Exhibit B

Prairie Island Nuclear Generating Plant

License Amendment Request Dated March 20, 1992

Proposed Changes Marked Up
On Existing Technical Specifications Pages

Exhibit B consists of existing and new Technical Specifications pages with the proposed changes highlighted on those pages. The existing pages affected by this License Amendment Request are listed below:

TS-v
TS.3.3-7
Table TS.3.5-1
Table TS.3.5-6
TS.3.7-1
TS.3.7-2
TS.3.7-3
TS.4.5-2
TS.4.5.3
TS.4.6-1
TS.4.6-2
B.3.3-3
B.3.5-2
B.3.5-3
B.3.5-4
B.3.5-5
B.3.7-1
B.4.6-1

TABLE OF CONTENTS (Continued)

3.3.D. Cooling Water System

1. A reactor shall not be made or maintained critical nor shall reactor coolant system average temperature exceed 200°F, unless the following conditions are satisfied (except as specified in 3.3.D.2 below).

   a. ~~Two diesel-driven~~Four of the five cooling water pumps are OPERABLE~~.~~, and if one diesel-driven cooling water pump is inoperable, then 121 cooling water pump shall be aligned as shown in the table below. All changes in the valve positions shall be under direct administrative control.

Inoperable Pump	Valve Alignment	Power Supply to Bus 27 (#121 Cooling Water Pump)
#12 Cooling Water Pump	MV-32037 or MV-32036 closed; and associated Bkr Locked Off	Bus 25
	MV-32034 and MV-32035 open; and both Bkrs Locked Off	
#22 Cooling Water Pump	MV-32034 or MV-32035 closed; and the associated Bkr Locked Off	Bus 26
	MV-32037 and MV-32036 open; and both Bkrs Locked Off	

   ~~b. Two motor-driven cooling water pumps are operable.~~

   ~~c~~b. Two safeguards traveling screens are OPERABLE.

   c. Two cooling water headers are OPERABLE.

   d. A fuel oil supply of 19,000 gallons is available for the diesel-driven cooling water pumps in the interconnected Unit 1 diesel fuel oil storage tanks. Note that the 19,000 gallon requirement is included in the 70,000 gallon total diesel fuel oil requirement of Specification 3.7.A.5 for Unit 1

2. During STARTUP OPERATION or POWER OPERATION, the following conditions of inoperability may exist provided STARTUP OPERATION is discontinued until OPERABILITY is restored. If OPERABILITY is not restored within the time specified, be in at least HOT SHUTDOWN within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

   a. ~~One diesel-driven~~Two of the five cooling water pumps may be inoperable for 7 days with the following stipulation. ~~(total for both diesel-driven cooling water pumps during any consecutive 30 day period) provided:~~

~~(1) the other diesel-driven pump and its associated diesel generator are OPERABLE.~~

~~(2) the engineered safety features associated with the OPERABLE diesel-driven cooling water pump are OPERABLE; and~~

~~(3) both paths from transmission grid to the plant 4 kV safeguards buses are OPERABLE.~~

~~(4) two motor-driven cooling water pumps shall be OPERABLE.~~

~~b. One of the two required motor-driven cooling water pumps may be inoperable for 7 days provided both diesel-driven cooling water pumps are OPERABLE.~~

If the inoperable pumps are any two of these: #12 Cooling Water Pump, #22 Cooling Water Pump, and #121 Cooling Water Pump, the following conditions shall apply:

(1) the engineered safety features associated with the OPERABLE safeguards cooling water pump are OPERABLE; and

(2) both paths from transmission grid to the unit 4 kV safeguards buses are OPERABLE (applicable to Unit 1 operation only); and

(3) this condition of inoperablility (i.e., two safeguards pumps inoperable simultaneously) may not exceed 7 days in any consecutive 30 day period.

~~c.~~ b. One of the two required cooling water headers may be inoperable for 72 hours provided:

(1) the diesel-driven pump and the diesel generator associated with safety features on the OPERABLE header are OPERABLE.

(2) the horizontal motor-driven pump associated with the OPERABLE header and the vertical motor-driven pump are OPERABLE.

~~d.~~ c. One of the Safeguards Traveling Screens may be inoperable for 90 days provided a sluice gate connecting the Emergency Bay and the Circ Water Bay is open (except during periods of testing not to exceed 24 hours).

~~e.~~ d. Both Safeguards Traveling Screens may be inoperable for 7 days provided a sluice gate connecting the Emergency Bay and the Circ Water Bay is open.

~~f.~~ e. The Emergency Cooling Water line from the Mississippi River may be inoperable for 7 days provided that a sluice gate connecting the Emergency Bay and the Circ Water Bay is open.

TABLE TS.3.5-1 (continued)

ENGINEERED SAFETY INITIATION INSTRUMENTATION LIMITING SET POINTS

FUNCTIONAL UNIT	CHANNEL	LIMITING SET POINTS	Unit 1	Unit 2
10. 4KV Safeguards Busses Voltage Restoration	a. Degraded Voltage**			
	Voltage (% nominal)	~~90 ± 2%~~	90 ± 2%	87.5 ± 3.5%
	Time Delay 1	~~6 ± 2 sec~~	3 ± 0.5 sec	8 ± 0.5 sec
	Time Delay 2		8 ± 0.5 to 60 ± 3 sec	8 ± 0.5 to 60 ± 3 sec
	b. ~~Loss of Voltage~~Undervoltage			
	~~1.~~ Voltage (% nominal)	~~55% ±10%~~	75 ± 2.5%	75 ± 2.5%
	Time Delay	~~2 ± 2 sec~~	4 ± 1.5 sec	4 ± 1.5 sec
	~~2. Voltage (% nominal)~~	~~90 ± 2%~~		
	~~Time Delay~~	~~2 ± 2 sec~~		

** Limiting setpoints are provided for both Unit 1 and Unit 2 in the interim between completion of electrical safeguards upgrades for Unit 2 and later completion of electrical safeguards upgrades for Unit 1.

TABLE TS 3.5-6

INSTRUMENT OPERATING CONDITIONS FOR AUXILIARY ELECTRICAL SYSTEM

FUNCTIONAL UNIT	1 MINIMUM OPERABLE CHANNELS	2 MINIMUM DEGREE OF REDUNDANCY	3 PERMISSIBLE BYPASS CONDITIONS	4 OPERATOR ACTION IF CONDITIONS OF COLUMN 1 OR 2 CANNOT BE MET
1. Degraded Voltage 4KV Safeguards Busses	~~1/Bus~~ 3/Bus	~~1/Bus~~ 2/Bus	---	Place inoperable channel in the tripped condition within one hour or be in hot shutdown.***
2. ~~a. Loss of voltage 4KV Safeguard Bus (90%)~~	~~1/Bus~~	~~1/Bus~~	~~—~~	~~Place inoperable channel in the tripped condition within one hour or be in hot shutdown.***~~
~~b. Loss of voltage 4KV Safeguard Bus (55%)~~	~~1/Bus~~	~~1/Bus~~	~~—~~	~~Place inoperable channel in the tripped condition within one hour or be in hot shutdown***~~
Undervoltage 4KV Safeguards Busses	3/Bus	2/Bus	---	Place inoperable channel in the tripped condition within one hour or be in hot shutdown.***

*** If minimum conditions are not met within 24 hours, steps shall be taken to place the unit in cold shutdown conditions.

Table TS.3.5-6

3.7 AUXILIARY ELECTRICAL SYSTEMS

Applicability

Applies to the availability of electrical power for the operation of plant auxiliaries.

Objectives

To define those conditions of electrical power availability necessary to assure safe reactor operation and continuing availability of engineered safeguards.

Specification

A. A reactor shall not be made or maintained critical nor shall reactor coolant system average temperature exceed 200°F unless all of the following requirements are satisfied for the applicable unit (except as specified in 3.7.B below):

1. At least two separate paths from the transmission grid to the ~~plant~~ unit 4 kV safeguards distribution system each capable of providing adequate power to minimum safety related equipment, shall be OPERABLE.

2. The 4 kV safeguards buses 15 and 16 (Unit 2 buses: 25 and 26) shall be energized.

3. The 480 V safeguards buses 110 and 120 (Unit 2 buses: ~~210 and 220~~ 211, 212, 221 and 222), and their safeguards motor control centers shall be energized.

4. Reactor protection instrument AC buses shall be energized: 111, 112, 113 and 114 (Unit 2 buses: 211, 212, 213 and 214).

~~5. D1 and D2 diesel generators are OPERABLE, and a fuel supply of 70,000 gallons is available in the interconnected storage tanks for the diesel generators and the diesel driven cooling water pumps.~~

5. The following unit specific conditions apply:

   (a) Unit 1: D1 and D2 diesel generators are OPERABLE, and a fuel supply of 51,000 gallons is available for the D1 and D2 diesel generators in the Unit 1 interconnected diesel fuel oil storage tanks. A total fuel supply of 70,000 gallons is available for the D1 and D2 diesel generators and the diesel-driven cooling water pumps in the Unit 1 interconnected diesel fuel oil storage tanks.

   (b) Unit 2: D5 and D6 diesel generators are OPERABLE and a fuel supply of 75,000 gallons is available for D5 and D6 diesel generators in the Unit 2 interconnected diesel fuel oil storage tanks.

6. Both batteries with their associated chargers and both d-c safeguard systems shall be OPERABLE.

7. No more than one of the Instrument AC Panels 111, 112, 113 and 114 (Unit 2 panels: 211, 212, 213 and 214) shall be powered from Panel 117 (Unit 2 panel: 217) or its associated instrument inverter bypass source.

3.7.B. During STARTUP OPERATION or POWER OPERATION, any of the following conditions of inoperability may exist for the times specified, provided STARTUP OPERATION is discontinued until OPERABILITY is restored. If OPERABILITY is not restored within the time specified, place the affected unit(s) in at least HOT SHUTDOWN within the next 6 hours and be in COLD SHUTDOWN within the following 30 hours.

1. One diesel generator may be inoperable for 7 days (total for both diesel generators during any consecutive 30 day period) provided (a) the OPERABILITY of the other diesel generator is demonstrated* by performance of surveillance requirement 4.6.A.1.e within 24 hours**, (b) all engineered safety features equipment associated with the operable diesel generator is OPERABLE, (c) the two required paths from the grid to the ~~plant~~ unit 4 kV safeguards distribution system are OPERABLE and (d) the OPERABILITY of the two required paths from the grid shall be verified OPERABLE within 1 hour and at least once per 8 hours thereafter.

2. One of the two required paths from the grid to the ~~plant~~ unit 4 kV safeguards distribution system may be inoperable for 7 days provided (a) D1 and D2 (Unit 2: D5 and D6) diesel generators are already operating or are demonstrated to be OPERABLE by sequentially performing surveillance requirement 4.6.A.1.e on each diesel generator within 24 hours and (b) the OPERABLE path from the grid shall be verified OPERABLE within 1 hour and at least once per 8 hours thereafter.

3. One of the two required paths from the grid to the ~~plant~~ unit 4 kV safeguards distribution system and one diesel generator may be inoperable for 12 hours provided, (a) the OPERABILITY of the other diesel generator is demonstrated* by performance of Surveillance Requirement 4.6.A.1.e within 8 hours**, (b) all engineered safety features equipment associated with the OPERABLE diesel generator is OPERABLE, and (c) the OPERABLE path from the grid shall be verified OPERABLE within 1 hour and at least once per 8 hours thereafter.

4. Both of the two required paths from the grid to the ~~plant~~ unit 4 kV safeguards distribution system may be inoperable for 12 hours provided the D1 and D2 (Unit 2: D5 and D6) diesel generators are already operating or are demonstrated to be OPERABLE by sequentially performing Surveillance requirement 4.6.A.1.e on each diesel generator within 8 hours.

* The OPERABILITY of the other diesel generator need not be demonstrated if the diesel generator inoperability was due to preplanned preventative maintenance or testing.

** This test is required to be completed regardless of when the inoperable diesel generator is restored to OPERABILITY.

3.7.B.5. D1 and D2 (Unit 2: D5 and D6) diesel generators may be inoperable for 2 hours provided the two required paths from the grid to the ~~plant~~ unit 4 kV safeguards distribution system are OPERABLE and the OPERABILITY of the two required paths from the grid are verified OPERABLE within 1 hour.

6. One 4 kV safeguards bus (and its associated 480 V bus (Unit 2: buses) including associated safeguards motor control centers) or one 480 V safeguards bus including associated safeguards motor control centers may be inoperable or not fully energized for 8 hours provided ~~its redundant counterpart is~~ the redundant 4 kV safeguards bus and its associated 480 V safeguards bus (Unit 2: buses) are verified OPERABLE and the diesel generator and safeguards equipment associated with ~~its counterpart~~ the redundant train are OPERABLE.

7. One battery charger may be inoperable for 8 hours provided, (a) its associated battery is OPERABLE, (b) its redundant counterpart is verified OPERABLE, and (c) the diesel generator and safeguards equipment associated with its counterpart are OPERABLE.

8. One battery may be inoperable for 8 hours provided that the other battery and both battery chargers remain OPERABLE.

9. In addition to the requirements of Specification TS.3.7.A.7 a second inverter supplying Instrument AC Panels 111, 112, 113, and 114 may (Unit 2 panels 211, 212, 213 and 214) be powered from an inverter bypass source for 8 hours.

3. Containment Fan Coolers

Each fan cooler unit shall be tested during each reactor refueling shutdown to verify proper operation of all essential features including low motor speed, cooling water valves, and normal ventilation system dampers. Individual unit performance will be monitored by observing the terminal temperatures of the fan coil unit and by verifying a cooling water flow rate of greater than or equal to 900 gpm to each fan coil unit.

4. Component Cooling Water System

a. System tests shall be performed during each reactor refueling shutdown. Operation of the system will be initiated by tripping the actuation instrumentation.

b. The test will be considered satisfactory if control board indication and visual observations indicate that all components have operated satisfactorily.

5. Cooling Water System

a. System tests shall be performed at each refueling shutdown. Tests shall consist of an automatic start of each diesel engine, automatic start of the vertical motor-driven cooling water pump and automatic operation of valves required to mitigate accidents including those valves that isolate non-essential equipment from the system. Operation of the system will be initiated by a simulated accident signal to the actuation instrumentation. The tests will be considered satisfactory if control board indication and visual observations indicate that all components have operated satisfactorily and if cooling water flow paths required for accident mitigation have been established.

b. At least once each 18 months, subject each diesel engine to a thorough inspection in accordance with procedures prepared in conjunction with the manufacturer's recommendations for this class of standby service.

4.5.B. Component Tests

1. Pumps

a. The safety injection pumps, residual heat removal pumps and containment spray pumps shall be started and operated at intervals of one month. Acceptable levels of performance shall be that the pumps start and reach their required developed head on minimum recirculation flow and the control board indications and visual observations indicate that the pumps are operating properly for at least 15 minutes.

b. A test consisting of a manually-initiated start of each diesel engine, and assumption of load within one minute, shall be conducted monthly.

c. The vertical motor-driven cooling water pump shall be operated at quarterly intervals. An acceptable level of performance shall be that the pump starts and reaches its required developed head and the control board indictions and visual observations indicate that the pump is operating properly for at least 15 minutes.

2. Containment Fan Motors

The Containment Fan Coil Units shall be run on low motor speed for at least 15 minutes at intervals of one month. Motor current shall be measured and compared to the nominal current expected for the test conditions.

3. Valves

a. The refueling water storage tank outlet valves shall be tested in accordance with Section 4.2.

b. The accumulator check valves will be checked for OPERABILITY during each refueling shutdown.

c. The boric acid tank valves to the Safety Injection System shall be tested at intervals of one month.

d. The spray chemical additive tank valves shall be cycled by operator action at intervals of one month.

e. Actuation circuits for Cooling Water System valves that isolate non-essential equipment from the system shall be tested monthly.

f. All motor-operated valves in the SIS, RHR, Containment Spray, Cooling Water, and Component Cooling Water System that are designed for operation during the safety injection or recirculation phase of emergency core cooling, shall be tested for OPERABILITY at each refueling shutdown.

4.6 PERIODIC TESTING OF EMERGENCY POWER SYSTEM

Applicability

Applies to periodic testing and surveillance requirements of the emergency power system.

Objective

To verify that the emergency power sources and equipment are OPERABLE.

Specification

The following tests and surveillance shall be performed:

A. Diesel Generators

1. At least once each month, for each diesel generator:

   a. Verify the fuel level in the day tank.

   b. Verify the fuel level in the fuel storage tank.

   c. Verify that a sample of diesel fuel from the fuel storage tank is within the acceptable limits specified in Table 1 of ASTM D975-~~6877~~ when checked for viscosity, water, and sediment.

   d. Verify the fuel transfer pump can be started and transfers fuel from the storage system to the day tank.

   e. Verify the diesel generator can start and gradually accelerate to synchronous speed ~~(900 rpm)~~ with generator voltage and frequency at 4160 ± 420 volts and 60 ± 1.2 Hz. Subsequently, manually ~~sychronize~~ synchronize the generator, gradually load to at least 1650 kW (Unit 2: 5100 kW to 5300 kW), and operate for at least 60 minutes. This test should be conducted in accordance with the manufacturer's recommendations regarding engine prelube, warm-up, loading and shutdown procedures where possible.

4.6.A.2. At least once each 6 months, for each diesel generator:

a. Verify the diesel generator starts and accelerates to at least ~~900 rpm~~ synchronous speed in less than or equal to 10 seconds.

b. Verify the generator voltage and frequency to be 4160 ± 420 volts and 60 ± 1.2 Hz within 10 seconds after the start signal.

c. Manually synchronize the generator, load to at least 1650 kW (Unit 2: 5100 kW to 5300 kW) in less than or equal to 60 seconds and operate for at least one hour.

d. This test should be conducted in accordance with the manufacturer's recommendations regarding engine prelube and shutdown procedures where possible.

3. At least once each 18 months:

a. Subject each diesel generator to a thorough inspection in accordance with procedures prepared in conjunction with the manufacturer's recommendations for this class of standby service.

b. For each unit, simulate a loss of offsite power in conjunction with a safety injection signal, and:

1. Verify de-energization of the emergency buses and load shedding from the emergency buses.

2. Verify the diesels start on the auto-start signal and energize the emergency buses in one minute. This test should be ~~conductee~~ conducted in accordance with the manufacturer's recommendations regarding engine prelube and shutdown procedures where possible.

3. Verify that the auto-connected loads do not exceed 3000 kw (Unit 2: 5100 kW).

4. Verify that the diesel generator system trips, except those for engine overspeed, ground fault, and generator differential current, are automatically bypassed.

c. Verify the capability of each generator to operate at least one hour while loaded to 3000 kw (Unit 2: 5100 kW to 5300 kW).

d. Verify the capability of each generator to reject a load of at least 650 kw (Unit 2: 860 kw) without tripping.

e. During this test, operation of the emergency lighting system shall be ascertained.

3.3 ENGINEERED SAFETY FEATURES

Bases continued

The containment cooling function is provided by two independent systems: containment fan cooler units and containment sprays. During normal operation, four containment fan cooler units are utilized to remove heat lost from equipment and piping within the containment. In the event of the Design Basis Accident, any one of the following combinations will provide sufficient cooling to reduce containment pressure: four containment fan cooler units, two containment spray pumps or two containment fan cooler units plus one containment spray pump (Reference 4). Two of the four containment fan cooler units are permitted to be inoperable during POWER OPERATION. This is an abnormal operating situation, in that plant operating procedures require that inoperable containment fan cooler units be repaired as soon as practical. However, because of the difficulty of access to make repairs, it is important on occasion to be able to operate temporarily with only two containment fan cooler units. Two containment fan cooler units can provide adequate cooling for normal operation when the containment fan cooler units are cooled by the chilled water system (Reference 3). Compensation for this mode of operation is provided by the high degree of redundancy of containment cooling systems during a Design Basis Accident.

One component cooling water pump together with one component cooling heat exchanger can accommodate the heat removal load on one unit, either following a loss-of-coolant accident or during normal plant shutdown. The four pumps of the two-unit facility can be cross connected as necessary to accommodate temporary outage of the pump. If, during the post-accident phase, the component cooling water supply were lost, core and containment cooling could be maintained until repairs were effected (Reference 5).

~~Normal cooling water supply is from two motor-driven pumps backed up by a third motor driven pump~~Cooling water can be supplied by either of the two horizontal motor-driven pumps, by a safeguards motor-driven pump or by either of two safeguards diesel-driven pumps. (Reference 6). ~~In the event of complete loss of station power, cooling water is supplied by two diesel-driven pumps which start automatically, each serving half the fan coolers in each reactor.~~ Operation of a single cooling water pump ~~of either type~~ provides sufficient cooling in one unit during the injection and recirculation phases of a postulated loss-of-coolant accident plus sufficient cooling to maintain the second unit in a hot standby condition.

TS.3.3.D.1.a assures that an automatic Safety Injection signal to the cooling water header isolation valves will not align both OPERABLE safeguards pumps to the same safeguards train.

TS.3.3.D.1.a also assures that 121 cooling water pump is aligned to provide cooling water to the same train as the train from which it is being powered (e.g., if 121 cooling water pump is aligned to Train B cooling water header, it needs to be powered from Bus 26 and,

3.3 ENGINEERED SAFETY FEATURES
Bases continued

ultimately, Diesel Generator D6 in the event of a loss of offsite power). Otherwise, the single failure of a diesel generator could leave one train of engineered safety features without power and the other train without cooling water.

The minimum fuel supply of 19,000 gallons will supply one diesel-driven cooling water pump for 14 days. Note that the 19,000 gallon requirement is included in the 70,000 gallon total diesel fuel oil requirement of Specification 3.7.A.5 for Unit 1.

The Safeguards Traveling Screens and Emergency Cooling Water Supply line are designed to provide a supply of screened cooling water in the event that an earthquake 1) destroys Dam No. 3 (dropping the water level in the normal canal to the screenhouse) and 2) causes the banks bordering the normal canal to the screenhouse to collapse eliminating the river as a source of cooling water. The Safeguards Traveling Screens and Emergency Cooling Water Supply line provide an alternate supply of water to the Safeguards Bay, which contains the two diesel driven and the one vertical motor driven cooling water pumps. Their normal supply is from the Circ

3.5 INSTRUMENTATION SYSTEM

Bases continued

Steam Line Isolation (continued)

line flow in coincidence with low T_{avg} and safety injection or high steam flow (Hi-Hi) in coincidence with safety injection. Adequate protection is afforded for breaks inside or outside the containment even when it is assumed that the steam line check valves do not function properly.

Containment Ventilation Isolation

Valves in the containment purge and inservice purge systems automatically close on receipt of a Safety Injection signal or a high radiation signal. Gaseous and particulate monitors in the exhaust stream or a gaseous monitor in the exhaust stack provide the high radiation signal.

Ventilation System Isolation

In the event of a high energy line rupture outside of containment, redundant isolation dampers in certain ventilation ducts are closed (Reference 4).

Safeguards Bus Voltage

Relays are provided on buses 15, 16, 25, and 26 to detect ~~loss of voltage~~ undervoltage and degraded voltage (the voltage level at which safety related equipment may not operate properly). Relays are not provided on 4 kV safeguards bus 27 to detect undervoltage and degraded voltage since voltage is monitored on the 4 kV source safeguards bus (i.e., bus 25 or bus 26) to which it is connected. ~~On loss of voltage,~~ Upon receipt of an undervoltage signal the automatic voltage restoring scheme is ~~initiated immediately~~ actuated after a short time delay which prevents actuation during normal transients (such as motor starting) and which allows protective relaying operation during faults. When degraded voltage is sensed, ~~the voltage restoring scheme is initiated if acceptable voltage is not restored within a short time period. This time delay prevents initiation of the voltage restoring scheme when large loads are started and bus voltage momentarily dips below the degraded voltage setpoint.~~ two time delays are actuated. The first time delay is long enough to allow for normal transients. The first time delay annunciates that a sustained degraded voltage condition exists and enables logic which will ensure that voltage and timing are adequate for safety injection loads by automatically performing the following upon receipt of a safety injection signal:

1. Auto start the diesel generator;
2. Separate the bus from the grid;
3. Load the bus onto the diesel generator; and
4. Start the load sequencer (including safety injection loads).

3.5 INSTRUMENTATION SYSTEM

Bases continued

The second longer time delay is used to allow the degraded voltage condition to be corrected by external actions within a time period that will not cause damage to operating equipment. If voltage is not restored within that time period, the logic automatically performs the following:

1. Auto start the diesel generator;
2. Separate the bus from the grid;
3. Load the bus onto the diesel generator; and
4. Start the load sequencer.

Auxiliary Feedwater System Actuation

The following signals automatically start the pumps and open the steam admission control valve to the turbine driven pump of the affected unit:

1. Low-low water level in either steam generator
2. Trip of both main feedwater pumps
3. Safety Injection signal
4. Undervoltage on both 4.16 kV normal buses (turbine driven pump only)

Manual control from both the control room and the Hot Shutdown Panel are also available. The design provides assurance that water can be supplied to the steam generators for decay heat removal when the normal feedwater system is not available.

Limiting Instrument Setpoints

1. The high containment pressure limit is set at about 10% of the maximum internal pressure. Initiation of Safety Injection protects against loss of coolant (Reference 2) or steam line break accidents as discussed in the safety analysis.

2. The Hi-Hi containment pressure limit is set at about 50% of the maximum internal pressure for initiation of containment spray and at about 30% for initiation of steam line isolation. Initiation of Containment Spray and Steam Line Isolation protects against large loss of coolant (Reference 2) or steam line break accidents (Reference 3) as discussed in the safety analysis.

3. The pressurizer low pressure limit is set substantially below system operating pressure limits. However, it is sufficiently high to protect against a loss of coolant accident as shown in the safety analysis (Reference 2).

3.5 INSTRUMENTATION SYSTEM

Bases continued

Limiting Instrument Setpoints (continued)

4. The steam line low pressure signal is lead/lag compensated and its set-point is set well above the pressure expected in the event of a large steam line break accident as shown in the safety analysis (Reference 3).

5. The high steam line flow limit is set at approximately 20% of nominal full-load flow at the no-load pressure and the high-high steam line flow limit is set at approximately 120% of nominal full-load flow at the full load pressure in order to protect against large steam break accidents. The coincident low T_{avg} setting limit for steam line isolation initiation is set below its hot shutdown value. The safety analysis shows that these settings provide protection in the event of a large steam break (Reference 3).

6. Steam generator low-low water level and 4.16 kV Bus 11 and 12 (21 and 22 in Unit 2) low bus voltage provide initiation signals for the Auxiliary Feedwater System. Selection of these setpoints is discussed in the Bases of Section 2.3 of the Technical Specification.

7. High radiation signals providing input to the Containment Ventilation Isolation circuitry are set in accordance with the Radioactive Effluent Technical Specifications. The setpoints are established to prevent exceeding the limits of 10 CFR Part 20 at the SITE BOUNDARY.

8. The degraded voltage protection setpoint is 90± 2% (Unit 2: 87.5± 3.5%) of nominal 4160 V bus voltage. Testing and analysis have shown that all safeguards loads will operate properly at or above the minimum degraded voltage setpoint. The maximum degraded voltage setpoint is chosen to prevent unnecessary actuation of the voltage restoring scheme at the minimum expected grid voltage. The first degraded voltage time delay of 8 ± 0.5 seconds has been shown by testing and analysis to be long enough to allow for normal transients (i.e., motor starting and fault clearing). It is also longer than the time required to start the safety injection pump at minimum voltage. The second degraded voltage time delay is provided to allow the degraded voltage condition to be corrected within a time frame which will not cause damage to permanently connected Class 1E loads. ~~The degraded voltage protection time delay of 6±2 seconds has been shown by testing and analysis to be long enough to allow for voltage dips resulting from the starting of large loads. This time delay is also consistent with the maximum time delay assumed in the ECCS analysis for starting of a safety injection pump. A maximum limit on the degraded voltage setpoint has been established to prevent unnecessary actuation of the voltage restoring scheme.~~

3.5 INSTRUMENTATION SYSTEM

Bases continued

Limiting Instrument Setpoints (continued)

The undervoltage setpoint is 75 ± 2.5% of nominal bus voltage. The minimum setpoint ensures equipment operates above the limiting value of 75% (of 4000 V) for one minute operation. The 75% maximum setpoint is chosen to prevent unnecessary actuation of the voltage restoring scheme during voltage dips which occur during motor starting. The undervoltage time delay of 4 ± 1.5 seconds has been shown by testing and analysis to be long enough to allow for normal transients and short enough to operate prior to the degraded voltage logic, providing a rapid transfer to an alternate source. ~~The loss of voltage protection setpoint is approximately 55% of nominal 4160 V bus voltage. Relays initiate a rapid (less than two seconds) transfer to an alternate source on loss of voltage.~~

Instrument Operating Conditions

During plant operations, the complete instrumentation systems will normally be in service. Reactor safety is provided by the Reactor Protection System, which automatically initiates appropriate action to prevent exceeding established limits. Safety is not compromised, however, by continuing operation with certain instrumentation channels out of service since provisions were made for this in the plant design. This specification outlines limiting conditions for operation necessary to preserve the effectiveness of the Reactor Control and Protection System when any one or more of the channels is out of service.

Almost all reactor protection channels are supplied with sufficient redundancy to provide the capability for CHANNEL CALIBRATION and test at power. Exceptions are backup channels such as reactor coolant pump breakers. The removal of one trip channel on process control equipment is accomplished by placing that channel bistable in a tripped mode; e.g., a two-out-of-three circuit becomes a one-out-of-two circuit. The source and intermediate range nuclear instrumentation system channels are not intentionally placed in a tripped mode since these are one-out of-two trips, and the trips are therefore bypassed during testing. Testing does not trip the system unless a trip condition exists in a concurrent channel.

References

1. USAR, Section 7.4.2
2. USAR, Section 14.6.1
3. USAR, Section 14.5.5
4. FSAR, Appendix I

3.7 AUXILIARY ELECTRICAL SYSTEM

Bases

The intent of this specification is to provide assurance that at least one external source and one standby source of electrical power is always available to accomplish safe shutdown and containment isolation and to operate required engineered safeguards equipment following an accident.

Plant auxiliary power can be supplied from four separate external power sources which have multiple off-site network connections: the reserve transformer from the 161 kV portion of the plant substation; the second reserve transformer from the 345 kV portion of the plant substation and the two cooling tower transformers, one of which is supplied from a tertiary winding on the substation auto transformer, and the other directly from the 345 kV switchyard. Any one of the four sources is sufficient, under analyzed conditions, to supply all the necessary accident and post-accident load requirements for one reactor, along with the shutdown of the second reactor.

Each source separately supplies the safeguards buses in such manner that items of equipment which are redundant to each other are supplied by separate sources and buses.

Each diesel generator, D1 or D2 (Unit 2: D5 or D6), is connected to ~~one~~ its associated 4160 volt safeguards bus in ~~each of the two reactors~~ Unit 1 (Unit 2) and each diesel generator has sufficient capacity to start sequentially and operate the safeguards equipment supplied by ~~one~~ its associated bus. The set of safeguards equipment items supplied by each bus is, alone, sufficient to maintain adequate cooling of the fuel and to maintain containment pressure within the design value in the event of a loss-of-coolant accident.

~~Each diesel starts automatically upon low voltage on its associated bus in either unit and both diesel generators start in the event of a safety injection signal for either reactor. The minimum fuel supply of 70,000 gallons will supply one diesel cooling water pump and one diesel generator (loaded per USAR Table 8.4-1) for greater than 14 days. Additional diesel fuel can normally be obtained within a few hours. This assures an adequate supply even in the event of the probable maximum flood.~~

If no offsite source is available to the associated bus, each diesel starts automatically upon receipt of an undervoltage signal on its associated bus. Both diesel generators start in the event of a safety injection signal for the reactor. The minimum fuel supply of 51,000 gallons will supply one Unit 1 diesel generator for 14 days. Note that the 51,000 gallon requirement is included in the 70,000 gallon total requirement for Unit 1. The total fuel supply of 70,000 gallons will supply one diesel-driven cooling water pump and one Unit 1 diesel generator (loaded per USAR Table 8.4-1) for greater than 14 days (Unit 2: A fuel supply of 61,300 gallons will supply one Unit 2 diesel

generator for 7 days at rated load calculated per the conservative method of ANSI-N195-1976. A minimum fuel supply of 75,000 gallons was conservatively chosen to supply one Unit 2 diesel generator for 14 days calculated per the time-dependent method of ANSI-N195-1976.) Additional diesel fuel can normally be obtained within a few hours. This assures an adequate supply even in the event of the probable maximum flood.

Following the inoperability of a Diesel Generator, the ~~other~~ redundant diesel generator is tested to prove that the cause of the inoperability does not affect both diesel generators. However, if the diesel generator is inoperable due to preplanned preventative maintenance, operability of the ~~other~~ redundant diesel generator does not need to be proven.

4.6 PERIODIC TESTING OF EMERGENCY POWER SYSTEMS

Bases

The monthly tests specified for the diesel generators will demonstrate their continued capability to start and to carry load. The fuel supplies and starting circuits and controls are continuously monitored, and abnormal conditions in these systems would be alarm-indicated without need for test startup.

The less frequent overall system test will demonstrate that the emergency power system and the control systems for the engineered safeguards equipment will function automatically in the event of loss of all other sources of a-c power, and that the diesel generators will start automatically in the event of a loss-of-coolant accident. This test will demonstrate proper tripping of motor feeder breakers, main supply and tie breakers on the affected bus, and sequential starting of essential equipment, as well as the OPERABILITY of the diesel generators. The load rejection test will demonstrate the capability to reject the single largest emergency load without tripping.

The specified test frequencies provide reasonable assurance that any mechanical or electrical deficiency will be detected and corrected before it can result in failure of one emergency power supply to respond when called upon to function. It's possible failure to respond is, of course, anticipated by providing two diesel generators per unit, each supplying, through an independent bus, a complete and adequate set of engineered safeguards equipment. Further, both diesel generators are provided as backup to multiple sources of external power, and this multiplicity of sources should be considered with regard to adequacy of test frequency.

Each diesel generator can start and be ready to accept full load within 10 seconds, and will sequentially start and supply the power requirements for one complete set of safeguards equipment in approximately one minute (Reference 1).

An internal fault in the generator could damage the generator severely. Moreover, this change complies with BTP EICSB 17. Auto-connected loads should not exceed the overload rating of the diesel generator for the 2000 hour maintenance interval, as prescribed in Regulatory Guide 1.9.

Station batteries will deteriorate with time, but precipitous failure is extremely unlikely. The surveillance specified is that which has been demonstrated over the years to provide indication of a cell becoming unserviceable long before it fails.

If a battery cell has deteriorated, or if a connection is loose, the voltage under load will drop excessively, indicating need for replacement or maintenance.

Exhibit C

Prairie Island Nuclear Generating Plant

License Amendment Request Dated March 20, 1992

Revised Technical Specifications Pages

Exhibit C consists of revised and new pages for the Prairie Island Nuclear Generating Plant Technical Specifications with the proposed changes incorporated. The revised pages are listed below:

TS-v
TS.3.3-7
TS.3.3-8
Table TS.3.5-1 Page 2 of 2
Table TS.3.5-6
TS.3.7-1
TS.3.7-2
TS.3.7-3
TS.4.5-2
TS.4.5-3
TS.4.5-4
TS.4.6-1
TS.4.6-2
B.3.3-3
B.3.3-4
B.3.5-2
B.3.5-3
B.3.5-4
B.3.5-5
B.3.7-1
B.3.7-2
B.4.6-1

TABLE OF CONTENTS (Continued)

3.3.D. Cooling Water System

1. A reactor shall not be made or maintained critical nor shall reactor coolant system average temperature exceed 200°F, unless the following conditions are satisfied (except as specified in 3.3.D.2 below).

a. Four of the five cooling water pumps are OPERABLE, and if one diesel-driven cooling water pump is inoperable, then 121 cooling water pump shall be aligned as shown in the table below. All changes in the valve positions shall be under direct administrative control.

Inoperable Pump	Valve Alignment	Power Supply to Bus 27 (#121 Cooling Water Pump)
#12 Cooling Water Pump	MV-32037 or MV-32036 closed; and associated Bkr Locked Off	Bus 25
	MV-32034 and MV-32035 open; and both Bkrs Locked Off	
#22 Cooling Water Pump	MV-32034 or MV-32035 closed; and the associated Bkr Locked Off	Bus 26
	MV-32037 and MV-32036 open; and both Bkrs Locked Off	

b. Two safeguards traveling screens are OPERABLE.

c. Two cooling water headers are OPERABLE.

d. A fuel oil supply of 19,000 gallons is available for the diesel-driven cooling water pumps in the interconnected Unit 1 diesel fuel oil storage tanks. Note that the 19,000 gallon requirement is included in the 70,000 gallon total diesel fuel oil requirement of Specification 3.7.A.5 for Unit 1.

3.3.D.2. During STARTUP OPERATION or POWER OPERATION, the following conditions of inoperability may exist provided STARTUP OPERATION is discontinued until OPERABILITY is restored. If OPERABILITY is not restored within the time specified, be in at least HOT SHUTDOWN within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

a. Two of the five cooling water pumps may be inoperable for 7 days with the following stipulation.

If the inoperable pumps are any two of these: #12 Cooling Water Pump, #22 Cooling Water Pump, and #121 Cooling Water Pump, the following conditions shall apply:

(1) the engineered safety features associated with the OPERABLE safeguards cooling water pump are OPERABLE; and

(2) both paths from transmission grid to the unit 4 kV safeguards buses are OPERABLE (applicable to Unit _ operation only); and

(3) this condition of inoperablility (i.e., two safeguards pumps inoperable simultaneously) may not exceed 7 days in any consecutive 30 day period.

b. One of the two required cooling water headers may be inoperable for 72 hours provided:

(1) the diesel-driven pump and the diesel generator associated with safety features on the OPERABLE header are OPERABLE.

(2) the horizontal motor driven pump associated with the OPERABLE header and the vertical motor-driven pump are OPERABLE.

c. One of the Safeguards Traveling Screens may be inoperable for 90 days provided a sluice gate connecting the Emergency Bay and the Circ Water Bay is open (except during periods of testing not to exceed 24 hours).

d. Both Safeguards Traveling Screens may be inoperable for 7 days provided a sluice gate connecting the Emergency Bay and the Circ Water Bay is open.

e. The Emergency Cooling Water line from the Mississippi River may be inoperable for 7 days provided that a sluice gate connecting the Emergency Bay and the Circ Water Bay is open.

TABLE TS.3.5-1 (continued)

ENGINEERED SAFETY INITIATION INSTRUMENTATION LIMITING SET POINTS

FUNCTIONAL UNIT	CHANNEL	LIMITING SET POINTS Unit 1	LIMITING SET POINTS Unit 2
10. 4KV Safeguards Busses Voltage Restoration	a. Degraded Voltage**		
	Voltage (% nominal)	90 ± 2	87.5 ± 3.5%
	Time Delay 1	8 ± 0.5 sec	8 ± 0.5 sec
	Time Delay 2	8 ± 0.5 to 60 ± 3 sec	8 ± 0.5 to 60 ± 3 sec
	b. Undervoltage		
	Voltage (% nominal)	75 ± 2.5%	75 ± 2.5%
	Time Delay	4 ± 1.5 sec	4 ± 1.5 sec

** Limiting setpoints are provided for both Unit 1 and Unit 2 in the interim between completion of electrical safeguards upgrades for Unit 2 and later completion of electrical safeguards upgrades for Unit 1.

TABLE TS.3.5-6

INSTRUMENT OPERATING CONDITIONS FOR AUXILIARY ELECTRICAL SYSTEM

FUNCTIONAL UNIT	1 MINIMUM OPERABLE CHANNELS	2 MINIMUM DEGREE OF REDUNDANCY	3 PERMISSIBLE BYPASS CONDITIONS	4 OPERATOR ACTION IF CONDITIONS OF COLUMN 1 OR 2 CANNOT BE MET
1. Degraded Voltage 4KV Safeguards Busses	3/Bus	2/Bus	---	Place inoperable channel in the tripped condition within one hour or be in hot shutdown.***
2. Undervoltage 4KV Safeguards Busses	3/Bus	2/Bus	---	Place inoperable channel in the tripped condition within one hour or be in hot shutdown.***

*** If minimum conditions are not met within 24 hours, steps shall be taken to place the unit in cold shutdown conditions.

3.7 AUXILIARY ELECTRICAL SYSTEMS

Applicability

Applies to the availability of electrical power for the operation of plant auxiliaries.

Objectives

To define those conditions of electrical power availability necessary to assure safe reactor operation and continuing availability of engineered safeguards.

Specification

A. A reactor shall not be made or maintained critical nor shall reactor coolant system average temperature exceed 200°F unless all of the following requirements are satisfied for the applicable unit (except as specified in 3.7.B below):

1. At least two separate paths from the transmission grid to the unit 4 kV safeguards distribution system each capable of providing adequate power to minimum safety related equipment, shall be OPERABLE.

2. The 4 kV safeguards buses 15 and 16 (Unit 2 buses: 25 and 26) shall be energized.

3. The 480 V safeguards buses 110 and 120 (Unit 2 buses: 211, 212, 221 and 222), and their safeguards motor control centers shall be energized.

4. Reactor protection instrument AC buses shall be energized: 111, 112, 113 and 114 (Unit 2 buses: 211, 212, 213 and 214).

5. The following unit specific conditions apply:

   (a) Unit 1: D1 and D2 diesel generators are OPERABLE, and a fuel supply of 51,000 gallons is available for the D1 and D2 diesel generators in the Unit 1 interconnected diesel fuel oil storage tanks. A total fuel supply of 70,000 gallons is available for the D1 and D2 diesel generators and the diesel-driven cooling water pumps in the Unit 1 interconnected diesel fuel oil storage tanks.

   (b) Unit 2: D5 and D6 diesel generators are OPERABLE and a fuel supply of 75,000 gallons is available for D5 and D6 diesel generators in the Unit 2 interconnected diesel fuel oil storage tanks.

6. Both batteries with their associated chargers and both d-c safeguard systems shall be OPERABLE.

7. No more than one of the Instrument AC Panels 111, 112, 113 and 114 (Unit 2 panels: 211, 212, 213 and 214) shall be powered from Panel 117 (Unit 2 panel: 217) or its associated instrument inverter bypass source.

3.7.B. During STARTUP OPERATION or POWER OPERATION, any of the following conditions of inoperability may exist for the times specified, provided STARTUP OPERATION is discontinued until OPERABILITY is restored. If OPERABILITY is not restored within the time specified, place the affected unit(s) in at least HOT SHUTDOWN within the next 6 hours and be in COLD SHUTDOWN within the following 30 hours.

1. One diesel generator may be inoperable for 7 days (total for both diesel generators during any consecutive 30 day period) provided (a) the OPERABILITY of the other diesel generator is demonstrated* by performance of surveillance requirement 4.6.A.1.e within 24 hours**, (b) all engineered safety features equipment associated with the operable diesel generator is OPERABLE, (c) the two required paths from the grid to the unit 4 kV safeguards distribution system are OPERABLE and (d) the OPERABILITY of the two required paths from the grid shall be verified OPERABLE within 1 hour and at least once per 8 hours thereafter.

2. One of the two required paths from the grid to the unit 4 kV safeguards distribution system may be inoperable for 7 days provided (a) D1 and D2 (Unit 2: D5 and D6) diesel generators are already operating or are demonstrated to be OPERABLE by sequentially performing surveillance requirement 4.6.A.1.e on each diesel generator within 24 hours and (b) the OPERABLE path from the grid shall be verified OPERABLE within 1 hour and at least once per 8 hours thereafter.

3. One of the two required paths from the grid to the unit 4 kV safeguards distribution system and one diesel generator may be inoperable for 12 hours provided, (a) the OPERABILITY of the other diesel generator is demonstrated* by performance of Surveillance Requirement 4.6.A.1.e within 8 hours**, (b) all engineered safety features equipment associated with the OPERABLE diesel generator is OPERABLE, and (c) the OPERABLE path from the grid shall be verified OPERABLE within 1 hour and at least once per 8 hours thereafter.

4. Both of the two required paths from the grid to the unit 4 kV safeguards distribution system may be inoperable for 12 hours provided the D1 and D2 (Unit 2: D5 and D6) diesel generators are already operating or are demonstrated to be OPERABLE by sequentially performing Surveillance requirement 4.6.A.1.e on each diesel generator within 8 hours.

* The OPERABILITY of the other diesel generator need not be demonstrated if the diesel generator inoperability was due to preplanned preventative maintenance or testing.

** This test is required to be completed regardless of when the inoperable diesel generator is restored to OPERABILITY.

3.7.B.5. D1 and D2 (Unit 2: D5 and D6) diesel generators may be inoperable for 2 hours provided the two required paths from the grid to the unit 4 kV safeguards distribution system are OPERABLE and the OPERABILITY of the two required paths from the grid are verified OPERABLE within 1 hour.

6. One 4 kV safeguards bus (and its associated 480 V bus (Unit 2: buses) including associated safeguards motor control centers) or one 480 V safeguards bus including associated safeguards motor control centers may be inoperable or not fully energized for 8 hours provided the redundant 4 kV safeguards bus and its associated 480 V safeguards bus (Unit 2: buses) are verified OPERABLE and the diesel generator and safeguards equipment associated with the redundant train are OPERABLE.

7. One battery charger may be inoperable for 8 hours provided, (a) its associated battery is OPERABLE, (b) its redundant counterpart is verified OPERABLE, and (c) the diesel generator and safeguards equipment associated with its counterpart are OPERABLE.

8. One battery may be inoperable for 8 hours provided that the other battery and both battery chargers remain OPERABLE.

9. In addition to the requirements of Specification TS.3.7.A.7 a second inverter supplying Instrument AC Panels 111, 112, 113, and 114 may (Unit 2 panels 211, 212, 213 and 214) be powered from an inverter bypass source for 8 hours.

3. Containment Fan Coolers

Each fan cooler unit shall be tested during each reactor refueling shutdown to verify proper operation of all essential features including low motor speed, cooling water valves, and normal ventilation system dampers. Individual unit performance will be monitored by observing the terminal temperatures of the fan coil unit and by verifying a cooling water flow rate of greater than or equal to 900 gpm to each fan coil unit.

4. Component Cooling Water System

a. System tests shall be performed during each reactor refueling shutdown. Operation of the system will be initiated by tripping the actuation instrumentation.

b. The test will be considered satisfactory if control board indication and visual observations indicate that all components have operated satisfactorily.

5. Cooling Water System

a. System tests shall be performed at each refueling shutdown. Tests shall consist of an automatic start of each diesel engine, automatic start of the vertical motor-driven cooling water pump and automatic operation of valves required to mitigate accidents including those valves that isolate non-essential equipment from the system. Operation of the system will be initiated by a simulated accident signal to the actuation instrumentation. The tests will be considered satisfactory if control board indication and visual observations indicate that all components have operated satisfactorily and if cooling water flow paths required for accident mitigation have been established.

b. At least once each 18 months, subject each diesel engine to a thorough inspection in accordance with procedures prepared in conjunction with the manufacturer's recommendations for this class of standby service.

4.5.B. Component Tests

1 Pumps

a. The safety injection pumps, residual heat removal pumps and containment spray pumps shall be started and operated at intervals of one month. Acceptable levels of performance shall be that the pumps start and reach their required developed head on minimum recirculation flow and the control board indications and visual observations indicate that the pumps are operating properly for at least 15 minutes.

b. A test consisting of a manually-initiated start of each diesel engine, and assumption of load within one minute, shall be conducted monthly.

c. The vertical motor-driven cooling water pump shall be operated at quarterly intervals. An acceptable level of performance shall be that the pump starts and reaches its required developed head and the control board indictions and visual observations indicate that the pump is operating properly for at least 15 minutes.

2. Containment Fan Motors

The Containment Fan Coil Units shall be run on low motor speed for at least 15 minutes at intervals of one month. Motor current shall be measured and compared to the nominal current expected for the test conditions.

3. Valves

a. The refueling water storage tank outlet valves shall be tested in accordance with Section 4.2.

b. The accumulator check valves will be checked for OPERABILITY during each refueling shutdown.

c. The boric acid tank valves to the Safety Injection System shall be tested at intervals of one month.

d. The sprey chemical additive tank valves shall be cycled by operator action at intervals of one month.

e. Actuation circuits for Cooling Water System valves that isolate non-essential equipment from the system shall be tested monthly.

f. All motor-operated valves in the SIS, RHR, Containment Spray, Cooling Water, and Component Cooling Water System that are designed for operation during the safety injection or recirculation phase of emergency core cooling, shall be tested for OPERABILITY at each refueling shutdown.

4.5.B.3.g. The correct position of the throttle valves below shall be verified as follows:

1. Within 4 hours following completion of each valve stroking operation
2. Within 4 hours following maintenance on the valve when the Safety Injection System is required to be OPERABLE, and
3. Periodically at least once per 18 months to the extent not verified in accordance with 1 and 2 above within this time period.

Unit 1 Valves	Unit 2 Valves
SI-15-6	2SI-15-6
SI-15-7	2SI-15-7
SI-15-8	2SI-15-8
SI-15-9	2SI-15-9

h. Following completion of high head Safety Injection System or RHR system modifications that alter system flow characteristics a flow balance test shall be performed during shutdown to confirm the following injection flow rates are achieved:

1. High Head Safety Injection System:

(a) Flow through all four injection lines plus miniflow shall not exceed 835 gpm with one pump in operation.

(b) The minimum flow through loop A & B cold legs shall be 670 gpm with one pump in operation. The flow rates in each leg shall be within 20 gpm of each other with one pump in operation.

(c) Flow orifices and throttling valves will be used to limit and balance flow through the reactor vessel injection lines to a maximum of the total flow limit in Specification 4.5.B.3.h.1.(a) above, with one pump in operation. During this flow test the flow rates in each leg shall be within 50 gpm of each other.

2. RHR System:

The minimum flow through each RHR Reactor Vessel Injection line shall be at least 1800 gpm.

4.6 PERIODIC TESTING OF EMERGENCY POWER SYSTEM

Applicability

Applies to periodic testing and surveillance requirements of the emergency power system.

Objective

To verify that the emergency power sources and equipment are OPERABLE.

Specification

The following tests and surveillance shall be performed:

A. Diesel Generators

1. At least once each month, for each diesel generator:

a. Verify the fuel level in the day tank.

b. Verify the fuel level in the fuel storage tank.

c. Verify that a sample of diesel fuel from the fuel storage tank is within the acceptable limits specified in Table 1 of ASTM D975-77 when checked for viscosity, water, and sediment.

d. Verify the fuel transfer pump can be started and transfers fuel from the storage system to the day tank.

e. Verify the diesel generator can start and gradually accelerate to synchronous speed with generator voltage and frequency at 4160 ± 420 volts and 60 ± 1.2 Hz. Subsequently, manually synchronize the generator, gradually load to at least 1650 kW (Unit 2: 5100 kW to 5300 KW), and operate for at least 60 minutes. This test should be conducted in accordance with the manufacturer's recommendations regarding engine prelube, warm-up, loading and shutdown procedures where possible.

4.6.A.2. At least once each 6 months, for each diesel generator:

a. Verify the diesel generator starts and accelerates to at least synchronous speed in less than or equal to 10 seconds.

b. Verify the generator voltage and frequency to be 4160 ± 420 volts and 60 ± 1.2 Hz within 10 seconds after the start signal.

c. Manually synchronize the generator, load to at least 1650 kW (Unit 2: 5100 kW to 5300 kW) in less than or equal to 60 seconds and operate for at least one hour.

d. This test should be conducted in accordance with the manufacturer's recommendations regarding engine prelube and shutdown procedures where possible.

3. At least once each 18 months:

a. Subject each diesel generator to a thorough inspection in accordance with procedures prepared in conjunction with the manufacturer's recommendations for this class of standby service.

b. For each unit, simulate a loss of offsite power in conjunction with a safety injection signal, and:

1. Verify de-energization of the emergency buses and load shedding from the emergency buses.

2. Verify the diesels start on the auto-start signal and energize the emergency buses in one minute. This test should be conducted in accordance with the manufacturer's recommendations regarding engine prelube and shutdown procedures where possible.

3. Verify that the auto-connected loads do not exceed 3000 kw (Unit 2: 5100 kW).

4. Verify that the diesel generator system trips, except those for engine overspeed, ground fault, and generator differential current, are automatically bypassed.

c. Verify the capability of each generator to operate at least one hour while loaded to 3000 kw (Unit 2: 5100 kW to 5300 kW).

d. Verify the capability of each generator to reject a load of at least 650 kw (Unit 2: 860 kw) without tripping.

e. During this test, operation of the emergency lighting system shall be ascertained.

3.3 ENGINEERED SAFETY FEATURES

Bases continued

The containment cooling function is provided by two independent systems: containment fan cooler units and containment sprays. During normal operation, four containment fan cooler units are utilized to remove heat lost from equipment and piping within the containment. In the event of the Design Basis Accident, any one of the following combinations will provide sufficient cooling to reduce containment pressure: four containment fan cooler units, two containment spray pumps or two containment fan cooler units plus one containment spray pump (Reference 4). Two of the four containment fan cooler units are permitted to be inoperable during POWER OPERATION. This is an abnormal operating situation, in that plant operating procedures require that inoperable containment fan cooler units be repaired as soon as practical. However, because of the difficulty of access to make repairs, it is important on occasion to be able to operate temporarily with only two containment fan cooler units. Two containment fan cooler units can provide adequate cooling for normal operation when the containment fan cooler units are cooled by the chilled water system (Reference 3). Compensation for this mode of operation is provided by the high degree of redundancy of containment cooling systems during a Design Basis Accident.

One component cooling water pump together with one component cooling heat exchanger can accommodate the heat removal load on one unit, either following a loss-of-coolant accident or during normal plant shutdown. The four pumps of the two-unit facility can be cross connected as necessary to accommodate temporary outage of the pump. If, during the post-accident phase, the component cooling water supply were lost, core and containment cooling could be maintained until repairs were effected (Reference 5).

Cooling water can be supplied by either of the two horizontal motor-driven pumps, by a safeguards motor-driven pump or by either of two safeguards diesel-driven pumps. (Reference 6). Operation of a single cooling water pump provides sufficient cooling in one unit during the injection and recirculation phases of a postulated loss-of-coolant accident plus sufficient cooling to maintain the second unit in a hot standby condition.

TS.3.3.D.1.a assures that an automatic Safety Injection signal to the cooling water header isolation valves will not align both OPERABLE safeguards pumps to the same safeguards train.

TS.3.3.D.1.a also assures that 121 cooling water pump is aligned to provide cooling water to the same train as the train from which it is being powered (e.g., if 121 cooling water pump is aligned to Train B cooling water header, it needs to be powered from Bus 26 and, ultimately, Diesel Generator D6 in the event of a loss of offsite power). Otherwise, the single failure of a diesel generator could leave one train of engineered safety features without power and the other train without cooling water.

The minimum fuel supply of 19,000 gallons will supply one diesel-driven cooling water pump for 14 days. Note that the 19,000 gallon requirement is included in the 70,000 gallon total diesel fuel oil requirement of Specification 3.7.A.5 for Unit 1.

3.3 ENGINEERED SAFETY FEATURES

Bases continued

The Safeguards Traveling Screens and Emergency Cooling Water Supply line are designed to provide a supply of screened cooling water in the event that an earthquake 1) destroys Dam No. 3 (dropping the water level in the normal canal to the screenhouse) and 2) causes the banks bordering the normal canal to the screenhouse to collapse eliminating the river as a source of cooling water. The Safeguards Traveling Screens and Emergency Cooling Water Supply line provide an alternate supply of water to the Safeguards Bay, which contains the two diesel driven and the one vertical motor driven cooling water pumps. Their normal supply is from the Circ Water Bay thru one of two sluice gates. Either one of the two sluice gates or one of the two Safeguards Traveling Screens will adequately supply any of the three cooling water pumps. The Safeguards Traveling Screens are not considered part of the "engineered safety features associated with the operable diesel-driven cooling water pump" for determination of operability of diesel-driven cooling water pumps.

The component cooling water system and the cooling water system provide water for cooling components used in normal operation, such as turbine generator components, and reactor auxiliary components in addition to supplying water for accident functions. These systems are designed to automatically provide two separate redundant paths in each system following an accident. Each redundant path is capable of cooling required components in the unit having the accident and in the operating unit.

There are several manual valves and manually-controlled motor-operated valves in the engineered safety feature systems that could, if one valve is improperly positioned, prevent the required injection of emergency coolant (Reference 7). These valves are used only when the reactor is subcritical and there is adequate time for actuation by the reactor operator. To ensure that the manual valve alignment is appro- priate for safety injection during power operation, these valves are tagged and the valve position will be changed only under direct administrative control. For the motor-operated valves, the motor control center supply breaker is physically locked in the open position to ensure that a single failure in the actuation circuit or power supply would not move the valve.

References

1. USAR, Section 3.3.2
2. USAR, Section 14.6.1
3. USAR, Section 6.3.2
4. USAR, Section 6.3
5. USAR, Section 10.4.2
6. USAR Section 10.4.1
7. USAR, Figure 6.2-1
   USAR, Figure 6.2-2
   USAR, Figure 6.2-5
   USAR, Figure 10.2-11

3.5 INSTRUMENTATION SYSTEM

Bases continued

Steam Line Isolation (continued)

line flow in coincidence with low T_{avg} and safety injection or high steam flow (Hi-Hi) in coincidence with safety injection. Adequate protection is afforded for breaks inside or outside the containment even when it is assumed that the steam line check valves do not function properly.

Containment Ventilation Isolation

Valves in the containment purge and inservice purge systems automatically close on receipt of a Safety Injection signal or a high radiation signal. Gaseous and particulate monitors in the exhaust stream or a gaseous monitor in the exhaust stack provide the high radiation signal.

Ventilation System Isolation

In the event of a high energy line rupture outside of containment, redundant isolation dampers in certain ventilation ducts are closed (Reference 4).

Safeguards Bus Voltage

Relays are provided on buses 15, 16, 25, and 26 to detect undervoltage and degraded voltage (the voltage level at which safety related equipment may not operate properly). Relays are not provided on 4 kV safeguards bus 27 to detect undervoltage and degraded voltage since voltage is monitored on the 4 kV source safeguards bus (i.e., bus 25 or bus 26) to which it is connected. Upon receipt of an undervoltage signal the automatic voltage restoring scheme is actuated after a short time delay which prevents actuation during normal transients (such as motor starting) and which allows protective relaying operation during faults. When degraded voltage is sensed, two time delays are actuated. The first time delay is long enough to allow for normal transients. The first time delay annunciates that a sustained degraded voltage condition exists and enables logic which will ensure that voltage and timing are adequate for safety injection loads by automatically performing the following upon receipt of a safety injection signal:

1. Auto start the diesel generator;
2. Separate the bus from the grid;
3. Load the bus onto the diesel generator; and
4. Start the load sequencer (including safety injection loads).

3.5 INSTRUMENTATION SYSTEM

Bases continued

The second longer time delay is used to allow the degraded voltage condition to be corrected by external actions within a time period that will not cause damage to operating equipment. If voltage is not restored within that time period, the logic automatically performs the following:

1. Auto start the diesel generator;
2. Separate the bus from the grid;
3. Load the bus onto the diesel generator; and
4. Start the load sequencer.

Auxiliary Feedwater System Actuation

The following signals automatically start the pumps and open the steam admission control valve to the turbine driven pump of the affected unit:

1. Low-low water level in either steam generator
2. Trip of both main feedwater pumps
3. Safety Injection signal
4. Undervoltage on both 4.16 kV normal buses (turbine driven pump only)

Manual control from both the control room and the Hot Shutdown Panel are also available. The design provides assurance that water can be supplied to the steam generators for decay heat removal when the normal feedwater system is not available.

Limiting Instrument Setpoints

1. The high containment pressure limit is set at about 10% of the maximum internal pressure. Initiation of Safety Injection protects against loss of coolant (Reference 2) or steam line break accidents as discussed in the safety analysis.

2. The Hi-Hi containment pressure limit is set at about 50% of the maximum internal pressure for initiation of containment spray and at about 30% for initiation of steam line isolation. Initiation of Containment Spray and Steam Line isolation protects against large loss of coolant (Reference 2) or steam line break accidents (Reference 3) as discussed in the safety analysis.

3. The pressurizer low pressure limit is set substantially below system operating pressure limits. However, it is sufficiently high to protect against a loss of coolant accident as shown in the safety analysis (Reference 2).

3.5 INSTRUMENTATION SYSTEM

Bases continued

Limiting Instrument Setpoints (continued)

4. The steam line low pressure signal is lead/lag compensated and its set-point is set well above the pressure expected in the event of a large steam line break accident as shown in the safety analysis (Reference 3).

5. The high steam line flow limit is set at approximately 20% of nominal full-load flow at the no-load pressure and the high-high steam line flow limit is set at approximately 120% of nominal full-load flow at the full load pressure in order to protect against large steam break accidents. The coincident low T_{avg} setting limit for steam line isolation initiation is set below its hot shutdown value. The safety analysis shows that these settings provide protection in the event of a large steam break (Reference 3).

6. Steam generator low-low water level and 4.16 kV Bus 11 and 12 (21 and 22 in Unit 2) low bus voltage provide initiation signals for the Auxiliary Feedwater System. Selection of these setpoints is discussed in the Bases of Section 2.3 of the Technical Specification.

7. High radiation signals providing input to the Containment Ventilation Isolation circuitry are set in accordance with the Radioactive Effluent Technical Specifications. The setpoints are established to prevent exceeding the limits of 10 CFR Part 20 at the SITE BOUNDARY.

8. The degraded voltage protection setpoint is 90± 2% (Unit 2: 87.5± 3.5%) of nominal 4160 V bus voltage. Testing and analysis have shown that all safeguards loads will operate properly at or above the minimum degraded voltage setpoint. The maximum degraded voltage setpoint is chosen to prevent unnecessary actuation of the voltage restoring scheme at the minimum expected grid voltage. The first degraded voltage time delay of 8 ± 0.5 seconds has been shown by testing and analysis to be long enough to allow for normal transients (i.e., motor starting and fault clearing). It is also longer than the time required to start the safety injection pump at minimum voltage. The second degraded voltage time delay is provided to allow the degraded voltage condition to be corrected within a time frame which will not cause damage to permanently connected Class 1E loads.

3.5 INSTRUMENTATION SYSTEM

Bases continued

Limiting Instrument Setpoints (continued)

The undervoltage setpoint is 75 ± 2.5% of nominal bus voltage. The minimum setpoint ensures equipment operates above the limiting value of 75% (of 4000 V) for one minute operation. The 75% maximum setpoint is chosen to prevent unnecessary actuation of the voltage restoring scheme during voltage dips which occur during motor starting. The undervoltage time delay of 4 ± 1.5 seconds has been shown by testing and analysis to be long enough to allow for normal transients and short enough to operate prior to the degraded voltage logic, providing a rapid transfer to an alternate source.

Instrument Operating Conditions

During plant operations, the complete instrumentation systems will normally be in service. Reactor safety is provided by the Reactor Protection System, which automatically initiates appropriate action to prevent exceeding established limits. Safety is not compromised, however, by continuing operation with certain instrumentation channels out of service since provisions were made for this in the plant design. This specification outlines limiting conditions for operation necessary to preserve the effectiveness of the Reactor Control and Protection System when any one or more of the channels is out of service.

Almost all reactor protection channels are supplied with sufficient redundancy to provide the capability for CHANNEL CALIBRATION and test at power. Exceptions are backup channels such as reactor coolant pump breakers. The removal of one trip channel on process control equipment is accomplished by placing that channel bistable in a tripped mode; e.g., a two-out-of-three circuit becomes a one-out-of-two circuit. The source and intermediate range nuclear instrumentation system channels are not intentionally placed in a tripped mode since these are one-out-of-two trips, and the trips are therefore bypassed during testing. Testing does not trip the system unless a trip condition exists in a concurrent channel

References

1. USAR, Section 7.4.2
2. USAR, Section 14.6.1
3. USAR, Section 14.5.5
4. FSAR, Appendix I

3.7 AUXILIARY ELECTRICAL SYSTEM

Bases

The intent of this specification is to provide assurance that at least one external source and one standby source of electrical power is always available to accomplish safe shutdown and containment isolation and to operate required engineered safeguards equipment following an accident.

Plant auxiliary power can be supplied from four separate external power sources which have multiple off-site network connections: the reserve transformer from the 161 kV portion of the plant substation; the second reserve transformer from the 345 kV portion of the plant substation and the two cooling tower transformers, one of which is supplied from a tertiary winding on the substation auto transformer, and the other directly from the 345 kV switchyard. Any one of the four sources is sufficient, under analyzed conditions, to supply all the necessary accident and post-accident load requirements for one reactor, along with the shutdown of the second reactor.

Each source separately supplies the safeguards buses in such manner that items of equipment which are redundant to each other are supplied by separate sources and buses.

Each diesel generator, D1 or D2 (Unit 2: D5 or D6), is connected to its associated 4160 volt safeguards bus in Unit 1 (Unit 2) and each diesel generator has sufficient capacity to start sequentially and operate the safeguards equipment supplied by its associated bus. The set of safeguards equipment items supplied by each bus is, alone, sufficient to maintain adequate cooling of the fuel and to maintain containment pressure within the design value in the event of a loss-of-coolant accident.

If no offsite source is available to the associated bus, each diesel starts automatically upon receipt of an undervoltage signal on its associated bus. Both diesel generators start in the event of a safety injection signal for the reactor. The minimum fuel supply of 51,000 gallons will supply one Unit 1 diesel generator for 14 days. Note that the 51,000 gallon requirement is included in the 70,000 gallon total requirement for Unit 1. The total fuel supply of 70,000 gallons will supply one diesel-driven cooling water pump and one Unit 1 diesel generator (loaded per USAR Table 8.4-1) for greater than 14 days (Unit 2: A fuel supply of 61,300 gallons will supply one Unit 2 diesel generator for 7 days at rated load calculated per the conservative method of ANSI-N195-1976. A minimum fuel supply of 75,000 gallons was conservatively chosen to supply one Unit 2 diesel generator for 14 days calculated per the time-dependent method of ANSI-N195-1976.) Additional diesel fuel can normally be obtained within a few hours. This assures an adequate supply even in the event of the probable maximum flood.

3.7 AUXILIARY ELECTRICAL SYSTEM

Bases continued

Following the inoperability of a Diesel Generator, the redundant diesel generator is tested to prove that the cause of the inoperability does not affect both diesel generators. However, if the diesel generator is inoperable due to preplanned preventative maintenance, operability of the redundant diesel generator does not need to be proven.

The plant 125 volt d-c power is normally supplied by two batteries for each plant, each of which will have a battery charger in service to maintain full charge and to assure adequate power for starting the diesel generators and supplying other emergency loads.

The arrangement of the auxiliary power sources and equipment and this specification assure that no single fault condition will deactivate more than one redundant set of safeguard equipment items in one reactor and will therefore not result in failure of the plant protection system to respond adequately to a loss-of-coolant accident.

Reference

USAR, Section 8
USAR, Figure 8.2-2

4.6 PERIODIC TESTING OF EMERGENCY POWER SYSTEMS

Bases

The monthly tests specified for the diesel generators will demonstrate their continued capability to start and to carry load. The fuel supplies and starting circuits and controls are continuously monitored, and abnormal conditions in these systems would be alarm-indicated without need for test startup.

The less frequent overall system test will demonstrate that the emergency power system and the control systems for the engineered safeguards equipment will function automatically in the event of loss of all other sources of a-c power, and that the diesel generators will start automatically in the event of a loss-of-coolant accident. This test will demonstrate proper tripping of motor feeder breakers, main supply and tie breakers on the affected bus, and sequential starting of essential equipment, as well as the OPERABILITY of the diesel generators. The load rejection test will demonstrate the capability to reject the single largest emergency load without tripping.

The specified test frequencies provide reasonable assurance that any mechanical or electrical deficiency will be detected and corrected before it can result in failure of one emergency power supply to respond when called upon to function. It's possible failure to respond is, of course, anticipated by providing two diesel generators per unit, each supplying, through an independent bus, a complete and adequate set of engineered safeguards equipment. Further, both diesel generators are provided as backup to multiple sources of external power, and this multiplicity of sources should be considered with regard to adequacy of test frequency.

Each diesel generator can start and be ready to accept full load within 10 seconds, and will sequentially start and supply the power requirements for one complete set of safeguards equipment in approximately one minute (Reference 1).

An internal fault in the generator could damage the generator severely. Moreover, this change complies with BTP EICSB 17. Auto-connected loads should not exceed the overload rating of the diesel generator for the 2000 hour maintenance interval, as prescribed in Regulatory Guide 1.9.

Station batteries will deteriorate with time, but precipitous failure is extremely unlikely. The surveillance specified is that which has been demonstrated over the years to provide indication of a cell becoming unserviceable long before it fails.

If a battery cell has deteriorated, or if a connection is loose, the voltage under load will drop excessively, indicating need for replacement or maintenance.