the gas turbine is operating, only one reactor will remain operating and it will be limited to 50% power. The second reactor will be placed in the hot shutdown condition.

c. If the 13.8/4.16 KV auxiliary transformers are reduced to only one, the reactor associated with the out of service transformer must be placed in the hot shutdown condition.

~~d. Either bus A03 or A04 may be out of service for a period not exceeding 7 days provided both diesel generators are operable and the associated diesel generator is operating and providing power to the engineered safeguard bus normally supplied by the out of service bus.~~

~~e~~d. With a unit in cold or refueling shutdown or defueled, one pair of buses, A05 and A06 or B03 and B04, for that shutdown unit, may be tied together through their common tie breaker for up to 8 hours provided the required redundant decay heat removal in the shutdown unit and the required redundant shared engineered safety features for the other unit are operable. If the tie breaker cannot be opened or the conditions of 15.3.7.B.1.~~f~~e met within 8 hours, the operating unit shall be placed in the hot shut-down condition within 6 hours and in cold shutdown within the following 30 hours.

~~fe~~. With a unit ~~fully~~ defueled, one pair of buses for the defueled unit, A05 and A06 or B03 and B04, may be tied together through their common tie-breaker in excess of 8 hours provided:

1) An evaluation is performed to show that the loads that remain or can be energized by the buses will not cause a potential overload of the associated diesel generator. The applicable Limiting Conditions for Operation of the equipment removed from service shall be entered for the operating unit.
2) A single train of spent fuel cooling is adequate to cool the spent fuel pool.
3) The required redundant shared engineered safety features for the other unit are operable.

f. The normal power supply or standby emergency power supply to Unit 1 A05/B03 or Unit 2 A06/B04 may be out of service for a period not exceeding 7 days provided the required redundant engineered safety features are operable and the required redundant standby emergency power supplies are started within 24 hours before or after entry into this LCO and every 72 hours thereafter. If the normal power supply is out of service, an operable emergency diesel generator is supplying the affected 4160/480 Volt buses. After 7 days, both units will be placed in hot shutdown within the following 6 hours and cold shutdown within 36 hours.

g. The normal power supply or standby emergency power supply to Unit 1 A06/B04 or Unit 2 A05/B03 or both may be out of service for a period not exceeding 7 days provided the required redundant engineered safety features are operable and the required redundant standby emergency power supplies are started within 24 hours before or after entry into this LCO and every 72 hours thereafter. If the normal power supply is out of service, an operable emergency diesel generator is supplying the affected 4160/480 Volt buses. After 7 days, the affected unit or units will be placed in hot shutdown within the following 6 hours and cold shutdown within 36 hours.

h. The normal power supply or standby emergency power supply to Unit 1 A05/B03 and Unit 2 A05/B03, or Unit 1 A06/B04 and Unit 2 A06/B04 may be out of service for a period not exceeding 7 days provided the required redundant engineered safety features are operable and the required redundant standby emergency power supplies are started within 24 hours before or after entry into this LCO and every 72 hours thereafter. If the normal power supply is out of service, an

operable emergency diesel generator is supplying the affected 4160/480 Volt buses. After 7 days, both units will be placed in hot shutdown within the following 6 hours and cold shutdown within 36 hours.

~~g. One diesel generator may be inoperable for a period not exceeding 7 days provided the engineered safety features associated with the operable diesel are operable and were tested within their required surveillance test intervals. The other diesel generator shall be started to ensure operability within 24 hours before or after entry into this LCO and every 72 hours thereafter. This LCO shall not be allowed in conjunction with e. or f. above.~~

~~h~~i. One of the four connected safety-related station batteries may be inoperable for a period not exceeding 24 hours provided four battery chargers remain operable with one charger carrying the DC loads of each main DC distribution bus.

~~i~~j. If an operating safety-related inverter is rendered inoperable and the associated loads transfer to a non-safety-related power source, the loads shall be transferred back to an operable safety-related inverter within 8 hours or be in hot shutdown within an additional 6 hours and cold shutdown within 44 hours of inverter inoperability.

k. If any safeguards bus is deenergized, the applicable LCOs will be entered for the affected equipment.

Basis

This two unit plant has four 345 KV transmission line interconnections. A 20 MW gas turbine generator, ~~and~~ two original and two additional ~~2850 KW~~ diesel generators are installed at the plant. All of these energy sources will be utilized to provide depth and reliability of service to the Engineered Safeguards equipment through redundant station auxiliary power supply systems.

The electrical system equipment is arranged so that no single contingency can inactivate enough safeguards equipment to jeopardize the plant safety. The 480-volt equipment is arranged on 4 buses per unit. The 4160-volt equipment is supplied from 6 buses per unit.

Two separate outside sources can serve either unit's low voltage station auxiliary transformer. One is a direct feed from the unit's high voltage station auxiliary transformer and the second is from the other unit's high voltage station auxiliary transformer or the gas turbine via the 13,800 volt

system tie bus H01. The normal power supplies for the A05 and A06 buses are the A03 and A04 buses, respectively.

Separation is maintained in the 4160-volt system to allow the plant auxiliary equipment to be arranged electrically so that redundant items receive their power from the two different buses. For example, the safety injection pumps are supplied from the 4160 volt buses 1-A05 and 1-A06 for Unit No. 1 and 2-A05 and 2-A06 for Unit No. 2; the six service water pumps are arranged on 480-volt buses as follows: two on bus 1-B03, one on bus 1-B04, one on bus 2-B03 and two on bus 2-B04; the four containment fans are divided between 480-volt buses 1-B03 and 1-B04 for Unit No. 1 and 2-B03 and 2-B04 for Unit No. 2 and so forth. Redundant valves are supplied from motor control centers 1-B32 and 1-B42 for Unit No. 1 and 2-B32 and 2-B42 for Unit No. 2.

The specifications for the 480 volt safeguards buses, B03 and B04, and the 4160 volt safeguards buses, A05 and A06, direct an independent lineup of power distribution, specifically stating that a normal lineup must be achieved (all safeguards buses associated with a unit are powered through their normal supply breaker with all safeguards bus tie-breakers open) prior to taking a unit critical and during subsequent power operation. Operability of the safeguards buses is based on maintaining at least one train of on-site ~~AC power source and associated distribution system~~ emergency power operable during accident conditions coincident with an assumed loss of offsite power and a single failure in the other train of on-site ~~AC source~~ emergency power. This includes a failure of a tie-breaker to trip, which under certain conditions could result in an overload and a loss of the associated diesel generator. The LCOs permit abnormal ~~power~~ electrical distribution lineups for periods of time in order to facilitate such items as maintenance of normal supply breakers or transformers. In such cases, bus independence may be relaxed under the conditions specified in the LCO.

Extended use of safeguards bus tie-breakers is allowed under specified, controlled conditions. For example, when a unit is fully defueled, safeguards and safe shutdown systems and equipment dedicated to that unit are not required. However, spent fuel pool cooling must be maintained. By limiting the loads supplied by the cross-connected buses, the potential for loss of a diesel generator due to overloading caused by the failure of a tie-breaker to open is minimized. Operability of shared safeguards systems such as auxiliary feedwater and service water must be maintained as required by their applicable LCOs.

The bus tie-breaker specifications have provisions that the required redundant decay heat removal for the shutdown unit and the required redundant shared engineered safety features for the other unit are operable. The specification that applies only to the defueled condition does not have the provision for the required redundant decay heat removal for the shutdown unit. It has provision for verifying the adequacy of a single train of spent fuel pool cooling in lieu of the consideration of decay heat removal for a reactor in cold shutdown.

The Point Beach DC electrical system has been modified so that each of the four main DC distribution buses, which are shared between the two units, has its own power supplies consisting of a safety-related station battery (D05, D06, D105, D106) and a battery charger. In addition to these bus-specific power supplies, a swing safety-related battery (D305) is installed which is capable of being connected to any one of the four main DC distribution buses. Swing battery chargers are also provided. Under normal circumstances, one battery and one battery charger are connected in each main DC distribution bus. The battery charger normally shall be in service on each battery so that the batteries will always be at full charge in anticipation of a loss-of-AC power incident. Under unusual circumstances, two of the five safety-related batteries may be out of service for a limited period of time provided one of the two out-of-service batteries is returned to service within the time periods specified in Specification 15.3.7.B.1.~~hi~~. These limiting conditions for operation ensure that adequate DC power will always be available for starting the emergency generators and other emergency uses.

The emergency diesel generators are the sources of standby emergency power. The support systems necessary to be operable to ensure the operability of the emergency diesel generators (EDGs) are the EDG starting air system, EDG fuel oil system, EDG ventilation system, and EDG DC control power. The standby emergency power supply for a 4160 Volt and associated 480 Volt safeguards bus consists of an operable EDG, including all required support systems, and an operable output breaker to that 4160 Volt safeguards bus.

The LCOs for the standby emergency power supplies require the redundant standby emergency power supplies to be started within 24 hours of entry into these LCOs. If the standby emergency power supply LCO is exited within 24 hours, starting of the redundant standby emergency power supplies is not required.

The EDG starting air system is considered operable when 1) all ~~three~~ starting air bottles in each bank are operable, 2) the starting air banks can be maintained at a minimum pressure of 165 psig, 3) the air bank crossconnect valve is shut unless

bank pressures are being equalized and an operator is stationed at the valve during pressure equalization, and 4) all four starting air motors and their associated valves and relays are operable.

The EDG fuel oil system is considered operable when 1) 11,000 gal. of fuel oil is initially available in the ~~emergency~~ fuel oil storage tank which supplies ~~to~~ the diesel generators [Because the EDGs consume approximately 205 gallons of fuel per hour when fully loaded, the 11,000 gallon fuel supply in the emergency fuel tank provides sufficient fuel to operate one EDG at design load for more than 48 hours.], 2) the EDG day tank for that EDG is operable and for G-01 and G-02 the associated motor-operated fill valve ~~are~~ is operable, 3) for G-01 and G-02, at least one of the two base-mounted sump tank fuel oil transfer pumps is operable, and 4) the fuel oil transfer ~~pump~~ system associated with the EDG is operable. However, ~~both~~ the fuel oil transfer ~~pumps and their associated piping and valves are~~ system is allowed to be out of service for four hours for G01 and G-02 due to a combined four-hour supply of fuel oil in the diesel base and day tanks which do not require a fuel oil transfer pump for flow to the associated EDG. The fuel oil transfer system is allowed to be out of service for two hours for G-03 and G-04 due to a two-hour supply of fuel oil in the day tank. The ~~pumps~~ transfer system may be out of service for longer ~~than four hours~~ periods if an appropriate alternate source of fuel is made available to the diesel generators.

The EDG ventilation system is considered operable when diesel room temperature can be maintained ≤120°F with the diesel engine operating at full load. Temperature will be maintained ≤120 °F if 1) all gravity-operated louvers are operable, and 2) both diesel room exhaust fans are operable OR for G-01 and G-02; one diesel room exhaust fan is operable and outside air temperature is ≤80°F.

Normal DC control power must energize all DC circuits for the associated EDG to be operable. ~~The following DC circuits are required to be powered for the associated EDG to be considered operable:~~

~~G-01~~	~~Circuit~~	~~G-02~~
~~D18-20~~	~~Start 2~~	~~D16-20~~
~~D12-01~~	~~Control~~	~~D14-01~~
~~D12-11~~	~~Start 1~~	~~D14-11~~
~~D12-13~~	~~Annunciator~~	~~D14-13~~
~~D11-28~~	~~Field Flash~~	~~D13-28~~

If only one 345 KV transmission line is in service to the plant switchyard, a temporary loss of this line would result in a reactor trip(s) if the reactor(s) power level were greater than 50%. Therefore, in order to maintain continuity of service and the possibility of self sustaining operations, if only one 345 KV transmission line is in service to any operating reactor(s), the power level of the affected reactor(s) will be limited to 50%.

If both 345/13.8 KV station auxiliary transformers are out of service, only one reactor will be operated. The gas turbine will be supplying power to operate safeguards auxiliaries of the operating reactor and acts as a backup supply for the unit's normal auxiliaries. Therefore, to prevent overloading the gas turbine in the event of a reactor trip, the maximum power level for the operating reactor will be limited to 50%. These conservative limits are set to improve transmission system reliability only and are not dictated by safety system requirements.

References

FSAR Section 8.

TABLE 15.3.14-1
SAFE SHUTDOWN AREA FIRE PROTECTION

		AUTOMATIC SUPPRESSION		MANUAL SUPPRESSION	
AREA	ELEVATION	WATER SPRINKLER SYSTEM	GAS SUPPRESSION SYSTEM	FIRE HOSE STATION	FIRE DETECTION
1. Auxiliary Building South	8'	(X) Partial		X	15
2. Auxiliary Building Center A. Safety Injection Pumps B. Component Cooling Water Pump	8'	 X X		X	13
3. Auxiliary Building North	8'	(X) Partial		X	9
4. Auxiliary Building West	8' & Below			X	16
5. Auxiliary Building South	26'			X	3
6. Auxiliary Building Center	26'			X	17
7. Auxiliary Building North	26'			X	7
8. Auxiliary Building Center	46'			X	6
9. Auxiliary Feedwater Pump Room	8'		X	X	11
10. Vital Switchgear & Battery Room	8'		X	X	8
11. G01 Diesel Generator Room	8'	X		X	4
12. G02 Diesel Generator Room	8'	X		X	4
13. Cable Spreading Room	26'		X	X	17
14. Circulating Water Pumphouse A. Service Water Pumps	8'	 X		X	15
15. G03 Diesel Generator Room	28'	X		X*	3
16. G04 Diesel Generator Room	28'	X		X*	3
17. G03 Vital Switchgear Room	28'			X*	2
18. G04 Vital Switchgear Room	28'			X*	2
19. G03 Fuel Oil Day Tank Room	28'	X		X*	1
20. G04 Fuel Oil Day Tank Room	28'	X		X*	1

*Diesel Generator Building fire hose stations are located in Mechanical Equipment Room.

3. The proper operation of Emergency Lighting, including the automatic transfer switch for DC lights, will be demonstrated during each reactor shutdown for a major fuel reloading.
4. Each diesel generator shall be given ~~an~~ inspections~~, at least annually,~~ following the manufacturer's recommendations for this class of stand-by service.
5. Operability of the diesel fuel oil system shall be verified monthly.
6. A diesel fuel oil testing program shall be maintained to test both new fuel oil upon receipt and ~~stored~~ fuel oil stored in the ~~emergency~~ fuel oil storage tanks which supply the emergency diesel generators on a quarterly frequency in accordance with applicable ASTM standards.

The above tests will be considered satisfactory if all applicable equipment operates as designed.

B. Safety-Related Station Batteries

These surveillance specifications are applicable to all four safety-related station batteries: D05, D06, D105, and D106; and the safety-related station swing battery D305.

1. Every month the voltage of each cell (to the nearest 0.05 volt), the specific gravity and temperature of a pilot cell in each battery and each battery voltage shall be measured and recorded.
2. Every 3 months the specific gravity, the height of electrolyte, and the amount of water added, for each cell, and the temperature of every fifth cell, shall be measured and recorded.
3. At each time data is recorded, new data shall be compared with old to detect signs of abuse or deterioration.
4. Each Safety-Related Station Battery shall be demonstrated OPERABLE:
   a. At least once per 18 months (SERVICE TEST) by verifying that the battery capacity is adequate to supply and maintain in OPERABLE status all of the actual or simulated emergency loads for the design duty cycle.
   b. At least once per 60 months (PERFORMANCE TEST) by verifying that the battery capacity is at least 80% of the manufacturer's rating. This performance discharge test may be performed in lieu of the battery service test.

DIESEL GENERATOR ADDITION PROJECT
TESTING SCHEDULE

PRE-REQUISITE TESTING June 27, 1994 through July 8, 1994

Scope De-bugging runs of the engine and tests on the auxiliaries to demonstrate their ability to meet design requirements.

PRE-OPERATIONAL TESTING July 18, 1994 through August 5, 1994

Scope Testing per the requirements of Reg Guide 1.9. This include only the tests that can be performed while connected to offsite power only such as the margin and endurance tests.

ACCEPTANCE TESTING September 24, 1994 Through October 29, 1994

Scope Testing is performed during the PBNP Unit 2 refueling outage. Tests include LOOP and SIAS tests as well as any other tests that require the diesels to be connected to the plant emergency busses.

This schedule is approximate and will be updated as the time gets closer.

Attachment 7
Revised Design Summary Pages
Pgs: 27, 32, 39, 41, 44, 91, 94, 95, 96, 102, 103,
103A, 103B, 104, 105, 106, 108, 109,
B-101, B-124, D-2, D-4, and D-12

4 1.3 Generator Refurbishment

The generators have had the following work performed on them since the purchase by Wisconsin Electric:

a. Modifications of the bearings to replace a fiberglass insulation sleeve. This modification was recommended by and installed per the requirements of the original manufacturer.

b. Complete rewind of one of the stators due to low megger readings in 4 of the 8 poles.

c. Retest per IEEE 387 section 6.1.2.

4.3.1.4 Diesel Generator Control Panel Refurbishment

The control panels have had the following work performed on them since purchase by Wisconsin Electric:

a. Reconnection of the generator output from 6900v wye connection to 4160v delta connection.

b. Replacement of all gauges, Potential Transformers and Current transformers to support the change to 4160v.

c. Installation of generator protective relays.

d. Installation of new governor controls.

e. Modification to engine and generator controls to meet the Wisconsin Electric human factors control requirements.

All work has been designed, qualified and installed by the original panel manufacturer. Portions of the seismic qualification of the control panels are done using the GIP (Generic Implementation Procedure) earthquake experience requirements.

4.3.5.2 Diesel Lube Oil System Installation

An engine pressure system pump will be provided consisting of two separate pumps in one housing as indicated below:

a. One pump section will deliver oil to the bearings, gears and turbocharger.

b. One pump section will deliver oil for piston cooling.

Additionally, two auxiliary AC motor driven pumps will be furnished. Each pump operates during engine operation and during standby. The first pump will be used to circulate oil from the lube oil sump to provide lubrication to the turbocharger bearings (and carry away heat from the bearings after the engine is shutdown). The second pump will circulate oil through the lube oil cooler and main lube oil manifold to pick up heat during the standby condition (See Section 4.3.2).

4.3.6 Diesel Combustion Air and Exhaust System

4.3.6.1 Diesel Combustion Air and Exhaust System Design

Each EDG will have independent air intake and exhaust systems. The air intake portion will include an oil bath air intake filter and a silencer that will function in accordance with the engine manufacturer's recommendations. The air intake will be designed and located no less than 20 feet above grade and away from the exhaust line discharge so fresh outside air will be provided and dilution with exhaust products will not occur. The air intake will be designed to prevent entrained water from entering the engine air intake.

The air inlet piping will be reviewed by the engine manufacturer and design engineer to assure the engine's ability to start and run during site design basis tornado depressurization conditions.

The exhaust portion will include a manufacturer's recommended industrial-type exhaust silencer with multi-compartment construction to limit noise level.

4.3.6.2 Diesel Air Intake and Exhaust System Installation

Installation requirements for the air intake and exhaust system of each engine will include the following interconnecting process piping:

a. From the air intake filter discharge connection to the turbocharger inlet connection.

b. From the turbocharger outlet connection to the connection to the exhaust silencer.

c. From the exhaust silencer discharge end to atmospheric discharge.

The air intake and exhaust system piping will be sized so the total maximum pressure drop will be within the manufacturer's recommendation.

The exhaust piping will be arranged such that it slopes away from the engine with a drain at the low point to avoid possible clogging due to rain, snow, or ice during standby or operation of the system.

Expansion joints will be provided in the intake air and exhaust piping to accommodate piping thermal expansion and to minimize transfer of vibration to the piping systems.

4.3.11.3 Shutdown

Three shutdown modes will be provided, each of which automatically trip the generator output breakers. The following is a description of each:

a. Normal Shutdown - The capability will be provided to initiate a normal shutdown by placing the EDG control switch in the main control room in the "stop" position while the local/remote switch is in the remote position or by depressing the "normal stop" pushbutton on the engine control cabinet while the local/remote switch is in the "local" position. This shutdown results in a fifteen minute cooldown run at idle speed before the engine is shutdown. If an auto fast start signal is received during cooldown, the normal shutdown is defeated and the diesel will enter the automatic fast start mode of operation as described above. Any automatic fast start signal will have to be cleared before the EDG can enter a normal shutdown.

b. Emergency Shutdown - The capability will be provided to initiate an emergency shutdown by depressing the "emergency stop" pushbutton on the engine control cabinet. This feature will be available independent of the position of the local/remote switch. The emergency shutdown will also be activated by a 2 out of 3 low lube oil pressure, a generator differential, or overspeed during emergency operation. During an exercise run, the emergency shutdown will also be activated by high cooling water temperature.

c. Overspeed Trip - This type of shutdown results in an immediate shutdown of the EDG. The overspeed trip results in the injectors being mechanically held in the no fuel position using mechanical components independent of those used to control the injectors during a normal or emergency shutdown.

4.3.12 Cathodic Protection

The addition of the two new EDGs and associated auxiliary systems requires installation of additional underground piping and tubing for the transportation of fuel oil, water and air. Even though cathodic protection systems can provide an effective means for corrosion control, there are other corrosion retardation techniques available which provide the required level of protection.

An analysis of the DGAP underground piping systems materials indicates that the required level of protection can be provided utilizing alternate corrosion retardation techniques. Specific installation and testing requirements as well as epoxy-coal tar coating on carbon steel pipe; three different types of stainless steel alloys; copper pipe for certain applications, and cast iron pipe with polyethylene wrappings will be used for corrosion control. It has been determined that the added underground piping for the DGAP will have no harmful effects on the existing PBNP cathodic protection systems when the above described corrosion controls are utilized.

4.4.2 Upgraded Fuel Oil Storage System

4.4.2.1 System Description

The upgraded fuel oil system, which includes new fuel oil storage and transfer components, will provide long term storage of fuel for new EDGs G03 and G04 and existing EDGs G01 and G02. The fuel storage components of the upgraded EDG fuel oil system will consist of two safety related EDG fuel oil storage tanks and one non-safety related fuel oil fill tank. The transfer components will include transfer pumps, piping, instrumentation, and controls that will have the ability, if filled to maximum capacity, of supplying fuel to the EDGs for approximately seven days of continuous operation at rated load (i.e.; 2848 KW with one of the two EDGs supplied from each operable storage tank), without being replenished. The two storage tanks will be encased in concrete under the new diesel generator building. This configuration will provide protection to the tanks from tornado generated missiles and flood. It will also provide a 3-hour fire protection barrier between the tanks and the new EDGs and avoid the possibility of oil fume accumulation below the DGB.

A fuel oil fill tank will be provided to receive and hold fuel oil from delivery trucks for testing prior to placing oil in the fuel oil storage tanks. The fill tank will be located outdoors and mounted on a diked concrete pad northwest of the DGB The storage tanks will be filled by means of gravity flow from the ou door fill tank. The storage tank to be filled will be selected by manual valve operation.

Each storage tank will be dedicated to the two train associated EDGs. Two 100% capacity transfer pumps (sized for at least 6 times the engine fuel consumption rate at 2848 KW) will be connected to each storage tank with one pump supplying one of the four day tanks. The two day tanks of the same train are capable of being tied together which will allow one pump to feed two EDG Day Tanks. This provides system flexibility to ensure operability of all EDGs under all potential single active failures of the Fuel Oil Storage System.

4.4.2.2 Tank Capacity

4.4.2.2.1 Diesel Generator Fuel Oil Storage Tanks

Each EDG pair (G01/G02 and G03/G04) will be provided with onsite fuel oil storage that will have the ability, if the tanks are filled to maximum capacity, to allow operation of either EDG for approximately seven days at maximum rated load or both EDGs at partial load for over five days. Manual cross-tie of the fuel oil storage tanks will extend the available fuel to more than seven days for any one of the diesels operating at full load or any pair operating at partial load.

In addition to level instrumentation, the level of each Fuel Oil Storage Tank will be able to be verified with a stick gauge which will be accessible through a nozzle in the engine rooms.

4.4.2.2.2 Fuel Oil Fill Tank

The fill tank will be designed to receive and hold fuel oil until it has passed all required testing for use. The tank will have a usable capacity of 15,000 gallons which is equivalent to two regular fuel oil truck shipments of 7,500 gallons each.

4.4.3.2 EDG Fuel Oil Storage Tank Enclosures

The storage tanks will be installed in two Seismic Category I reinforced concrete enclosures and encased in concrete. The enclosures will be located below grade level under the G03 and G04 EDG Diesel Rooms. The enclosures, in conjunction with the concrete encasement, will provide the required 3-hour rated fire protection barrier for enclosed fuel supply tanks, and in addition, will withstand the effects of tornado generated missiles, site flood, and buoyancy force considerations.

Leak-proof hatches will be provided on top of the enclosures for tank internal inspection access and to allow removal of tank internal strainers and baffles and other appurtenances. Level instrumentation will be top mounted.

The tanks will be externally lined with High Density Polyethylene (HPDE) for containing leakage of the tank contents. The lining will be piped to a sump, which will be monitored for leakage. Level instruments will be provided to alert operations to the presence of liquid in the sump.

4.4.3.3 Fuel Oil Transfer Pump Design

The transfer pumps will be of the rotary positive displacement type. The pump casing will be constructed of carbon steel or other materials that are compatible with diesel fuel oil. The transfer pumps will be located in the G01/G02 Transfer Pump Room located adjacent to the G03 diesel room and in the G03/G04 Transfer Pump Room located adjacent to the G04 diesel room. Elevation will ensure the available net positive suction head (NPSH) will conservatively envelop the required NPSH. The transfer pumps will be separated from the adjacent components/rooms by a 3-hour rated fire barrier.

4.4.3.4 Piping System

All piping, fittings, strainers, valves, and associated components and supports connecting the storage tanks, transfer pumps, day tanks, and the emergency truck fill station will be designed and fabricated to the requirements of ANSI B31.1, 1989 with enhanced requirements.

All piping and isolation valves protecting the safety-related pressure boundary will be located within the Category I diesel generator building where it is protected from tornado missiles and site flood conditions. Pipe supports will be designed to the requirements of ANSI B31.1, 1989 . Pipe support structural steel welds will be per AWS Code D.1.1.

All piping and components associated with the fill tank and connected beyond the safety-related piping pressure boundary isolation valves will be designed to the requirements of ANSI B31.1 and designated as non-safety related.

Sample stations will be provided in the transfer piping to the Day Tank, at the Day Tanks and also on the fill tank. All stations are located inside the Day Tank rooms or at the fill tank to allow convenient fuel test sample retrieval for the required chemical testing of stored fuel.

All fuel oil piping will be located inside concrete structures, over diked concrete slabs or buried underground in HDPE lined trenches with leak detection. Containment curbs as required (dikes) and sumps will be provided to collect all potential fuel leakage or spills to prevent ground contamination.

The transfer pumps and all fuel oil piping (except underground piping) will be designed to allow for inspection, maintenance and testing. Pump and valve maintenance envelope space requirements will be in accordance with manufacturer's recommendations. Flanges are permitted where required for maintenance (e.g. pump connections).

Piping material will be of carbon steel having a minimum ANSI pressure-temperature rating of 150 lbs.

Either storage tank will be able to receive fuel from the other storage tank while the first storage tank is feeding its associated day tanks utilizing manual connections not normally in place to avoid train cross tie concerns.

High voltage station auxiliary transformer 2-X03 provides power to low voltage station auxiliary transformer 2-X04 which in turn provides power to Unit 2 4160V buses 2-A03 and 2-A04 through two separate windings. Buses 2-A03 and 2-A04 in turn provide power to the Unit 2 4160V safeguards buses, 2-A05 and 2-A06, respectively.

6.1.2.2 Standby Emergency Source

Two EDGs G01 and G02, common to both units, are connected to the engineered safeguards features buses of both units to supply emergency shutdown power in the event of loss of power from low voltage station auxiliary transformer 1-X04 or 2-X04. The standby emergency onsite source for Train A buses 1-A05 and 2-A05 is EDG G01. Similarly, the standby emergency onsite source for Train B buses 1-A06 and 2-A06 is EDG G02.

Each existing EDG (G01 or G02) is capable of supplying power, in the event of a loss of off-site power (LOOP), to all the necessary safeguards equipment of one unit in an accident condition, plus the loads needed to place the other unit in a safe (hot) shutdown condition. Table 3-A depicts the presently evaluated EDG G01 and G02 loads for the above scenario.

Each EDG is automatically started by either of the following events:

a. Loss of voltage on either or both of the associated 4160V buses (buses 1-A05 or 2-A05 for G01 and buses 1-A06 or 2-A06 for G02);

b. Initiation of a safety injection signal from the associated Train (G01 starts on a Train A SI signal from either unit and G02 starts on a Train B SI signal from either unit).

A degraded voltage condition (not as severe as undervoltage) will be detected by 3 relays connected phase to phase to a 4160V safeguards bus. To prevent spurious actuation due to failure of one relay, operation of any two relays will trip the normal emergency supply breaker from A03 or A04. The resulting undervoltage will then start the associated EDG. A time delay associated with degraded voltage relays prevents tripping of the supply breaker during motor starting transients. Normally the time delay is approximately 50 seconds, but with an SI signal from the associated train of either unit, the time delay will be less than approximately 10 seconds.

With a loss of voltage on any of the four 4160V safeguards buses, the automatic voltage restoring sequence is as follows:

a. Trip the normal emergency supply breaker and/or the tie breaker to the opposite train of the same unit (A05 to A06 tie breaker).

b. Trip all 480V safeguards bus feeder breakers except for the component cooling pump motor, auxiliary feedwater pump motor, and the feeder breaker to the safeguards motor control center.

c. Start the associated EDG.

d. After the EDG comes up to speed (as sensed by the EDG speed switch) and voltage (as determined by generator field being present), close the EDG output breaker and re-energize the safeguards bus.

e. Upon re-energization of the safeguards bus, safeguards loads are sequenced on in the event of a safeguards actuation.

After voltage is re-established on the subject 4160-volt bus, the EDG continues to run (loaded or unloaded) until manually shutdown.

Running loads, which are not de-energized by the load shed sequence and have maintained contact circuitry in their starting circuits, will subsequently be re-energized when bus voltage is restored.

Motors not running prior to the loss of voltage condition will not start upon restoration of voltage, until manual or subsequent automatic action is initiated.

6.1.3.2 Standby Emergency Source

Separate normal and alternate standby emergency source EDGs for each of the four 4160V safeguards buses will be provided. The alternate standby emergency source for a given safeguards bus is the normal standby emergency source EDG for the opposite Unit in the same train.

The standby emergency sources for Unit 1 safeguards buses 1-A05 and 1-A06 will normally be EDG's G01 and G03 (normal standby emergency source), and EDG's G02 and G04 (alternate standby emergency source), respectively. The standby emergency sources for Unit 2 safeguards buses 2-A05 and 2-A06 will normally be EDG's G02 and G04 (normal standby emergency source), and EDG's G01 and G03 (alternate standby emergency source), respectively.

Selection of the EDG that will automatically energize a 4160 V safeguards bus upon an undervoltage condition is made by placing the associated EDG output breaker control switch in the Auto position. The alternate standby emergency supply that will not automatically energize the bus will have its output breaker control switch key locked in the Pull-Out position.

The differences between operation of the existing and modified Safeguards Electrical Distribution System are as follows:

a. The normal standby emergency power source for each of the four 4160 V safeguards buses (two for each Unit) is supplied by a separate EDG.

b. The EDG that serves as the normal standby emergency power source for a train in one Unit is available as the alternate standby emergency power source for the same train in the other Unit.

c. There are no longer tie breakers between the 4160 V safeguards buses for each Unit to open on bus undervoltage. (Existing Technical Specifications requires the A05 to A06 cross-tie breakers to be removed from their cubicles during operation).

d. Two EDGs are started when voltage is lost on a safeguards bus (the normal and alternate EDG's) instead of one. Loading of the preselected EDG is automatic. Loading of the EDG that was not preselected must be manually initiated.

The load on the EDGs following LOCA, coupled with a loss of normal emergency power to both units, is summarized in Table 6-B. Page 1 of Table 6-B summarizes loading during the injection phase and Page 2 summarizes loading during the recirculation phase. In determining this loading, it is assumed that only one EDG is available. The worse case loading for any of the four EDG's occurs on the B Train EDG's during the injection phase of a LOCA on one Unit with the other Unit in cold shutdown. This loading is 2902 KW lasting for less than 1/2 hour which is less than the 200 hour rating (2951 KW) of the new EDG's. After the first half hour, the worse case loading is reduced to 2578 KW which is less than the 2848 KW continuous (2000 hour) rating.

Note: Changes to the loading of the diesels is currently underway. Modifications to add and reduce load are being performed. The net result of the modifications shows loading for all the diesels to be less than the 2848kw 2000hr rating. Please refer to pages 3 and 4 of table 6-B.

Upon loss of bus voltage or a sustained degraded bus voltage condition on the 4160 V safeguards buses in Units 1 or 2, a number of events will take place to restore proper voltage to the safeguards loads. These events include tripping the normal emergency supply breaker, automatic starting of the EDGs, automatic load shedding and a subsequent reloading using the emergency power sources. The existing control scheme will control these events. The only difference is that two EDGs will be started instead of one when an undervoltage condition is sensed on any of the four 4160 V safeguards buses. Both the normal and alternate EDG for the bus will be started.

When the EDG is up to speed (as sensed by an electric speed switch for EDG's G03 and G04) and up to voltage (as sensed by a voltage relay on the EDG output for G03 and G04), it will be connected to its normal bus which has lost power, the other EDG will run unloaded until stopped manually if power to its normal bus is still available. Prior operator action will be required for automatic connection of an EDG to its alternate bus. This prevents automatic connection of two EDGs to a single bus.

The offsite normal emergency source and onsite standby EDG existing and proposed voltage restoration sequences are summarized in Table 6-A.

6.1.3.3 125 V DC Power System

Two new Train B 125 V DC distribution panels D28 and D40 will be installed in the DGB to provide control power and DC auxiliary power for EDG G03 and EDG G04, respectively. D28 and D40 will also provide DC control power to the new 4160 V switchgear 1-A06 and 2-A06, respectively. DC panel D28 will be supplied from existing DC panel D04 while D40 will be supplied from existing DC panel D02. The new distribution panels will have an alternate feed that will come from the opposite distribution panel (ie. the alternate feed to D28 will be D40 and the alternate feed to D40 will be D28). Interlocks will be provided to disallow the panels from being energized by their normal and alternate feeders simultaneously. The new DC distribution panels will be 2 wire, ungrounded, with 250 VDC, 200A Main Bus, and 10,000A short circuit current withstand rating.

Each of the EDG's will have a normal and an alternate DC power source as follows:

EDG G01	D01 (Normal)	D03 (Alternate)
EDG G02	D03 (Normal)	D04 (Alternate)
EDG G03	D28 (Normal)	D40 (Alternate)
EDG G04	D40 (Normal)	D28 (Alternate)

Each of the 4160 V safeguards buses have a normal and an alternate DC power source as follows:

1-A05	D01 (Normal)	D02 (Alternate)
1-A06	D28 (Normal)	D40 (Alternate)
2-A05	D03 (Normal)	D01 (Alternate)
2-A06	D40 (Normal)	D28 (Alternate)

Manual action must be taken to place any alternate DC source into service. Interlocks are provided to disallow energizing any circuit from its normal and alternate DC source simultaneously.

6.2 MODIFIED 480 V CONFIGURATION - SAFEGUARDS BUSES

The configuration of the existing 480V safeguards switchgear buses will not be modified except the power source for the two 480V B Train buses will come off the new A06 buses rather than the old A06 buses.

Two new Train A 480V MCC's will be installed in the DGB to supply the EDG G01 and EDG G02 fuel oil transfer pumps and associated fuel oil transfer pump room safety-related heaters. These two new MCC's (1-B30 and 2-B30) will be supplied from existing safeguards MCC's 1-B32 and 2-B32, respectively. The two new MCCs will be of the indoor type, rated at 600 V, 60Hz, 3 phase, 3 wire, with 600A horizontal bus and 300A vertical bus, and a 22,000A short circuit current withstand rating.

Two new Train B MCC's will be installed in the DGB to supply the EDG G03 and EDG G04 auxiliaries as well as the DGB loads such as lighting. These two new MCC's (1-B40 and 2-B40) will be supplied from the new 4160 V switchgear buses 1-A06 and 2-A06 via two new 4160 V - 480 V dry type transformers 1-X06 and 2-X06, respectively. Each new B Train MCC will be divided into two sections, a Class 1E section and a non Class 1E section. The non Class 1E section will be fed from its associated Class 1E section via a circuit breaker that will be tripped on an SIAS or an undervoltage signal from the associated 4160 V bus. All safety related loads in the DGB will be fed from the safety related portion of the MCC's. The two new MCCs will be of the indoor type, rated at 600 V, 60Hz, 3 phase, 3 wire, with 600A horizontal bus and 300A vertical bus, and a 22,000A short circuit current withstand rating.

6.3 MAIN CONTROL ROOM "C01" AND "C02" PANEL MODIFICATION

The existing controls for the 345 KV switchyard and the 13.8 KV system will be relocated to the rear of control room panel C02 (common to both units) to make room for the controls required for EDGs G03 and G04 and their associated 4160 V buses. Status indication for the 345 KV switchyard and the 13.8 KV system will be duplicated on the front and back of C02.

Control room panel C01 will be modified to incorporate the modified fuel oil system. This will include the addition of fuel oil transfer pump controls for G01 and G02 only (the G03 and G04 transfer pump control will be in the DGB).

EMERGENCY DIESEL GENERATOR LOADING
FOLLOWING LOSS OF COOLANT ACCIDENT

Injection Phase

Accident Unit and Common Loads	Rating (Each)	Load (KW) G01/G02 *	G01/G02 #	G03/G04 *	G03/G04 #
1 Safety Injection Pump	700 HP	560	560	560	560
1 Residual Heat Removal Pump	200 HP	141	141	141	141
3 Service Water Pumps	300 HP	718	718	718	718
2 Containment Fans(See Note Below)	150 HP	164	164	164	164
1 Aux. Feedwater Pump	250 HP	207	207	207	207
1 Containment Spray Pump	200 HP	166	166	166	166
1 Component Cooling Pump	250 HP	207	207	207	207
1 Charging Pump	100 HP	83	83	83	91
1 Emergency Lighting Xfmr	30 KVA	27	27	27	27
2 Diesel Room Fans	20 HP	24	24		
1 XY06 Instrument Bus Xfmr	30 KVA	27	27	27	27
1 Battery Room Fan	12 HP	4	4	4	4
1 B.A. Heat Trace Xfmr	112 KVA			112	112
1 Station Service Xfmr Losses		22	10	14	23
1 Diesel Generator Aux. MCC		8	8	102	102
	Subtotal	2358	2346	2532	2549
Non-Accident Unit Loads (Hot Shutdown)					
1 Component Cooling Pump	250 HP	207	207	207	207
1 Charging Pump	100 HP	83	83	91	83
1 Containment Accident Fan	150 HP	45	45	45	45
1 Station Service Xfmr Losses		3	10	11	5
	Total	2696	2691	2886	2889
Non-Accident Unit Loads (Cold Shutdown)					
1 Component Cooling Pump	250 HP	207	207	207	207
1 Residual Heat Removal Pump	200 HP	141	141	141	141
1 Station Service Xfmr Losses		3	10	10	5
	Total	2709	2704	2890	2902

* Unit 1 Accident
\# Unit 2 Accident

The above injection phase loading will last for about 1/2 hour.

Note: The containment fan KW is different than those provided in FSAR Table 8.2-1, since it is calculated based on actual Brake Horsepower. The FSAR changes to this table is pending.

Proposed Revision

EMERGENCY DIESEL GENERATOR LOADING
FOLLOWING LOSS OF COOLANT ACCIDENT

Recirculation Phase

Accident Unit and Common Loads	Rating (Each)	Load (KW) G01/G02 *	G01/G02 #	G03/G04 *	G03/G04 #
1 Safety Injection Pump	700 HP	560	560	560	560
1 Residual Heat Removal Pump	200 HP	141	141	141	141
3 Service Water Pumps	300 HP	718	718	718	718
2 Containment Fans(See Note Below)	150 HP	164	164	164	164
1 Component Cooling Pump	250 HP	207	207	207	207
1 Emergency Lighting Xfmr	30 KVA	27	27	27	27
2 Diesel Room Fans	20 HP	24	24		
1 XY06 Instrument Bus Xfmr	30 KVA	27	27	27	27
1 Battery Room Fan	12 HP	4	4	4	4
1 Battery Charger	76 KVA	54	54	54	54
1 Battery Charger	112 KVA	75	75	75	75
1 Fuel Oil Transfer Pump**	3 HP	0	0	0	0
1 Security Battery Charger	51 KVA	36	36	36	36
1 Instrument Air Compressor	100 HP	93	93	93	93
1 Station Service Xfmr Losses		15	7	8	14
1 Diesel Gen. Aux. MCC		11	11	105	105
	Subtotal	2156	2148	2219	2225
Non-Accident Unit Loads (Hot Shutdown)					
1 Component Cooling Pump	250 HP	207	207	207	207
1 Charging Pump	100 HP	83	83	91	83
1 Containment Accident Fan	150 HP	45	45	45	45
1 Station Service Xfmr Losses		4	10	10	5
	Total	2495	2493	2572	2565
Non-Accident Unit Loads (Cold Shutdown)					
1 Component Cooling Pump	250 HP	207	207	207	207
1 Residual Heat Removal Pump	200 HP	141	141	141	141
1 Station Service Xfmr Losses		4	10	10	5
	Total	2508	2506	2577	2578

* Unit 1 Accident
\# Unit 2 Accident
** These loads are included under Diesel Gen. Aux. MCC

The above recirculation phase loading is considered continuous with respect to emergency generator loading.

Note: The containment fan KW is different than those provided in FSAR Table 8.2-1, since it is calculated based on actual Brake Horsepower. The FSAR changes to this table is pending.

Proposed Revision

Note: This table is provided for information only. The following is the result of recalculation of loading due to modifications for additions and deletions of loads as well as changes due to conductor losses.

EMERGENCY DIESEL GENERATOR LOADING
FOLLOWING LOSS OF COOLANT ACCIDENT

Injection Phase

Accident Unit and Common Loads	Rating (Each)	Load (KW) G01/G02 *	G01/G02 #	G03/G04 *	G03/G04 #
1 Safety Injection Pump	700 HP	560	560	560	560
1 Residual Heat Removal Pump	200 HP	141	141	141	141
3 Service Water Pumps	300 HP	718	718	718	718
2 Containment Fans (See Note Below)	150 HP	164	164	164	164
1 Aux. Feedwater Pump	250 HP	207	207	207	207
1 Containment Spray Pump	200 HP	166	166	166	166
1 Component Cooling Pump	250 HP	207	207	207	207
1 Charging Pump	100 HP	83	83	83	91
1 Emergency Lighting Xfmr	30 KVA	27	27	27	27
2 Diesel Room Fans	20 HP	24	24		
1 XY06 Instrument Bus Xfmr	30 KVA	27	27	27	27
1 Battery Room Fan	12 HP	4	4	4	4
1 Station Service Xfmr Losses		22	11	11	22
1 Diesel Generator Aux. MCC		14	14	128	128
	Subtotal	2364	2353	2442	2462
Non-Accident Unit Loads (Hot Shutdown)					
Total Conductor Loss (Both Units)		12	13	18	17
1 Component Cooling Pump	250 HP	207	207	207	207
1 Charging Pump	100 HP	83	83	91	83
1 Containment Accident Fan	150 HP	45	45	45	45
1 Station Service Xfmr Losses		3	9	11	4
	Total	2715	2710	2814	2817
Non-Accident Unit Loads (Cold Shutdown)					
Total Conductor Loss (Both Units)		12	13	18	17
1 Component Cooling Pump	250 HP	207	207	207	207
1 Residual Heat Removal Pump	200 HP	141	141	141	141
1 Station Service Xfmr Losses		3	9	11	4
	Total	2728	2724	2820	2831

* Unit 1 Accident
\# Unit 2 Accident

The above injection phase loading will last for about 1/2 hour.

Note: The containment fan KW is different than those provided in FSAR Table 8.2-1, since it is calculated based on actual Brake Horsepower. The FSAR changes to this table is pending.

Note: This table is provided for information only. The following is the result of recalculation of loading due to modifications for additions and deletions of loads as well as changes due to conductor losses.

EMERGENCY DIESEL GENERATOR LOADING
FOLLOWING LOSS OF COOLANT ACCIDENT

Recirculation Phase

Accident Unit and Common Loads	Rating (Each)	Load (KW) G01/G02 *	G01/G02 #	G03/G04 *	G03/G04 #
1 Safety Injection Pump	700 HP	560	560	560	560
1 Residual Heat Removal Pump	200 HP	141	141	141	141
3 Service Water Pumps	300 HP	718	718	718	718
2 Containment Fans (See Note Below)	150 HP	164	164	164	164
1 Component Cooling Pump	250 HP	207	207	207	207
1 Emergency Lighting Xfmr	30 KVA	27	27	27	27
2 Diesel Room Fans	20 HP	24	24		
1 XY06 Instrument Bus Xfmr	30 KVA	27	27	27	27
1 Battery Room Fan	12 HP	4	4	4	4
1 Battery Charger	76 KVA	54	54	54	54
1 Battery Charger	112 KVA	75	75	75	75
1 Fuel Oil Transfer Pump**	3 HP	0	0	0	0
1 Security Battery Charger	51 KVA	36	36	36	36
1 Instrument Air Compressor	100 HP	93	93	93	93
1 Station Service Xfmr Losses		16	12	9	14
1 Control Rm Filter Fan	7.5 HP	7	7	7	7
1 Control Rm Recirc Fan	15 HP	13	13	13	13
1 Diesel Gen. Aux. MCC		17	17	131	131
	Subtotal	2183	2179	2266	2271
Non-Accident Unit Loads (Hot Shutdown)					
Total Conductor Loss (Both Units)		13	13	20	18
1 Component Cooling Pump	250 HP	207	207	207	207
1 Charging Pump	100 HP	83	83	91	83
1 Containment Accident Fan	150 HP	45	45	45	45
1 Station Service Xfmr Losses		5	4	10	6
	Total	2534	2530	2636	2628
Non-Accident Unit Loads (Cold Shutdown)					
Total Conductor Loss (Both Units)		13	13	20	18
1 Component Cooling Pump	250 HP	207	207	207	207
1 Residual Heat Removal Pump	200 HP	141	141	141	141
1 Station Service Xfmr Losses		5	4	10	6
	Total	2547	2543	2641	2641

* Unit 1 Accident
\# Unit 2 Accident
** These loads are included under Diesel Gen. Aux. MCC

The above recirculation phase loading is considered continuous with respect to emergency generator loading.

Note: The containment fan KW is different than those provided in FSAR Table 8.2-1, since it is calculated based on actual Brake Horsepower. The FSAR changes to this table is pending.

7.0 IMPLEMENTATION PLAN

7.1 INSTALLATION PLAN

7.1.1 Control Panel Modifications

This work includes the modifications to the main control room control panels to rearrange the existing controls and add the new diesel generator controls. Work began during the spring 1993 Unit 1 refueling outage and is scheduled to continue through the fall 1995 Unit 2 refueling outage.

7.1.2 Diesel Building Installation

This work includes the installation of all Civil, Mechanical and Electrical components in the new building and the installation of the underground electrical ductbank and fuel oil piping up to the existing security fence.

7.1.3 Plant Interface Installation

This work includes the installation of all Civil, Mechanical and Electrical components within the existing plant security fence up to the existing plant equipment.

7.1.4 Shore Protection Installation

This work includes the extension of the existing shore protection to the north. The extension will be installed to provide shore protection for the new diesel generator building installation. Work is scheduled to be completed by October of 1994.

7.1.5 Security Modifications

This work includes the installation of a new security fence, cameras, card readers, lighting and intrusion detection around the new diesel generator facility. This also includes the removal of the existing fence between the existing plant and the new diesel generator facility. Work is scheduled to be completed by October of 1994.

7.1.6 Tie-in of G04

This work includes the connection of all power and control cables to allow G04 to provide emergency power to the 2A06 safeguards bus. It also includes the removal of the G02 connection to the 2A06 bus. This work is scheduled to be completed during the 1994 fall Unit 2 refueling outage. Upon completion of this work, Point Beach will have 3 operable Emergency Diesel Generators. The configuration will be as follows: G01 connected to 1A05 and 2A05, G02 connected to 1A06, and G04 connected to 2A06.

7.1.7 Tie-in of G03

This work includes the connection of all power and control cables to allow G03 to provide emergency power to the 1A06 safegaurds bus. It also includes the removal of the G02 connection to the 1A06 bus. This work is scheduled to be completed during the 1995 spring Unit 1 refueling outage. Upon completion of this work, Point Beach will have 3 operable Emergency Diesel Generators. The configuration will be as follows: G01 connected to 1A05 and 2A05, G03 connected to 1A06, and G04 connected to 2A06.

7.1.8 Retraining of G02

This work includes changing all items associated with G02 in order to declare it an "A" train diesel. This work also includes the connection of all power and control cables to allow G02 to provide emergency power to the 2A05 safegaurds bus. This work is scheduled to be completed during the fall 1995 Unit 2 refueling outage (except for some testing to declare G02 operable to the 1A05 safeguards bus). Upon completion of this work, (and after G02 is tested to 1A05) Point Beach will have 4 operable Emergency Diesel Generators connected in their final configuration.

7.2 PREOPERATIONAL/STARTUP TESTING

7.2.1 Original Testing

The original testing for the diesel generators was completed in 1976 per the requirements of IEEE Std 387-1974. The modifications performed on the DGs as outlined in section 4.3.1 above have impacted the original qualifications. A review of the modifications by the original manufacturer has concluded that all of these modifications are considered "minor" as defined in IEEE 387. The basis for this conclusion is listed below However, Wisconsin Electric believes that even though these changes are classified as minor, there are sufficient changes to warrant retesting of the diesel generators as outlined below in sections 7.2.2 and 7.2.3.

7.2.1.1 Modififcation Descriptions

1) Engine Cooling System Modifications
   a. Replace heat exchanger with radiator (electric motor driven fans).
   b. Use glycol in cooling water.
   c. Replace existing engine cylinder heads with EMD "Diamond 6" type.

2) Governor Replacement
   a. Replace EGA with 2301A.
   b. Replace EGB-C actuator with EGB-P.

3) Change Generator Output Voltage from 6900V to 4160V.
   a. Change generator from wye to delta connection.
   b. Replace PT's to accommodate lower voltage.

4) Flywheel Replacement
   a. Replace standard flywheel with larger inertia flywheel.

5) Turbocharger Rebuild
   a. Upgrade to high capacity turbocharger.

7.2.1.2 Definition of Major and Minor Changes

Paragraph 7.6 of IEEE 387-1984 requires that changes to a previously qualified diesel generator unit shall be analyzed to determine if the degree of change is major or minor. Major changes require requalification while minor changes require analysis or testing (or both) for qualification. Examples of modifications that may change the capability or performance of a previously qualified diesel generator are listed as:

Governor
Overall system flywheel effect
Excitation system characteristics
Type of Coolant

Major changes are listed as:

Differences in the number of cylinders
Changes in stroke or bore
Brake mean effective pressure
Speed
Unique or different diesel generator configuration

Minor changes are listed as:

Component part substitutions

7.2.1.3 Classification Rational

1) Engine Cooling System Modification

The engine cooling system modifications are considered to be "minor". The performance of the cooling system can be verified by performing site load testing. The design of the cooling system does not affect the capability of the diesel generator to start and accept load; therefore, it should not be necessary to have to perform the Start and Load Acceptance Tests of paragraph 7.2.2 (300 start test).

2) Governor Replacement

The governor replacement is considered to be "minor". The new EGB-P actuator is the same basic governor as the original EGB-C actuator except for the electric coil. The new "P" actuator requires a proportional voltage signal from the 2301A electric governor to change engine speed/load while the "C" actuator used a compensating voltage signal from the EGA electric governor. The response time to load or speed change is the same for both actuators. In addition, a diesel generator with an EGB-P actuator and a 2301 electric governor has already been 300 start tested by Power Systems; therefore, it is not necessary to have to requalify the system. The performance of the new governor system can be verified by performing the Performance Tests of paragraph 6.2.1.2.a (IEEE 387) and a transient load acceptance test. The transient load acceptance test will consist of block loads of 0-25%, 0-50%, 0-75% and 0-100% of rated continuous load which would be applied and rejected to demonstrate governor response.

6. Load Acceptance Test (Load Profile Test). See table below for information.

Motor	Size (hp)	Voltage Rating	Normal Sequence	Sequence A	Sequence B
Safety Injection Pump	700	4160V	0	0	0
RHR Pump	200	480V	5	4	7
Aux Feedwater Pump	250	480V	10	12	9
Service Water + Containment Spray Pumps	300 + 200	480V	15	14	17
Service Water Pump	300	480V	20	22	19
Service Water Pump	300	480V	25	24	27.5
Containment Cooling Fan	150	480V	30	33	29
Containment Cooling Fan	150	480V	35	34	38.5
CCW + RHR Pump	250 + 200	480V	60	60	60
Base load (Resistive)	240kva*	480V	0	0	0
Comp Cooling Water Pump	250	480V	0	0	0
Radiator Fan Motors (2)	40 + 40	480V	0	0	0

* This load may be adjusted so that the total load equals 2950 kw.

NOTE: The above table is representative of the loading used during the load profile testing at the factory. The loads were adjusted based on subsequent timing adjustments and to obtain a worst case load profile. For the actual load profiles used during the testing please refer to the actual factory test reports.

7. Margin Test per the IEEE Std.

8. Endurance Test.

Generator Tests

Per section 6.2.2 0f ANSI/IEEE Std 387-1984

7.2.3 Site Acceptance Testing

Site Acceptance testing will be completed per ANSI/IEEE Std 387-1984 section 6.3 and Reg. Guide 1.9 Rev. 3[A] as follows:

1. Start Test
2. Load-Run Test
3. Fast-Start Test
4. Loss-of-Offsite-Power (LOOP) Test
5. Safety-Injection-Actuation-Signal (SIAS) Test
6. Combined SIAS and LOOP Test
7. Single Load Rejection Test[B]
8. Full Load Rejection Test[B]
9. Endurance and Margin Test[B]
10. Hot Restart Test
11. Synchonizing Test
12. Protective Trip Bypass Test
~~10. Test Mode Change-Over Test~~[C]
13. Redundant Unit Test

NOTES:

A. Compliance to Reg. Guide 1.9 Rev. 3 is for the factory and site acceptance testing section only. Reg. Guide 1.9 Rev. 2 is used for other portions of this work as outlined in Appendix D of this Design Summary.

B. These tests were successfully accomplished at the factory as indicated earlier. However, Wisconsin Electric will also perform portions or all of these tests during the site acceptance testing.

C. This test has been deleted because the design of the controls of the existing and new diesels do not contain this function.

SRP ACCEPTANCE CRITERIA	ACCEPTANCE CRITERIA COMPLIANCE		REFERENCE	DISCUSSION/RESOLUTION
	YES	NO		
3.10 SEISMIC AND DYNAMIC QUALIFICATION OF MECHANICAL AND ELECTRICAL EQUIPMENT, REV. 2, July 1981 (cont'd)				
3. GDC 1 of Appendix A and paragraph XVII of Appendix B to 10 CFR 50 establish requirements for records concerning the qualification of equipment. In order to satisfy these requirements, complete and auditable records must be available and maintained by the applicant, for the life of the plant, at a central location. Their files should describe the qualification method used for all equipment in sufficient detail to document the degree of compliance with the criteria of this SRP section. These records should be updated and maintained current as equipment is replaced, further tested, or otherwise further qualified. The equipment qualification file should contain a list of all systems equipment and the equipment support structures. as defined in paragraph 2 of subsection I. The equipment list should identify which equipment is NSSS supplied and which equipment is BOP supplied. The equipment qualification file should also include qualification summary data sheets for each piece of equipment, i.e., each mechanical and electrical component of each system, which summarize the component's qualification. These data sheets should include the following information: a. Identification of equipment, including vendor, model number and location within each building. Valves that are part of the reactor coolant pressure boundary should be so identified. b. Physical description, including dimensions, weight and field mounting condition. Identification of whether the equipment is pipe, floor, or wall supported. c. A description of the equipment's function within the system.	X			Auditable qualification records will be maintained by WE in accordance with GDC 1 of Appendix A and paragraph XVII of Appendix B to 10 CFR 50.

WISCONSIN ELECTRIC POWER COMPANY

DIESEL GENERATOR ADDITION PROJECT
STANDARD REVIEW PLANS COMPLIANCE SUMMARY

SRP ACCEPTANCE CRITERIA	ACCEPTANCE CRITERIA COMPLIANCE		REFERENCE	DISCUSSION/RESOLUTION
	YES	NO		
9.5.4 EMERGENCY DIESEL ENGINE FUEL OIL STORAGE AND TRANSFER SYSTEM REV. 2 - July 1981 (cont'd)				
	X			The level of fuel is indicated and alarmed locally and alarmed remotely.
	X			Each Fuel Oil Storage Tank has a total capacity of 35,800 gallons, of which approximately 34,000 gallons are usable. One storage tank is interconnected with both new EDGs (G03 and G04) to provide a sufficient supply of oil for one or both EDGs for approximately five days (normal minimum tank levels and an emergency cross tie will assure a minimum of seven days to either train on the failure of the opposite train). Each day tank (G03 and G04) has a 550 gallon capacity. The EDG fuel consumption at the generator rating of 2850 kW is less than 208 gallons per hour.
	X			The site storage of approximately five days is dedicated to the EDGs. Fuel can be brought to the site quickly from local sources located within 35 miles from Point Beach.
	X			A single failure may result in loss of fuel to one EDG, the other units can provide sufficient capacity for emergency conditions, including safe shutdown of both reactors coincident with LOOP.
	X			The EDGs will be qualified in accordance with IEEE 387 and R.G. 1.9.
	X			The basis for the selection of the EDGs as related to the storage and transfer system meets the requirements of R. G. 1.9.
b. Regulatory Guide 1.137 are related to the diesel engine fuel oil system design, fuel oil quality and tests.	X			To assure quality and reliability of the fuel oil supplied to the EDGs, certification will be required that the delivered oil conforms to the standards specified in ANSI N195. Samples of delivered fuel will be tested to measure viscosity and percent of moisture and sediment. Inspection of stored fuel is scheduled at 92 day intervals. Over limit indications require corrective action. Residual fuel in the fill tank will be sample tested prior to fill with new fuel.

WISCONSIN ELECTRIC POWER COMPANY

DIESEL GENERATOR ADDITION PROJECT
REGULATORY GUIDES COMPLIANCE SUMMARY

REGULATORY GUIDE		REGULATORY POSITION COMPLIANCE		REFERENCE	DISCUSSION/RESOLUTION
		YES	NO		
Regulatory Guide 1.9	Selection, Design, and Qualification of Diesel-Generator Units Used as Standby (Onsite) Electric Power Systems at Nuclear Power Plants (Revision 2, 12/79)		X	FSAR 8.2, 8.3, 13.2.2.1, 15.4.6 (Ref. 1)	The new installation shall be in compliance with regulatory guide 1.9 unless noted otherwise below. For site acceptance testing purposes only Rev. 3 of Reg. Guide 1.9 is used. See section 7.2 of the Design Summary for details of compliance. In addition to supplying sufficient power for shutting down the other unit, each EDG has enough capacity to start and run a fully loaded set of engineered safeguards equipment to adequately cool the core and maintain the containment pressure within the design value for any loss of coolant accident. EDG loads are known and are within the EDG's 200 hour rating for the first approximately 1/2 hour and within the EDG's 2000 hour rating thereafter. The EDG applications design incorporates all applicable service, environmental, testing and design basis requirements. The EDG is provided with automatic and manual control both locally and in the Control Room. Surveillance instrumentation is provided. The EDG is tripped on overspeed or differe. al overcurrent or 2 out of 3 low lube oil pressure after time delay. All other trips are bypassed under accident conditions.
Regulatory Guide 1.12	Instrumentation for Earthquake(Revision 1,4/74)		X	Ref. 2	Seismic instruments were provided on the Unit 1 containment base slab, in the switch yard and in the Energy Information Center Building of the PBNP. The instruments were installed in 1970 to satisfy a commitment in the Point Beach FFDSAR in response to AEC Question 5.12. Two of the instruments were later relocated to the foundation of the control Auxiliary Building at El. 8'-0" and on the side of the Spent Fuel Pool. The instruments do not satisfy the Regulatory Guide 1.12 requirements. However, Wisconsin Electric is not required to meet these requirements since it was licensed prior to the issuance of this Regulatory Guide. No seismic instrumentation is required in the Diesel Generator Building.

WISCONSIN ELECTRIC POWER COMPANY

DIESEL GENERATOR ADDITION PROJECT
REGULATORY GUIDES COMPLIANCE SUMMARY

REGULATORY GUIDE		REGULATORY POSITION COMPLIANCE		REFERENCE	DISCUSSION/RESOLUTION
		YES	NO		
Regulatory Guide 1.32	Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants (Revision 2, 2/77)	X		FSAR 8.1, 8.2 (Ref. 1)	The new safety related power system design is in compliance with IEEE-308 principal and supplementary design criteria. The offsite power is outside the scope of this project. The DC system is outside the scope of this project except for DC feeder circuits which are used for EDG and switchgear breaker control. See R.G. 1.75 discussion for "Independence of Redundant Standby Sources" and Connection of Non-Class 1E Equipment to 1E Systems." See R.G. 1.9 discussion for "Diesel Generator Set Capacity." See R.G. 1.81 discussion for "Shared Electric Systems for Multiple-Unit Nuclear Power Plants." See R.G. 1.93 discussion for "Availability of Electric Power Systems."
Regulatory Guide 1.41	Preoperational Testing of Redundant On-Site Electric Power Systems to Verify Proper Load Group Assignments (3/73)		X	FSAR 8.3 13.2.2.1 15.4.6 (Ref. 1)	The modified on-site electrical power system will be subjected to pre-operational tests to verify the existence of independence among redundant on-site emergency power sources and their load groups. These tests will consist of cable continuity tests and actual start-run-load tests. Redundant loads groups will be monitored to verify that no unanticipated or spurious operation occurs. The redundant emergency power sources and their load groups will not be disconnected.
Regulatory Guide 1.47	Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems (5/73)	X		FSAR 8.3.3 (Ref. 1)	System level annunciators are provided for each of the new EDGs (G03 and G04). To assure compliance with IEEE 279-1971, the annunciators located in the control room will automatically actuate if the EDGs, its mechanical or electrical auxiliaries are bypassed or rendered inoperative.

WISCONSIN ELECTRIC POWER COMPANY

DIESEL GENERATOR ADDITION PROJECT
REGULATORY GUIDES COMPLIANCE SUMMARY

REGULATORY GUIDE		REGULATORY POSITION COMPLIANCE		REFERENCE	DISCUSSION/RESOLUTION
		YES	NO		
Regulatory Guide 1.100	Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants (Revision 2, 6/88)	X		TVA DCN No. E6-90-0707 (Ref. 23)	The seismic qualification of Electric and Mechanical Equipment of the Diesel Generator Project either conforms to the requirements of IEEE Std. 344-1975 or IEEE Std. 344-1987 as follows: Switchgear — IEEE Std. 344-1987 All other Class 1E Electric — IEEE Std. 344-1987 Diesel Generator Control Panel — IEEE Std. 344-1987 Diesel Generators and Mechanical Equipment (already procured by WE) — IEEE Std. 344-1975 All other Class 1 Mechanical Equipment including Tanks — IEEE Std. 344-1987 As an alternative, some of the Class 1E electric or Class 1 Mechanical Equipment is seismically qualified using the USI A-46 (GIP) methodology. IEEE Std. 344-1987 accepts the use of experience data for equipment qualification. NRC has accepted the GIP methodology for PBNP equipment and components. This methodology is part of the design basis for the Diesel Generator Project.
Regulatory Guide 1.102	Flood Protection for Nuclear Power Plants (Revision 1, 9/76)	X		FSAR 2.5 (Ref. 1)	Section 2.5 of FSAR provides information on the most plausible flooding hazard at the site. The site is 20 or more feet above normal lake level and there is no record that it was flooded by the lake at any time. Natural drainage of the site, a storm sewer system in the plant yard, and an interceptor ditch discharging to Lake Michigan provide protection against local flooding.
Regulatory Guide 1.105	Instrument Setpoints for Safety-Related Systems (Rev. 2. 2/86)			FSAR 15.2 (Ref. 1)	Not applicable to this modification.
Regulatory Guide 1.106	Thermal Overload Protection for Electric Motors on Motor Operated Valves (Revision 1, 3/77)				Not applicable to this modification since no new MOVs or MOV controllers with thermal overload protection will be installed. The modification to the existing MOV circuits is limited to relocating the power supply for one valve.