ATTACHMENT I TO IPN-99-009

PROPOSED TECHNICAL SPECIFICATION CHANGES REGARDING REQUIRED NUMBER OF EMERGENCY DIESEL GENERATORS IN COLD SHUTDOWN

Affected Technical Specification pages:

3.7-3a
3.7-3b (re-pagination)
3.7-4
3.7-4a
3.7-4b (re-pagination)
3.7-5 (re-pagination)
3.7-5a (re-pagination)
3.7-6

NEW YORK POWER AUTHORITY
INDIAN POINT 3 NUCLEAR POWER PLANT
DOCKET NO. 50-286
DPR-64

4. Two operable diesel generators together with total underground storage containing a minimum of 6671 gallons of fuel. It is permissible to have only one operable diesel generator together with total underground storage containing a minimum of 6671 gallons provided that: (1) the reactor is in cold shutdown or refueling and has been subcritical for at least 5 days AND (2) the water level in the refueling cavity above the top of the reactor vessel flange is equal to or greater than 23 feet OR no fuel is in the reactor or refueling cavity.

5. If either of the required diesel generators specified in 3.7.F.4 for cold shutdown are not operable, when two are required to be operable, then the following actions should be pursued without delay and in a controlled manner:

   a. Initiate action to suspend operations involving positive reactivity additions. However, this does not preclude actions to maintain or increase reactor vessel or reactor cavity inventory provided the required SDM is maintained.
   AND

   b. Initiate actions to restore the required diesel generator to operable status.

6. If the one required diesel generator specified in 3.7.F.4 for cold shutdown is not operable, then the following actions should be pursued without delay and in a controlled manner:

   a. Suspend all core alterations.
   AND

   b. Suspend movement of irradiated fuel assemblies.
   AND

   c. Initiate actions to suspend operations involving positive reactivity additions. However, this does not preclude actions to maintain or increase reactor vessel or reactor cavity inventory provided the required SDM is maintained.
   AND

   d. Initiate action to restore the required diesel generator to operable status.

G. When a system, subsystem, train, component or device is determined to be inoperable solely because its emergency power source is inoperable, or solely because its normal power source is inoperable, it may be considered operable for the purpose of satisfying the requirements of its applicable specification provided: (1) its corresponding normal or emergency power source is operable; and (2) all of its redundant system(s), subsystem(s), train(s), components(s) and device(s) are operable or likewise satisfy the requirements of the specification.

Basis

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. The 6900-volt equipment is supplied from 6 buses.

The Buchanan Substation has both 345 KV and 138 KV transmission circuits which are capable of supplying startup, normal operation, shutdown and/or engineered safeguards loads.

The 138 KV supplies or the gas turbines are capable of providing sufficient power for plant startup. Power via the station auxiliary transformer can supply all the required plant auxiliaries during normal operation, if required.

In addition to the unit transformer, four separate sources supply station service power to the plant.[1]

The plant auxiliary equipment is arranged electrically so that multiple items receive their power from different buses. Redundant valves are individually supplied from separate motor control centers.

The bus arrangements specified for operation ensure that power is available to an adequate number of safeguards auxiliaries. With additional switching, more equipment could be out of service without infringing on safety. In the case of a Loss of Offsite Power (LOOP) event when the reactor has been subcritical for at least 5 days and only one diesel generator is operable, having two of the four 480-volt buses energized means the single, operable diesel generator would energize its associated 480-volt bus. The other 480-volt buses would subsequently be energized by this single diesel generator through manual closure of 480-volt bus tie breakers as required for safe shutdown load management purposes.

Two diesel generators have sufficient capacity to start and run within design load the minimum required engineered safeguards equipment.(1) The minimum onsite underground stored diesel fuel oil inventory is maintained at all times to assure the operation of two diesels carrying the minimum required engineered safeguards equipment load for at least 48 hours.(2) The minimum required storage tank volume (when above cold shutdown) of 6671 gallons is the minimum volume required when sounding the tanks to obtain level information. This volume includes allowances for fuel not usable due to the oil transfer pump cutoff switch (760 gallons) and a safety margin (20 gallons). If the installed level indicators are used to measure tank volume, 6721 gallons of oil (6671 gallons plus the 50 gallon uncertainty assoicated with the level indicators) must be in each storage tank.

When in cold shutdown, two diesel generators must be operable with a total undergound storage of 6671 gallons of fuel oil. Only one diesel generator is required to be operable in cold shutdown or refueling, when the reactor has been subcritical for 5 days or greater, because it is able to power the necessary safe shutdown loads and maintain diesel loading within the 1750 KW continuous loading and 2 hour 1950 KW peak loading requirements. The reactor being subcritical for at least 5 days provides for operator action, in the case of a LOOP, to manually restore decay heat removal loads prior to heatup, from 140 to 200 degrees F occurring when the reactor cavity is flooded up or the spent fuel pool is completely loaded with fuel. The need to have the reactor cavity flooded to at least 23 feet above the flange OR no fuel in the reactor or cavity accounts for having sufficient water inventory for effective decay heat removal until RHR or Spent Fuel Pool cooling can be restored in the case of a LOOP event with one operable EDG. Operators are expected to restore RHR or Spent Fuel Pool cooling in the case of a LOOP event well within the 3 hours plus allowable time frame, which provides sufficient margin in the worst case when in cold shutdown and the reactor has been subcritical for 5 days. It is acceptable for 480 V emergency power trains to be cross tied during cold shutdown and refueling conditions, allowing a single power circuit to supply all required trains.

The AC sources required to be operable in cold shutdown and refueling provide assurance that: (1) Systems which provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core, (2) Systems needed to mitigate a fuel handling accident are available, (3) Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available and (4) Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown or refueling condition.

The Action Statements listed in LCO 3.7.F.5 and 3.7.F.6 are provided for specific operator guidance on those restrictions which are pursued without delay in response to the loss of a required on-site EDG power source. With the required on-site EDG(s) inoperable, the minimum required diversity of AC power sources is not available. It is therefore required to suspend core alterations, movement of irradiated fuel assemblies, and operations involving positive reactivity additions. Suspension of these activities does not preclude completion of those actions necessary to establish a safe condition. These actions minimize the probability or the occurrence of postulated events. It is further required to initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the required safety systems.

The same methodology used to measure fuel volume above cold shutdown should be used. Additional fuel oil suitable for use in the diesel generators will be stored either on site or at the Buchanan Substation. The minimum storage of 30,026 gallons of additional fuel oil will assure continuous operation of two diesels at the minimum engineered safeguards load for a total of 7 days. A truck with hosing connections compatible with the underground diesel fuel oil storage tanks is available for transferal of diesel oil from storage areas either on site or at the Buchanan Substation. Commercial oil supplies and trucking facilities are also available.

Periodic diesel outages will be necessary to perform the corrective maintenance required as a result of previous tests or operations and the preventive maintenance recommended by the manufacturer. If a diesel generator is out of service due to preplanned preventive maintenance or testing, special surveillance testing of the remaining diesel generators is not required because the required periodic surveillance testing suffices to provide assurance of their operability. The fact that preplanned corrective maintenance is sometimes performed in conjunction with this preventive maintenance or testing does not necessitate that the remaining diesels be tested, because this corrective maintenance is on defects or potential defects that never called diesel operability into question. If a diesel generator defect or operability concern is discovered while performing this preplanned preventive maintenance or testing, the concern or defect is evaluated to determine if the same concern or defect could render the remaining diesel generators inoperable. Unless this evaluation determines that the potential for the defect or concern to effect the remaining diesel generators has been eliminated, performance of a surveillance test on each of the remaining diesel generators provides adequate assurance of their operability.

One battery charger 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. This insures that adequate D.C. power will be available for starting the emergency generators and other emergency uses.

The plant can be safely shutdown without the use of offsite power since all vital loads (safety systems, instruments, etc.) can be supplied from the emergency diesel generators.

Any two of three diesel generators, the station auxiliary transformer or the separate 13.8 to 6.9 KV transformer are each capable of supplying the minimum safeguards loads, and therefore provide separate sources of power immediately available for operation of these loads. Thus the power supply system meets the single failure criteria required of safety systems. To provide maximum assurance that the redundant or alternate power supplies will operate if required to do so, the redundant or alternate power supplies are verified operable prior to initiating repair of the inoperable power supply. Continued plant operation is governed by the specified allowable time period for the power source, not the specified allowable time period for those items determined to be inoperable solely because of the inoperability of its normal or emergency power source provided the conditions defined in specification 3.7.G are satisfied. These conditions assure that the minimum required safeguards will be operable. If it develops that (a) the inoperable power supply is not repaired within the specified allowable time period, or (b) a second power supply in the same or related category is found to be inoperable, the reactor, if critical, will initially be brought to the hot shutdown condition utilizing normal operating procedures to provide for reduction of the decay heat from the fuel, and consequent reduction of cooling requirements after a postulated loss-of-coolant accident. If the reactor was already subcritical, the reactor coolant system temperature and pressure will be maintained within the stated values in order to limit the amount of stored energy in the Reactor Coolant System. The stated tolerances provide a band for operator control. After a limited time in hot shutdown, if the malfunction(s) are not corrected, the reactor will be brought to the cold shutdown condition, utilizing normal shutdown and cool-down procedures. In the cold shutdown condition there is no possibility of an accident that would damage the fuel elements or result in a release in excess of 10 CFR 100 and 10 CFR 50 dose limits.

Conditions of a system-wide blackout could result in a unit trip. Since normal off-site power supplies as required in Specification 3.7.A.1 are not available for startup, it is necessary to be able to black start the unit with gas turbines providing the incoming power supplies as a first step in restoring the system to an operable status and restoring power to customers for essential services. Specification 3.7.C provides for startup using 37 MW's of gas turbine power (nameplate rating at 80°F) which is sufficient to carry out a normal plant startup. A system-wide blackout is deemed to exist when the majority of Con Edison electric generating facilities are shutdown due to an electrical disturbance and the remainder are incapable of supplying the system therefore necessitating major load shedding.

Since the backup lighting supply is stripped on safety injection, the requirement that not more than one 120 volt A.C. instrument bus be energized from the backup lighting supply is to assure minimum operable containment spray actuation channels.

As a result of an investigation of the effect components that might become submerged following a LOCA may have on ECCS, containment isolation and other safety-related functions, a fuse and a locked open circuit breaker were provided on the electrical feeder to emergency lighting panel 318 inside containment. With the circuit breaker in the open position, containment electrical penetration H-70 is de-energized during the accident condition. Personnel access to containment may be required during power operation. Since it is highly improbable that a LOCA would occur during this short period of time, the circuit breaker may be closed during that time to provide emergency lighting inside containment for personnel safety.

When the 138 KV source of offsite power is out of service and the 13.8KV power source is being used to feed Buses 5 and 6, the automatic transfer of 6.9 KV Buses 1, 2, 3 and 4 to offsite power after a unit trip could result in overloading of the 20 MVA 13.8 KV/6.9 KV auto-transformer. Accordingly, the intent of specification 3.7.B.3 is to prevent the automatic transfer when only the 13.8 KV source of offsite power is available. However, this specification is not intended to preclude subsequent manual operations or bus transfers once sufficient loads have been stripped to assure that the 20 MVA auto-transformer will not be overloaded by these manual actions.

References

1) FSAR - Section 8.2.1
2) NYPA Calculation, IP3-CALC-EG-00217, Revision 3, dated May 25, 1994.
3) NYPA Calculation, IP3-CALC-EDG-02897, Revision 0, dated December 4, 1998
4) NYPA Evaluation, IP3-RPT-ED-02889, Revision 0, dated December 4, 1998
5) NYPA Calculation, IP3-CALC-RCS-02903, Revision 0, dated December 17, 1998
6) NYPA Calculation, IP3-CALC-SFPC-02959, Revision 0, dated January 15, 1999

ATTACHMENT II TO IPN-99-009

**SAFETY EVALUATION FOR
PROPOSED TECHNICAL SPECIFICATION CHANGES REGARDING
REQUIRED NUMBER OF EMERGENCY DIESEL
GENERATORS IN COLD SHUTDOWN**

NEW YORK POWER AUTHORITY
INDIAN POINT 3 NUCLEAR POWER PLANT
DOCKET NO. 50-286
DPR-64

SECTION I – BACKGROUND

Indian Point 3 (IP3) has identified an improvement in the Technical Specifications that would provide flexibility in reducing the duration of refueling outages, while still maintaining an acceptable level of safety. Indian Point 3 has three 480VAC emergency power trains, including an Emergency Diesel Generator (EDG) as a backup power source for each of the associated emergency power trains (as shown on IP3 Electrical Distribution simplified diagram per Enclosure 1). Current Auxiliary Electrical Systems Technical Specifications require two EDG's to be operable when in Cold Shutdown and Refueling operations. This causes maintenance on the EDG's to be completed in series, which could lengthen an outage and interfere with sequencing of activities. Based upon whether the preventative maintenance on the EDG's is of the 2,4,6,8,12 or 16 year variety, potential outage time savings is 6 to 10 days, with some or all of this possibly on critical path. The proposed change provides additional flexibility for outage management in these situations and minimizes the impact of the EDG maintenance on the outage schedule.

In reviewing the Westinghouse Standard Technical Specifications, NUREG 1431, the Limiting Condition for Operation (LCO) for Cold Shutdown and Refueling conditions, one EDG capable of supplying one train of the onsite Class 1E AC electrical power distribution subsystems is required to be operable. It is also acceptable for trains to be cross-tied during shutdown conditions, allowing a single offsite power circuit to supply all trains. The Standard Technical Specifications also describe, in the safety analysis for this LCO, that it is not required to assume a single failure along with a concurrent loss of offsite power when the unit is in Cold Shutdown or Refueling. The rationale for this is that many Design Basis Accidents (DBA's) analyzed in operating conditions from Hot Shutdown to 100 percent power have no specific analyses in Cold Shutdown and Refueling operations. Worst case bounding events are not deemed to be credible in Cold Shutdown and Refueling because the energy contained within the reactor pressure boundary, reactor coolant temperature/pressure and the corresponding stresses result in probabilities of DBA occurrence being significantly reduced or eliminated and ultimately in minimal consequences. These differences from DBA analysis assumptions and design requirements during Cold Shutdown and Refueling conditions are allowed by this LCO for the required safe shutdown systems.

A review to identify the systems and components required, under certain conditions, during both Cold Shutdown and Refueling at IP3 has been completed. This review demonstrates that it is possible to safely operate and to mitigate all applicable DBA's in Cold Shutdown and Refueling conditions with one EDG supplying various 480VAC emergency power trains via bus tie breakers. The review also showed that there is sufficient time (at least 3 hours plus) to restore reactor core/cavity decay heat removal and/or spent fuel pool cooling mechanisms upon loss of offsite power, via the one operable EDG supplying power to the necessary safety and non-safety related electrical loads on the various emergency power trains. NYPA has determined that operator action from the control room (CR), or with dedicated operators stationed at equipment outside the CR and in contact with CR, if CR controls inoperable, will enable the operating crew to align electrical power to the necessary components within one hour. An additional margin of one hour has been established for this operator action to successfully restore safe shutdown components. The calculated worst case heatup time of 3 hours plus for either the reactor cavity or SFP boiling to occur demonstrates that the two hours allowed for operator actions to restore electrical power is an acceptable time frame. Additionally, this review determined that the core must be subcritical for 5 days or greater to provide a time of 3 hours plus or greater to heatup the reactor cavity or the SFP from 140 to 200 degrees F, if a Loss of Offsite Power (LOOP) occurs and the one operable EDG is required to supply needed safe shutdown loads. Finally, this review verified the design function and operation of the 480VAC bus tie breakers and bus load sequencers to ensure minimal challenges to the operating crew in the event of a loss of offsite power in Cold Shutdown and Refueling. A key part of EDG operability is proper sequencing of loads when an automatic start is required. This includes the tripping of non-safety related loads as well.

The implementation plan for this change includes revising necessary operator procedures and the establishment of defense-in-depth outage contingency plans to ensure that both automatic load sequencing and manually started electrical loads are aligned and accounted for prior to implementing this Technical Specification change. Additionally, the implementation plan will include training operators and validating the one hour identified as margin for the operating crew.

Based upon the results of this detailed review, this submittal requests a change to Technical Specification 3.7.F to allow only one EDG to be operable in the Cold Shutdown and Refueling modes of plant operation contingent upon the reactor being subcritical for 5 days with the reactor cavity being filled at least 23 feet above the top of the reactor vessel flange OR no fuel in the reactor or refueling cavity.

SECTION II - DESCRIPTION OF PROPOSED CHANGES

This application for amendment to LCO 3.7.F.4, and the addition of LCO 3.7.F.5 & 6 as action statements to support 3.7.F.4 in the Indian Point 3 Technical Specifications, proposes to modify the number of required EDG's in the Cold shutdown and Refueling operational conditions. This proposed change is based on the guidance of the Standard Technical Specifications and is intended to allow parallel maintenance on two separate EDG's to reduce potential critical path time and reduce the overall length of an outage anywhere from 6 to 10 days for improved utility economic considerations, while maintaining acceptable plant safety levels. The current specification requires one offsite circuit to be operable, two of the four 480 VAC buses to be energized, and two EDG's to be operable in Cold Shutdown. The proposed change will allow one EDG, upon loss of the offsite circuit, to supply those 480 VAC bus loads necessary to provide safe shutdown and allow acceptable recovery time in the case of a LOOP event. Changes to the Technical Specification Basis in the Auxiliary Electrical Systems area are also proposed to further support this needed revision.

TECHNICAL SPECIFICATION LCO'S

Technical Specification LCO 3.7.F.4 currently states:

> "Two operable diesel generators together with total underground storage containing a minimum of 6671 gallons of fuel."

The proposed change to this Technical Specification is as follows:

> "Two operable diesel generators together with total underground storage containing a minimum of 6671 gallons of fuel. It is permissible to have only one operable diesel generator together with total underground storage containing a minimum of 6671 gallons provided that: (1) the reactor is in cold shutdown or refueling and has been subcritical for at least 5 days AND (2) the water level in the refueling cavity above the top of the reactor vessel flange is equal to or greater than 23 feet OR no fuel is in the reactor or refueling cavity.

The proposed addition of two new sections to Technical Specification LCO 3.7.F, namely 3.7.F.5 and 3.7.F.6 is as follows:

"3.7.F.5 If either of the required diesel generators specified in 3.7.F.4 for cold shutdown are not operable, when two are required to be operable, then the following actions should be pursued without delay and in a controlled manner:

1. Initiate action to suspend operations involving positive reactivity additions. However, this does not preclude actions to maintain or increase reactor vessel or reactor cavity inventory provided the required SDM is maintained.

   AND

2. Initiate actions to restore the required diesel generator to operable status."

"3.7.F.6 If the one required diesel generator specified in 3.7.F.4 for cold shutdown is not operable, then the following actions should be pursued without delay and in a controlled manner:

1. Suspend all core alterations.

   AND

2. Suspend movement of irradiated fuel assemblies.

   AND

3. Initiate actions to suspend operations involving positive reactivity additions. However, this does not preclude actions to maintain or increase reactor vessel or reactor cavity inventory provided the required SDM is maintained.

   AND

4. Initiate action to restore the required diesel generator to operable status."

TECHNICAL SPECIFICATION BASIS

Technical Specification Basis on page 3.7-4 currently states in part:

> "The bus arrangements specified for operation ensure that power is available to an adequate number of safeguard auxiliaries. With additional switching, more equipment could be out of service without infringing on safety."
>
> "When in cold shutdown, two diesel generators must be operable with a total underground storage of 6671 gallons of fuel oil."

The proposed changes and additions to the Technical Specification Basis, page 3.7-4, is as follows:

> "In case of a loss of offsite power (LOOP) event when the reactor has been subcritical for at least 5 days and only one diesel generators is operable, having two of the four 480-volt buses energized means the single, operable diesel generator would energize its associated 480-volt bus. The other 480-volt buses would subsequently be energized by this one diesel generator through manual closure of appropriate 480-volt bus tie breakers as required for safe shutdown load management purposes."
>
> "Only one diesel generator is required to be operable in cold shutdown or refueling, when the reactor has been subcritical for 5 days or greater, because it is able to power the necessary safe shutdown loads and maintain diesel loading within the 1750 KW continuous loading and 2 hour 1950 KW peak loading requirements. The reactor being subcritical for at least 5 days provides for operator action, in the case of a LOOP, to manually restore decay heat removal loads prior to heatup from 140 to 200 degrees F occurring when the reactor cavity is flooded up or the spent fuel pool is completely loaded with fuel. The need to have the reactor cavity flooded to at least 23 feet above the flange OR no fuel in the reactor or cavity accounts for having sufficient water inventory for effective decay heat removal until RHR or Spent Fuel Pool cooling can be restored in the case of a LOOP event with one operable EDG. Operators are expected to restore RHR or Spent Fuel Pool cooling in the case of a LOOP event well within the 3 hours plus allowable time frame, which provides sufficient margin in the worst case when in cold shutdown and the reactor has been subcritical for 5 days. It is acceptable for 480 V emergency power trains to be cross tied during cold shutdown and refueling conditions, allowing a single power circuit to supply all required trains."

The proposed addition to the Technical Specification Basis, page 3.7-4a, is as follows:

"The AC sources required to be operable in cold shutdown and refueling provide assurance that: (1) Systems which provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core, (2) Systems needed to mitigate a fuel handling accident are available, (3) Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available and (4) Instrumentation and control capability is available for monitoring and maintaining the unit in cold shutdown or refueling condition."

"The Action Statements listed in LCO 3.7.F.5 and 3.7.F.6 are provided for specific operator guidance on those restrictions which are pursued without delay in response to the loss of a required on-site EDG power source. With the required on-site EDG(s) inoperable, the minimum required diversity of AC power sources is not available. It is therefore required to suspend core alterations, movement of irradiated fuel assemblies, and operations involving positive reactivity additions. Suspension of these activities does not preclude completion of those actions necessary to establish a safe condition. These actions minimize the probability or the occurrence of postulated events. It is further required to initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the required safety systems. "

SECTION III – EVALUATION OF CHANGES

Summary

A review was performed to support this proposed change to the Technical Specification for Auxiliary Electrical Systems when in Cold Shutdown. This review supported the conclusion that the IP3 Nuclear Power Plant has the ability, during certain Cold Shutdown and Refueling plant operating conditions, with one EDG as a backup to the offsite power source(s) available, to maintain a safe shutdown condition and successfully mitigate analyzed DBA's, when the reactor has been subcritical for sufficient time to allow at least 3 hours plus for heatup of reactor cavity or spent fuel pool from 140 to 200 degrees F upon a loss of Residual Heat Removal (RHR) or Spent Fuel Pool (SFP) cooling. Previous IP3 operations experience and guidance in present operating procedures indicates that the operators have the ability to restore RHR or SFP Cooling well within the limiting time frame by manually closing 480 VAC bus tie breakers to cross connect the necessary 480 VAC buses. These bus tie breakers have actually been closed at IP3 due to previous LOOP scenarios, which have occurred in previous shutdown conditions. The proposed Technical Specification assures the availability of the necessary safe shutdown electrical equipment power under these conditions. Action statements for the revised Technical Specification will also provide for clarification of those needed operator actions in the case of the loss of one of two required EDG's or the only available EDG dependent upon whether one or two EDG's are required in cold shutdown or refueling conditions. These action statements call for actions to be taken without delay in these cases to ensure the necessary design safety functions are addressed in cold shutdown or refueling. These statements are derived largely from the standard Westinghouse Standard Technical Specifications, NUREG 1431, and are consistent with IP3 design requirements. These actions minimize the probability or the occurrence of postulated events. By use of these Technical Specification LCO action statements, the operators are provided with specific direction if the equipment (EDG's) required by specification 3.7.F.4 is inoperable.

A systematic approach was used in this review to logically address applicable plant system design and operation involved with justifying this Technical Specification change. Plant systems and components needed in Cold Shutdown and Refueling conditions were reviewed to determine whether they are capable of performing their accident mitigation functions in the case of a LOOP with one operable EDG powering the 480 VAC buses via manual bus tie breaker closures. The engineering review consisted of the following items:

* Identified the plant equipment (systems and components) required during both Cold Shutdown and Refueling conditions for mitigation of postulated events and for Technical Specification compliance. The attached Table 1 presents the results of this review.

* Performed a bus loading analysis/calculation to verify those loads associated with equipment needed for applicable DBA and LOOP mitigation during both Cold Shutdown and Refueling conditions. This calculation (IP3-CALC-EDG-02897) is discussed later. The attached Table 1 presents a brief summary of these approximate KW values along with the systems/components.

* Identified the necessary functions to be satisfied during an outage. These were derived from a review of design criteria of 10CFR50, the IP3 FSAR, and the NRC Safety Evaluation Report (SER) for IP3. These functions are based upon plant design bases which are: 1) maintaining the integrity of the RCS pressure boundary, 2) ensuring the capability to shut down and maintain safe shut down conditions and 3) preventing or mitigating the consequences of accidents that could result in potential offsite exposures comparable to those in 10CFR100. Attached Table 2 lists these necessary functions along with the plant systems required to meet these functional requirements, since these systems must be powered by the operable EDG following a LOOP as well as preventing postulated DBA's.

* Reviewed those DBA's described in the IP3 FSAR applicable in Cold Shutdown and Refueling operating conditions. A review was then performed relating these DBA's to the case of having one EDG operable to supply the necessary 480VAC bus needs upon a simultaneous LOOP. These DBA, with simultaneous LOOP, results are presented in the attached Table 3. It should be noted that this analysis, of looking at a LOOP concurrent with another shutdown DBA is beyond the Standard Technical Specifications, NUREG 1431, safety analysis, for AC sources shutdown, which states that it is not required to assume a single failure along with a concurrent LOOP when the unit is in Cold Shutdown or Refueling.

* Reviewed the redundancy of the necessary 480VAC powered safe shutdown equipment and where connected to the four 480VAC buses for potential loading to a single EDG via bus tie breakers. The attached Table 4 provides a tabulation of that safe shutdown related equipment connected to the applicable 480VAC bus power sources with scenario explanation.

* Completed an evaluation of the Non-Safety Injection (SI) Blackout 480VAC bus load shedding, load sequencing and bus tie breaker logic during Cold Shutdown conditions. This evaluation report (IP3-RPT-ED-02889) is discussed later.

* Analyzed the times available for operator action involved with loss of core decay heat removal methods and spent fuel pool cooling upon a LOOP in Cold Shutdown and Refueling. This is documented via calculations (IP3-CALC-RCS-02903 & IP3-CALC-SFPC -02959)

and discussed later. This calculation defines the time to heatup from 140 to 200 degrees F for the reactor core, reactor cavity and the fully loaded spent fuel pool in the case of a LOOP. These calculations provide the maximum time it can be allowed until one EDG must be able to supply decay heat removal electrical power needs under certain Cold Shutdown or Refueling operating conditions.

* Reviewed all other Technical and Operational Specifications to identify any other specifications which would be impacted by requiring one EDG in Cold Shutdown and Refueling conditions.

The conclusion of this detailed review is that all required systems, when operating in conformance with the proposed Technical Specification, can:

* Perform their required safety function(s) during postulated DBA's in both Cold Shutdown and Refueling operating conditions.

* Perform their system design functions and meet their operability requirements during an outage with the power supplies required by the proposed Technical Specifications.

This review evaluated the system and component capability from relevant operational perspectives, including power supply and support system requirements. The discussion below addresses this review in greater detail.

System Description

The IP3 480VAC Electrical Distribution System (EDS) is designed (see enclosed IP3 Electrical Distribution simplified diagram) to supply power to both safety related and non-safety related motors and other electrical equipment. Operation of the 480VAC EDS is required during plant shutdown and refueling conditions to maintain safe shutdown conditions to mitigate analyzed DBA's, such as Loss of Offsite Power and Loss of Decay Heat Removal. The 480VAC EDS consists of a distribution bus arrangement with the capability to supply power from diverse power sources. When the unit is shutdown these power sources include both offsite (138KV, 13.8KV feeders) and onsite (Emergency Diesel Generators) capability. The 480VAC EDS includes four 480VAC buses: 2A, 3A, 5A and 6A. These 480VAC EDS buses distribute power to Engineered Safety Feature (ESF) motors and to safety related Motor Control Centers (MCC's) 36A, 36B, 36C, 36D and 36E. The ESF motors and safety related MCC's are dispersed among the buses to balance the electrical loads on the buses and to ensure that sufficient power is available to the required minimum number of ESF loads. The 480VAC EDS buses also supply power to various non-safety-related loads, including MCC's. The 480VAC EDS can be fed from a number of independent offsite power sources. The preferred offsite source is the 138KV AC tie from Buchanan. Power from the 138KV AC EDS is distributed to 6.9KV buses 5 and 6 through the Station Auxiliary Transformer (SAT). The 6.9KV buses 2,3,5 and 6, in turn feed the 480VAC EDS buses 2A, 3A, 5A and 6A, respectively, via Station Service Transformers (SST's) 5 and 6. If the preferred power source is not available, two independent 13.8KV feeders and an independent 138KV tie are available as an alternate source of power from Buchanan. In addition to these power sources, there are two gas turbine generators (approximately 25 MW and 17 MW respectively) at the Buchanan substation connected to the 13.8KV feeders and a gas turbine generator (approximately 21 MW) located on the Indian Point Site. These gas turbine generators are independent of those power feeds outside of the Buchanan substation but utilize the identical 138 KV lines leading to Buchanan as the other offsite power feeds. Additionally, an independent Appendix R diesel generator (rated at 2500 KW) may be available to supply AC power to 480VAC EDS through 6.9KV EDS switch gear if offsite power or any EDG's are unable to be restored.

There are three (3) onsite 1750 KW EDG's with associated controls and internal support systems (e.g., air start, fuel oil, cooling, etc.) which are also available to provide emergency power to the 480VAC EDS. Each EDG is separate and independent from the others. There are 480VAC EDS bus tie breakers between 2A, 3A, 5A and 6A 480VAC buses available for manual closure during plant Cold Shutdown conditions as an acceptable method of supplying loads such as RHR or SFP cooling pumps from an available 480VAC bus. Power sources to each of the EDG support systems and controls are also associated with the same 480VAC EDS bus as the EDG. Normally, each EDG is in standby and aligned to power it's associated 480VAC bus. During a LOOP each EDG automatically starts and energizes its associated 480VAC EDS bus. EDG 31 supplies power to buses 2A/3A. EDG's 32 and 33 provide power to buses 6A and 5A, respectively. When an undervoltage condition exists on any of the 480VAC EDS buses, the affected bus is stripped of its loads with the exception of the associated safety related MCC's. The respective EDG is started automatically and connected to the affected bus once the EDG is up to proper speed and voltage. Once the EDG's are connected to the buses, the required equipment is either automatically or manually sequenced onto the buses in a manner that will not overload the EDG's. If power is lost to one bus only, the unaffected buses remain connected to the offsite power sources and are not connected to the respective EDG.

Bus-tie breakers (5AT2A, 2AT3A and 3AT6A) are available to electrically connect the 480VAC EDS buses to allow one EDG to supply electrical loads from an EDG supplied 480VAC bus to de-energized 480VAC buses. These bus-tie breakers allow any or all of the four buses to be supplied by any EDG. Bus-ties 5AT2A and 3AT6A are open (as per Technical Specification 3.7.A.4) during plant operation above cold shutdown in order to prevent overloading of buses and transformers and to prevent one bus from disabling another should an electrical fault occur. If needed, and as per approved Operations procedural guidance, these tie breakers can be closed for powering 480VAC buses from one EDG during Cold Shutdown or Refueling. Above Cold Shutdown conditions, breakers 5AT2A and 3AT6A are open, racked to the "TEST" position and the control power fuses removed.

The 480VAC EDS also provides power to their respective 125VDC EDS battery charger as well as to their respective 120V Vital AC EDS voltage-regulating transformers. The four 480VAC EDS switchgear bus sections receive DC control power for breaker control and sequencing relays from the appropriate battery-backed DC panel associated with the channel.

<u>EDS and Safe Shutdown System Review and Results</u>

The maximum required electrical load on each EDG during Cold Shutdown and Refueling conditions is bounded by the required loading during DBA's considered in these plant operating conditions. A single EDG is capable of supplying the necessary DBA mitigation electrical power to its connected 480VAC bus loads as well as to those 480VAC EDS bus loads manually connected via closure of the bus tie breakers in the event of those DBA's analyzed in the IP3 FSAR. The attached Table 1 indicates the specific safe shutdown plant equipment required when in Cold Shutdown or Refueling. This shows the results of both the deterministic analysis of IP3 license basis DBA's applicable in these operating conditions and compares this equipment to that which can be handled by a single EDG, from electrical loading standpoint, as discussed in the electrical calculation concerning one EDG in Cold Shutdown (IP3-CALC-EDG-02897). The results of this tabulation demonstrate the relationship between what systems are required and what a single EDG can supply in the case of the applicable DBA's analyzed in the IP3 FSAR. From an accident analyses and electrical loading standpoint, a single EDG is capable of starting and powering the necessary equipment for maintaining safe shutdown conditions.

While in Cold Shutdown and Refueling operating conditions, electrical power is required for an RHR pump, a Component Cooling Water (CCW) pump, a Service Water (SW) pump, a Charging pump, a (Primary Auxiliary Building) PAB exhaust fan, DC Battery Chargers, a Fan Cooler Unit (FCU), various safety related MCC loads (which also includes a SFP cooling Pump) and specific plant instrumentation.

To allow a single CCW and SW pump to supply required loads without pump runout becoming an issue, systems valve lineups must be performed to limit the cooling loads to the necessary, identified safe shutdown loads which these pumps would be supplying. The proposed change to this specification to revise the EDG operability requirement is consistent with the requirements of other applicable specifications and yet provides additional flexibility to permit the required EDG maintenance to be performed within a shorter outage window.

To ensure that these systems/equipment determined above also meet those functions needed to be satisfied during Cold Shutdown and Refueling conditions, a review of these functional requirements was completed. This review indicated a connection between those systems able to be provided by one EDG in the event of a LOOP and/or postulated DBA's, and those plant systems needed to meet plant shutdown design criteria. These functions are specifically based upon design criteria such as maintaining the Reactor Coolant System (RCS) pressure boundary and monitoring of the fuel storage system, among others. The attached Table 2 provides the listing of those necessary functional requirements vs. the plant systems required to meet them.

A review of the postulated DBA's in Cold Shutdown and Refueling, as listed in the attached Table 3, provided further input and verification of those plant systems needed to mitigate the postulated DBA's concurrent with a LOOP event. This analysis confirmed that one EDG is capable of supplying the necessary automatic and manual safe shutdown loads if required to do so. The various breakers for the various some loads will be manually closed by the operating crew using administrative controls. Plant operators have sufficient time (about 3 hours or more), as previously mentioned, and margin exists to restore a decay heat removal method (RHR/SFP cooling) prior to a reactor cavity or SFP heatup from 140 to 200 degrees F. In light of this need to provide the necessary time for decay heat removal restoration, the proposed Technical Specification for one EDG in Cold Shutdown will allow one EDG in Cold Shutdown only when the reactor has been subcritical for sufficient time that about 3 hours or more is available for operator action. This shutdown time frame, 5 days subcritical, corresponds to that which is recommended due to the loss of RHR and SFP cooling and the subsequent times for reactor core/SFP heatup to occur. These heatup values are as described in engineering calculations IP3-CALC-RCS-02903 & IP3-CALC-SFPC-02959. These analyses determined that upon a LOOP and loss of RHR, reactor core/cavity and spent fuel pool heatup (the time to reach 200 degrees F) in Cold Shutdown or Refueling with at least 23 feet above the reactor pressure vessel flange or no fuel in the reactor or cavity would occur in 3 hours plus if starting from an initial RCS or SFP temperature of 140 degrees F and the reactor subcritical for 5 days. This means that RHR or SFP cooling would need to be re-established by energizing 480VAC EDS buses 3A, 5A, or 6A, along with the necessary support cooling systems, Service Water and CCW, in the same time frame to avoid this heatup. If there is no fuel in the reactor and no fuel in the reactor cavity, the heatup in the spent fuel pool upon a LOOP and one EDG available, with a freshly discharged reactor core after 5 days subcritical, is analyzed to take approximately 3.2 hours. This ensures that one EDG is used at a time when decay heat removal capability is maximized in the event of a LOOP and one EDG is called upon to restore RHR cooling in a needed short time period. The use of this proposed Technical Specification in the case of RCS reduced inventory or mid-loop operations is not included in this amendment request.

The attached Table 4 provides an integrated list of the specific 480VAC bus supplies to the various pieces of electrical equipment, which are available in the case of a LOOP in Cold Shutdown and Refueling. Depending upon the single, selected, operable EDG (when reactor subcritical for at least 5 days), the sequential automatic loading of that EDG will occur first.

For example, in the preferential scenario the operable EDG's would automatically load the associated Essential SW pump, CCW pump and safety related MCC 36's load first, along with the automatic closure of bus tie breaker 2AT3A connecting the 2A and 3A buses.

The operator, depending upon which EDG is operable, can then manually close the appropriate 480VAC bus tie breakers to place other safe shutdown loads in service. This scenario, using the 33 EDG as the lone operable EDG, was run on the IP3 Control Room (CR) plant specific simulator to provide further verification of bus sequencing and tie breaker closure requirements and timing. The integrated picture of 480VAC EDS bus loading and bus tie breaker closure, to energize needed safe shutdown equipment, was verified in an engineering evaluation (IP3-RPT-ED-02899). This evaluation specifically involved Non-SI blackout 480 VAC EDS bus load shedding, load sequencing and bus tie breaker logic during cold shutdown and refueling operating conditions. Various EDG scenarios are discussed in this report.

This report also verified that the interlocks in the current control schemes would allow the automatic loading of the individual bus Non-SI blackout loads onto the operable EDG. Any Non-SI Blackout load on a bus with an inoperable EDG is stripped as designed but not automatically sequenced on. The 5AT2A and 3AT6A bus tie breakers can be closed in a timely, deliberate fashion using the existing controls, as no undervoltage jumpers are necessary in connecting an energized 480 VAC bus to a de-energized 480 VAC bus. Additional loads (RHR, SFP, Charging pump, etc.) may be manually started after 480 VAC bus power is re-established via the bus tie breakers. The appropriate bus tie breakers are also assumed to be racked in with their control power fuses installed prior to the LOOP event occurring in Cold Shutdown. Following the closure of the tie breakers the operator actions to restart required loads (i.e., RHR, SFP, FCU, Charging Pump, etc.) are the same as currently required once power is re-established to the 480 VAC buses.

One EDG does have sufficient continuous rating capacity (1750 KW) and sufficient 2 hour peak rating capacity (1950 KW) to support the necessary safe shutdown loads required in case of a DBA in Cold Shutdown or Refueling. The previously discussed report of bus load sequencing looked at various scenarios to determine that with any one of the 3 EDG's operable alone, satisfactory automatic load sequencing, bus tie breaker closure and manual bus reloading could restore RHR/SFP cooling and additional equipment well within the worst case Cold Shutdown and Refueling scenario of 3 hours plus heatup time (to reach 200 degrees F) at 5 days reactor subcritical. This 3 hour plus value was put into the TS bases in order to demonstrate ample time to meet established (1 hour) margin, which is a result of the expected 1 hour time for operators to restore electrical power with the one EDG and 1 hour added for conservatism in this restoration process.

A review was also conducted of all other Technical and Operational Specifications to identify any other specifications which would be impacted and require change due to this proposed amendment. There are no other specifications that require revision as operability of RHR and its associated support equipment is maintained upon a LOOP with one operable EDG in cold shutdown by virtue of existing Technical Specification 3.7.G. The lone EDG, via manually closed bus tie breakers, is still considered the operable emergency power source and is capable of supplying the necessary safe shutdown required electrical loads.

This Technical Specification change utilized the present specification and design bases established in the Standard Technical Specifications, NUREG 1431, "AC Sources-Shutdown", for guidance as well.

SECTION IV - NO SIGNIFICANT HAZARDS EVALUATION

Consistent with the criteria of 10 CFR 50.92, the proposed changes to the Technical Specifications are judged to involve no significant hazards based upon the following information:

(1) Does the proposed license amendment involve a significant increase in the probability or consequences of an accident previously analyzed?

Response:

No. The equipment, which is affected by the proposed Technical Specification change, is not an initiator to those accidents postulated to occur during Cold Shutdown or Refueling operating conditions. A comprehensive systems review and EDG loading electrical analysis has demonstrated the ability of those shutdown support systems, necessary to provide safe shutdown needs, to perform their accident mitigation functions for the postulated accidents during Cold Shutdown and Refueling conditions. One EDG can support the necessary electrical loads required in Cold Shutdown and Refueling in the event of postulated accidents along with a LOOP in the time frame required to prevent reactor core/cavity/SFP heatup concerns. This EDG support relies upon existing plant designed manual closure of 480VAC EDS bus tie breakers to allow a single EDG to pick up other 480VAC EDS bus loads, such as supplying an RHR pump and SFP cooling pump, located on 480VAC EDS buses 3A, 5A, or 6A. Together, operability of the required offsite circuit(s) and one EDG ensures the availability of sufficient AC sources to operate the unit in a safe manner and to mitigate the consequences of postulated accidents during shutdown (e.g., Fuel Handling Accidents). Action statements provide prompt, specific guidance to ensure sufficiently conservative plant response should the expected EDG power supply not be available. These Action Statements are similar to those in the STS. Therefore, the proposed license amendment (i.e., changes to 3.7.F.4 and the added sections of 3.7.F.5 & 3.7.F.6) does not involve a significant increase in the probability or consequences of an accident previously analyzed.

(2) Does the proposed license amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response:

No. The proposed license amendment does not involve any physical changes to plant systems or component set points. The use of 480VAC EDS bus tie breakers to power loads from an energized 480VAC bus is part of present plant design and included within the present LOOP Off-Normal operating procedures when the reactor is in Cold Shutdown operating conditions. As discussed in the Standard Technical Specifications, NUREG 1431, during plant shutdown with one EDG, it is not required to assume a single failure and concurrent loss of all offsite or all onsite power. Worst case bounding events are deemed not credible in Cold Shutdown and Refueling conditions because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and the corresponding stresses result in the probabilities of occurrence being significantly reduced or eliminated, and ultimately result in minimal consequences. The lone EDG is capable of accepting and starting required loads within the assumed loading sequence intervals and continue to operate until offsite power can be provided to the 480VAC EDS buses. Action statements provide prompt, specific guidance to ensure sufficiently conservative plant response should the expected EDG power supply not be available. These action statements are similar to those in the STS. Therefore, the proposed license amendment (i.e., changes to 3.7.F.4 and added sections 3.7.F.5 & 3.7.F.6) does not create the possibility of a new or different kind of accident from any accident previously evaluated.

(3) Does the proposed license amendment involve a significant reduction in the margin of safety?

Response:

No. The electrical power system specifications support the equipment required to be operable, commensurate with the current level of safety, including the equipment requiring an EDG backed power source. The design review results demonstrate that operation in the conditions of Cold Shutdown and Refueling, in accordance with the proposed Technical Specification change, is acceptable from an accident mitigation standpoint. The basic system functions in Cold Shutdown and Refueling operating conditions are not changed. One EDG can supply the necessary electrical power needs during these plant operating conditions, and in the time frame required to prevent reactor core/cavity/SFP heatup concerns, with sufficient "kw loading" to spare. The analysis conducted shows that the systems are capable of performing their design basis functions. Applicable safety analysis in the Standard Technical Specifications , NUREG 1431,discusses these system requirements as well (i.e., it is not required to assume a single failure and concurrent loss of all offsite or all onsite power). Action statements, similar to those in the Standard Technical Specifications, provide prompt, specific guidance to ensure sufficiently conservative plant response should the expected EDG power supply not be available. On this basis, the proposed license amendment (i.e., changes to 3.7.F.4 and added sections 3.7.F.5 & 3.7.F.6) does not involve a significant reduction in the margin of safety.

SECTION V – IMPACT OF CHANGES

The proposed changes will not adversely affect the ALARA Program, the Security and Fire Protection Programs, or the Emergency Plan. This conclusion is based on the type of change being made in comparison to the purpose, scope and content of these programs. There are no physical changes needed to plant systems, equipment, or component set points. The proposed changes also do not affect the FSAR description or the conclusions drawn in the Safety Evaluation Report, which do not discuss Cold Shutdown/Refueling electrical power requirements. The implementation of the proposed license amendment will involve administrative activities, such as operating procedure revisions, outage contingency defense-in-depth planning and training. As such, this Technical Specification change is requested to be dispositioned prior the start of the next refueling outage, planned for a 10 September 1999 start date. This will allow the various operations procedure revisions, necessary Defense-in-Depth Outage Contingency Plans, and the training of necessary plant personnel to be completed before this Technical Specification is implemented during planned EDG maintenance in the upcoming refueling outage (RO-10).

SECTION VI - CONCLUSIONS

The incorporation of this change:

a) will not significantly increase the probability nor the consequences of an accident or malfunction of equipment important to safety as previously evaluated in the Final Safety Analysis Report;

b) will not create the possibility for an accident or malfunction of a different type than any previously evaluated in the Final safety Analysis Report; and

c) will not significantly reduce the margin of safety as defined in the bases for any Technical Specification.

Therefore, the proposed change involves no significant hazards consideration as defined in 10 CFR 50.92.

SECTION VII – REFERENCES

1. NUREG-1431, "Standard Technical Specifications, Westinghouse Plants," Revision 1, dated April 1995.

2. Indian point 3 Updated Final Safety Analysis Report, dated December 1997.

3. NRC Safety Evaluation Report (SER) for Indian Point 3 Nuclear Generating Station, and Supplements 1, 2 and 3 dated September 21, 1973, February 21, 1975, and December 12, 1975 and April 5, 1976, respectively.

4. WCAP-12313, "Safety Evaluation For An Ultimate Heat Sink Temperature Increase To 95 Degrees At Indian Point Unit 3", dated July 1989.

4. IP3 Design Basis Document, IP3-DBD-307, "480V AC, 125V DC, 120V AC Electrical Distribution Systems", Revision 2, dated February 19, 1998.

6. IP3 Design Basis Document, IP3-DBD-302, "Residual Heat Removal System", Revision 2, dated February 17, 1998.

7. IP3 Design Basis Document, IP3-DBD-304, "Service Water System", Revision 2, dated January 22, 1998.

8. IP3 Design Basis Document, IP3-DBD-308, "Component Cooling Water System (CCWS) And Spent Fuel Pit Cooling System (SFPCS), Revision 1, dated May 1, 1998.

9. IP3-CALC-EDG-02897, "Emergency Diesel Generator (One) Loading During Cold Shutdown", Revision 0, dated December 4, 1998.

10. IP3-RPT-ED-02889, "Evaluation of the Non-SI Blackout 480V Bus Load Shedding, Load Sequencing and Bus Tie Breaker Logic", Revision 0, dated December 4, 1998.

11. IP3-CALC-RCS-02903, "Generic Heatup Calculation for Core and SFP After Five day Subcriticality", Revision 0, dated December 17, 1998.

12. NYPA Engineering memo RET-98-563, "One EDG Available in Cold Shutdown", dated November 30, 1998.

13. IP3 NSE 93-3-142 SWS, "Evaluation of Tying or Cross-Connecting the Service Water System Headers at Cold Shutdown", Rev. 2, dated October 27, 1995.

14. IP3-CALC-SFPC-02959, "Comparison of Heat Sink During and After Core Offload", Revision 0, dated January 15, 1999.

TABLE 1 **(page 1 of 2)**

PLANT EQUIPMENT IDENTIFIED FOR LOADING IN COLD SHUTDOWN/ REFUELING CONDITIONS IN THE CASE OF DESIGN BASIS ACCIDENT MITIGATION AND TECHNICAL SPECIFICATION COMPLIANCE (with loads as per IP3-CALC-EDG-02897, Rev. 0, 12/4/98)

Required Plant Equipment #	Approximate KW Electrical Load
1 RHR Pump	316 KW
1 SW Pump	281 KW
1 CCW Pump(system lined up to support RHR, SFP, and Charging pumps)	220 KW
1 FCU	157 KW
1 PAB Exhaust Fan	122 KW
MCC's (36A, B, C, D, E) (which also includes 31/32 CRAC and Battery Charger 33*)	241 KW
1 Charging Pump	150 KW
MCC's (32,34,37 & 39) (which also includes one SFP pump and Battery Chargers 31,32 & 34*)	227 KW
Total Approximate KW Loading analyzed	1714 KW

Note: Not ALL equipment listed above is required for all scenarios.
* Note: Fully charged batteries have at least 2 hours of capability in a LOOP (Non-SI Blackout) event with one EDG supplying all 4 of the 480VAC EDS buses. The addition of this load is conservative in this condition, but does minimize reduction of battery capacity.

Table Loading Summary:

1. The total KW loading indicated above covers the scenario of a LOOP with one EDG and fuel in BOTH reactor core/cavity and the SFP. This "worst case" loading arrangement is WITHIN the capacity of 1 EDG (1750KW continuous and 1950KW peak for 2 hours). This includes both normal and transient (startup current) EDG loading.
2. One SW pump (if aligned to essential header) and one CCW pump are automatically loaded onto the EDG energized bus. MCC-36's (A through E) are not stripped and are re-energized upon closure of EDG output breaker. All other equipment must be manually restarted as required for safe shutdown load management.

TABLE 1 **(page 2 of 2)**

Table Loading Summary (continued):

3. The most time limiting load in the LOOP event is the RHR pump or SFP cooling pump, and the associated cooling support systems, which are required to provide decay heat removal capability within 3 hours plus when core has been subcritical for 5 days, before any reactor cavity or spent fuel pool heatup from 140 to 200 degrees F could occur.
4. RHR, SW & CCW systems need to be lined up ahead of time to be able to support RHR cooling loop capability if LOOP does occur to be able to fully support restoration of RHR within the 3 hour plus limiting timeframe.
5. Fuel Storage Building (FSB) Ventilation electrical power requirements not included in above list because potentially only needed when irradiated fuel being handled in FSB. However, proposed TS Action Statements 3.7.F.5 & 6 cause operators to suspend fuel handling operations if LOOP occurs. In that scenario some loads from above list are not required, which provides sufficient electrical capacity on one EDG for including FSB ventilation (approximately 61 to 67 KW would be required) if still needed. Additionally, this FSB load must be manually loaded by the operators if needed.
6. Necessary Safety Related Motor Operated Valves (MOV's) are included in the MCC 36 A & B loading values.
7. The EDG transient performance capability for CSD is bounded by NYPA report IP3-RPT-ED-02588. This analysis (IP3-RPT-ED-02588), "Evaluation of EDG Capability", is based upon the sequencing of SI loads during a DBA which is a very severe operating condition for the EDG, far exceeding the scenario for CSD. That report concluded the unit's response was well within design limits.

TABLE 2

NECESSARY FUNCTIONAL REQUIREMENTS CONSIDERED DURING COLD SHUTDOWN/REFUELING AND THE PLANT SYSTEMS NEEDED TO SUPPORT THEM

Functional Criteria	Applicable System(s)
*Reactor Coolant Pressure Boundary maintained	Reactor Coolant System, CVCS, Overpressure Protection System
*Assure that Containment design conditions important to safety not exceeded	Containment Isolation System
*Onsite/Offsite electrical power provided to permit functioning of systems/components important to safety	EDG's, 6.9 KV, 480VAC EDS, 120VAC, 125 VDC
*Control Room provided to operate plant safely under accident conditions	CRAC, 120VAC
*Reactivity Control System redundancy and capability of holding reactor core subcritical under cold conditions	CVCS, RWST, CCW
*Residual Heat Removal capability to transfer fission product decay heat and other heat from the core	RHR, Service Water, CCW PAB ventilation
*Provide abundant Emergency Core Cooling	RHR, PAB ventilation
*Removal of heat from Containment	FCU, Service water
*Transfer heat from structures, systems and components to an ultimate heat sink	Service Water, CCW
*Fuel Storage and Handling designed to assure adequate safety under normal and postulated accident conditions	Spent Fuel Cooling, CCW
*Criticality in Fuel Storage and Handling System prevented	Spent Fuel Cooling, 120VAC
*Appropriate monitoring of Fuel Storage System to detect conditions that may result in the loss of RHR capability and excessive radiation levels	Spent Fuel Cooling, FSB Ventilation, 120VAC

TABLE 3 (page 1 of 2)

FSAR DESIGN BASIS ACCIDENTS & EVENTS CONSIDERED FOR COLD SHUTDOWN AND REFUELING OPERATING CONDITIONS (REVIEWED FOR ONLY REQUIRING ONE EDG TO BE OPERABLE)

Note: All affected accidents reviewed consider a concurrent Loss of Offsite Power (LOOP) Event.

Accident Description	FSAR Section	CSD DBA	Refueling DBA	Comments
Fuel Handling Accident	14.2.1	No	Yes	Limiting case is a fuel drop in SFP building. If LOOP happened simultaneous with fuel drop, results would be the same regardless of number of EDG's available. SFP building ventilation could be manually loaded as required by procedures. So, proposed TS has no effect.
Dilution Accident	14.1.5	Yes	Yes	LOOP before precludes this event. LOOP at end would prevent boron add. However, end of event is defined as point at which SDM lost (min required 1.3 percent). LOOP would delay reborating but SDM remains adequate. Hence, proposed TS change has no effect.

TABLE 3 (page 2 of 2)

Accident Description	FSAR Section	CSD DBA	Refueling DBA	Comments
Loss of RHR Cooling	Not included	Yes	Yes	One EDG available looks at loss of RHR either through single worst failure of the one operable EDG with an RHR pump on its bus OR it is the EDG with no RHR pump. Per current plant design, the RHR pumps are manually reloaded via 480VAC bus tie breakers after LOOP. Either 1 or 2 RHR pumps can be required to be operable per TS. No single failure is postulated so RHR capability can be restored within minimum required time to prevent reactor cavity or SFP heatup by manual operator action.
Loss of Spent Fuel Cooling	9.3.3	Yes	Yes	Similar to Loss of RHR. Minimum time of heatup of SFP has been calculated as needed to restore SFP cooling.
RCS Low Temperature Overpressure Event	4.3.4	Yes	Yes	Upon LOOP, OPS remains operational for up to two hours on DC battery power, until EDG powered.

TABLE 4

DEPICTION OF SELECTED SAFE SHUTDOWN EQUIPMENT/COMPONENTS CONNECTED TO THE 480VAC EDS BUSES FOR SPECIFIC POWER SUPPLIES TO SAFETY RELATED EQUIPMENT CONSIDERED FOR COLD SHUTDOWN AND REFUELING OPERATING CONDITIONS

	EQUIPMENT POWERED FROM			
EQUIPMENT	**5A**	**2A**	**3A**	**6A**
Residual Heat Removal Pumps			31	32
Service Water Pumps	31/34	32	35	33/36
Component Cooling Water Pumps	31	32		33
Charging Pumps	31		32	33
PAB Exhaust Fans			31	32
MCC-36(A through E)	36A/E	36C		36B/D
Spent Fuel Pool Cooling Pumps (via MCC-37 and MCC-39)	32			31
Battery Chargers 31-33 and Sola Xfmers to 34	31	33, Sola Xfmer to 34		32, Sola Xfmer to 34
CRAC Units (via MCC-36A & 36B)	31			32
Fan Cooler Units	31/33	32	34	35

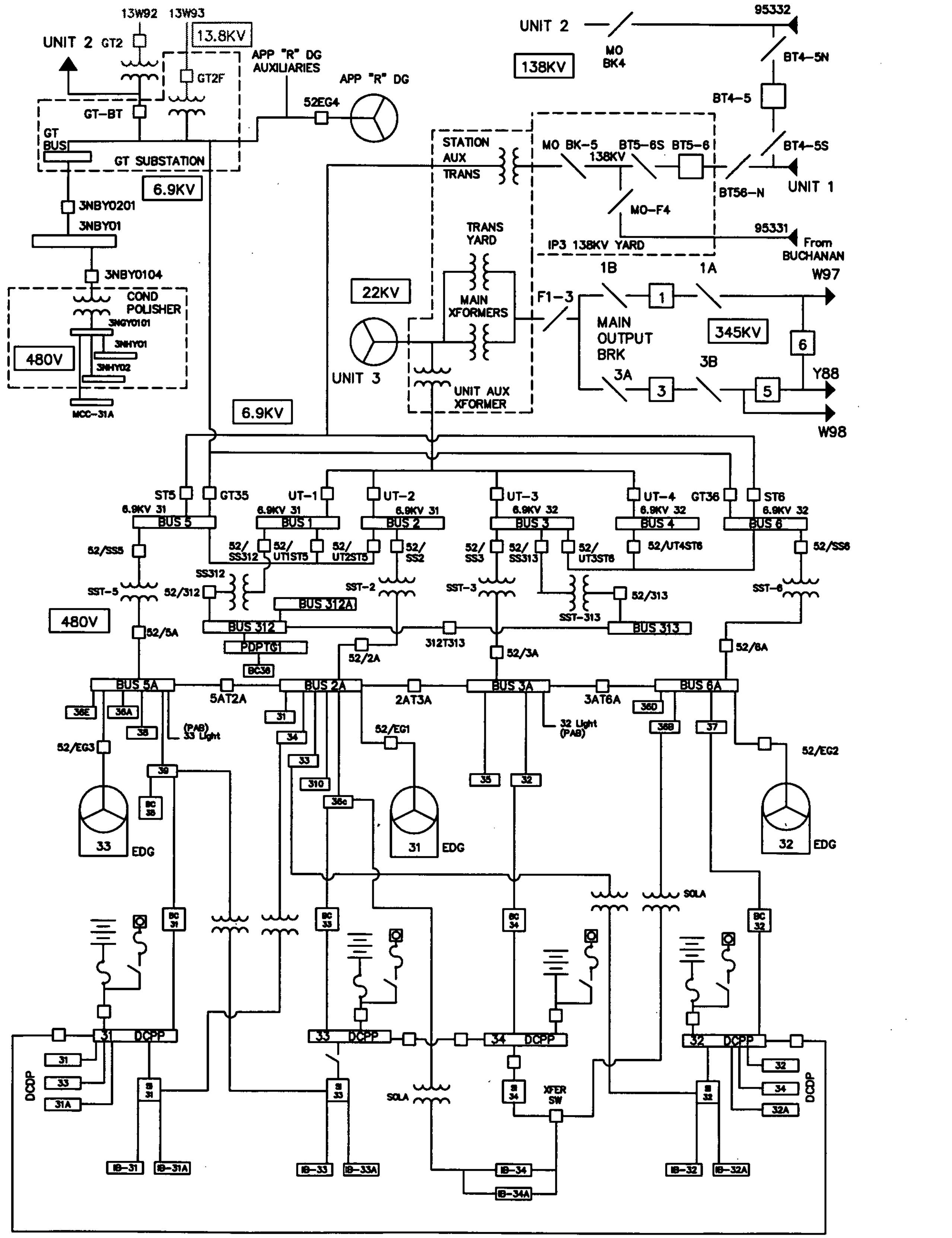
This table provides a tabulation of significant equipment/components to show where they are connected to the different 480VAC EDS buses. Depending on the single, selected EDG which is operable during Cold Shutdown and Refueling conditions, the preferential scenario would include the sequential (via load sequencer) automatic loading of that EDG by its associated Essential SW Pump, CCW Pump and MCC-36's occurring first, along with auto closure of bus tie breaker 2AT3A. The operator is then able, via manual closure of appropriate bus tie breakers 5AT2A and 3AT6A, to close individual load breakers and utilize additional safe shutdown loads such as RHR, Charging, SW, PAB fan, additional MCC loads (including SFP cooling), etc., so as not to exceed the rating on the lone EDG of 1750KW for continuous operation or the 2 hour 1950 KW rating.

ENCLOSURE 1 TO IPN-99-009

IP3 ELECTRICAL DISTRIBUTION SIMPLIFIED DIAGRAM

NEW YORK POWER AUTHORITY
INDIAN POINT 3 NUCLEAR POWER PLANT
DOCKET NO. 50-286
DPR-64

IP-3 ELECTRICAL DISTRIBUTION



FOR INFORMATION ONLY
NOT A CONTROLLED DOCUMENT

EDS_14.DWG
Rev. 07 (05/28/98)

ATTACHMENT III TO IPN-99-009

MARKUP OF PROPOSED TECHNICAL SPECIFICATION CHANGES REGARDING REQUIRED NUMBER OF EMERGENCY DIESEL GENERATORS IN COLD SHUTDOWN

Affected Technical Specification pages:

3.7-3a
3.7-3b
3.7-4
3.7-4a
3.7-4b
3.7-5
3.7-5a
3.7-6

NEW YORK POWER AUTHORITY
INDIAN POINT 3 NUCLEAR POWER PLANT
DOCKET NO. 50-286
DPR-64

4. Two operable diesel generators together with total underground storage containing a minimum of 6671 gallons of fuel. **It is permissible to have only one operable diesel generator together with total underground storage containing a minimum of 6671 gallons provided that: (1) the reactor is in cold shutdown or refueling and has been subcritical for at least 5 days AND (2) the water level in the refueling cavity above the top of the reactor vessel flange is equal to or greater than 23 feet OR no fuel is in the reactor or refueling cavity.**

5. **If either of the required diesel generators specified in 3.7.F.4 for cold shutdown are not operable, when two are required to be operable, then the following actions should be pursued without delay and in a controlled manner:**

   a. Initiate action to suspend operations involving positive reactivity additions. However, this does not preclude actions to maintain or increase reactor vessel or reactor cavity inventory provided the required SDM is maintained.
   AND

   b. Initiate actions to restore the required diesel generator to operable status.

6. **If the one required diesel generator specified in 3.7.F.4 for cold shutdown is not operable, then the following actions should be pursued without delay and in a controlled manner:**

   a. Suspend all core alterations.
   AND

   b. Suspend movement of irradiated fuel assemblies.
   AND

   c. Initiate actions to suspend operations involving positive reactivity additions. However, this does not preclude actions to maintain or increase reactor vessel or reactor cavity inventory provided the required SDM is maintained.
   AND

   d. Initiate action to restore the required diesel generator to operable status.

G. When a system, subsystem, train, component or device is determined to be inoperable solely because its emergency power source is inoperable, or solely because its normal power source is inoperable, it may be considered operable for the purpose of satisfying the requirements of its applicable specification provided: (1) its corresponding normal or emergency power source is operable; and (2) all of its redundant system(s), subsystem(s), train(s), components(s) and device(s) are operable or likewise satisfy the requirements of the specification.

Basis

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. The 6900-volt equipment is supplied from 6 buses.

The Buchanan Substation has both 345 KV and 138 KV transmission circuits which are capable of supplying startup, normal operation, shutdown and/or engineered safeguards loads.

The 138 KV supplies or the gas turbines are capable of providing sufficient power for plant startup. Power via the station auxiliary transformer can supply all the required plant auxiliaries during normal operation, if required.

In addition to the unit transformer, four separate sources supply station service power to the plant.[1]

The plant auxiliary equipment is arranged electrically so that multiple items receive their power from different buses. Redundant valves are individually supplied from separate motor control centers.

The bus arrangements specified for operation ensure that power is available to an adequate number of safeguards auxiliaries. With additional switching, more equipment could be out of service without infringing on safety. **In the case of a Loss of Offsite Power (LOOP) event when the reactor has been subcritical for at least 5 days and only one diesel generator is operable, having two of the four 480-volt buses energized means the single, operable diesel generator would energize its associated 480-volt bus. The other 480-volt buses would subsequently be energized by this single diesel generator through manual closure of 480-volt bus tie breakers as required for safe shutdown load management purposes.**

Two diesel generators have sufficient capacity to start and run within design load the minimum required engineered safeguards equipment.[1] The minimum onsite underground stored diesel fuel oil inventory is maintained at all times to assure the operation of two diesels carrying the minimum required engineered safeguards equipment load for at least 48 hours.[2] The minimum required storage tank volume (when above cold shutdown) of 6671 gallons is the minimum volume required when sounding the tanks to obtain level information. This volume includes allowances for fuel not usable due to the oil transfer pump cutoff switch (760 gallons) and a safety margin (20 gallons). If the installed level indicators are used to measure tank volume, 6721 gallons of oil (6671 gallons plus the 50 gallon uncertainty assoicated with the level indicators) must be in each storage tank.

When in cold shutdown, two diesel generators must be operable with a total undergound storage of 6671 gallons of fuel oil. **Only one diesel generator is required to be operable in cold shutdown or refueling, when the reactor has been subcritical for 5 days or greater, because it is able to power the necessary safe shutdown loads and maintain diesel loading within the 1750 KW continuous loading and 2 hour 1950 KW peak loading requirements. The reactor being subcritical for at least 5 days provides for operator action, in the case of a LOOP, to manually restore decay heat removal loads prior to heatup from 140 to 200 degrees F occurring when the reactor cavity is flooded up or the spent fuel pool is completely loaded with fuel. The need to have the reactor cavity flooded to at least 23 feet above the flange OR no fuel in the reactor or cavity accounts for having sufficient water inventory for effective decay heat removal until RHR or Spent Fuel Pool cooling can be restored in the case of a LOOP event with one operable EDG. Operators are expected to restore RHR or Spent Fuel Pool cooling in the case of a LOOP event well within the 3 hours plus allowable time frame, which provides sufficient margin in the worst case when in cold shutdown and the reactor has been subcritical for 5 days. It is acceptable for 480 V emergency power trains to be cross tied during cold shutdown and refueling conditions, allowing a single power circuit to supply all required trains.**

The AC sources required to be operable in cold shutdown and refueling provide assurance that: (1) Systems which provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core, (2) Systems needed to mitigate a fuel handling accident are available, (3) Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available and (4) Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown or refueling condition.

The Action Statements listed in LCO 3.7.F.5 and 3.7.F.6 are provided for specific operator guidance on those restrictions which are pursued without delay in response to the loss of a required on-site EDG power source. With the required on-site EDG(s) inoperable, the minimum required diversity of AC power sources is not available. It is therefore required to suspend core alterations, movement of irradiated fuel assemblies, and operations involing positive reactivity additions. Suspension of these activities does not preclude completion of those actions necessary to establish a safe condition. These actions minimize the probability or the occurrence of postulated events. It is further required to initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the required safety systems.

The same methodology used to measure fuel volume above cold shutdown should be used. Additional fuel oil suitable for use in the diesel generators will be stored either on site or at the Buchanan Substation. The minimum storage of 30,026 gallons of additional fuel oil will assure continuous operation of two diesels at the minimum engineered safeguards load for a total of 7 days. A truck with hosing connections compatible with the underground diesel fuel oil storage tanks is available for transferal of diesel oil from storage areas either on site or at the Buchanan Substation. Commercial oil supplies and trucking facilities are also available.

Periodic diesel outages will be necessary to perform the corrective maintenance required as a result of previous tests or operations and the preventive maintenance recommended by the manufacturer. If a diesel generator is out of service due to preplanned preventive maintenance or testing, special surveillance testing of the remaining diesel generators is not required because the required periodic surveillance testing suffices to provide assurance of their operability. The fact that preplanned corrective maintenance is sometimes performed in conjunction with this preventive maintenance or testing does not necessitate that the remaining diesels be tested, because this corrective maintenance is on defects or potential defects that never called diesel operability into question. If a diesel generator defect or operability concern is discovered while performing this preplanned preventive maintenance or testing, the concern or defect is evaluated to determine if the same concern or defect could render the remaining diesel generators inoperable. Unless this evaluation determines that the potential for the defect or concern to effect the remaining diesel generators has been eliminated, performance of a surveillance test on each of the remaining diesel generators provides adequate assurance of their operability.

One battery charger 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. This insures that adequate D.C. power will be available for starting the emergency generators and other emergency uses.

The plant can be safely shutdown without the use of offsite power since all vital loads (safety systems, instruments, etc.) can be supplied from the emergency diesel generators.

Any two of three diesel generators, the station auxiliary transformer or the separate 13.8 to 6.9 KV transformer are each capable of supplying the minimum safeguards loads, and therefore provide separate sources of power immediately available for operation of these loads. Thus the power supply system meets the single failure criteria required of safety systems. To provide maximum assurance that the redundant or alternate power supplies will operate if required to do so, the redundant or alternate power supplies are verified operable prior to initiating repair of the inoperable power supply. Continued plant operation is governed by the specified allowable time period for the power source, not the specified allowable time period for those items determined to be inoperable solely because of the inoperability of its normal or emergency power source provided the conditions defined in specification 3.7.G are satisfied. These conditions assure that the minimum required safeguards will be operable. If it develops that (a) the inoperable power supply is not repaired within the specified allowable time period, or (b) a second power supply in the same or related category is found to be inoperable, the reactor, if critical, will initially be brought to the hot shutdown condition utilizing normal operating procedures to provide for reduction of the decay heat from the fuel, and consequent reduction of cooling requirements after a postulated loss-of-coolant accident. If the reactor was already subcritical, the reactor coolant system temperature and pressure will be maintained within the stated values in order to limit the amount of stored energy in the Reactor Coolant System. The stated tolerances provide a band for operator control. After a limited time in hot shutdown, if the malfunction(s) are not corrected, the reactor will be brought to the cold shutdown condition, utilizing normal shutdown and cool-down procedures. In the cold shutdown condition there is no possibility of an accident that would damage the fuel elements or result in a release in excess of 10 CFR 100 and 10 CFR 50 dose limits.

Conditions of a system-wide blackout could result in a unit trip. Since normal off-site power supplies as required in Specification 3.7.A.1 are not available for startup, it is necessary to be able to black start the unit with gas turbines providing the incoming power supplies as a first step in restoring the system to an operable status and restoring power to customers for essential services. Specification 3.7.C provides for startup using 37 MW's of gas turbine power (nameplate rating at 80°F) which is sufficient to carry out a normal plant startup. A system-wide blackout is deemed to exist when the majority of Con Edison electric generating facilities are shutdown due to an electrical disturbance and the remainder are incapable of supplying the system therefore necessitating major load shedding.

Since the backup lighting supply is stripped on safety injection, the requirement that not more than one 120 volt A.C. instrument bus be energized from the backup lighting supply is to assure minimum operable containment spray actuation channels.

As a result of an investigation of the effect components that might become submerged following a LOCA may have on ECCS, containment isolation and other safety-related functions, a fuse and a locked open circuit breaker were provided on the electrical feeder to emergency lighting panel 318 inside containment. With the circuit breaker in the open position, containment electrical penetration H-70 is de-energized during the accident condition. Personnel access to containment may be required during power operation. Since it is highly improbable that a LOCA would occur during this short period of time, the circuit breaker may be closed during that time to provide emergency lighting inside containment for personnel safety.

When the 138 KV source of offsite power is out of service and the 13.8KV power source is being used to feed Buses 5 and 6, the automatic transfer of 6.9 KV Buses 1, 2, 3 and 4 to offsite power after a unit trip could result in overloading of the 20 MVA 13.8 KV/6.9 KV auto-transformer. Accordingly, the intent of specification 3.7.B.3 is to prevent the automatic transfer when only the 13.8 KV source of offsite power is available. However, this specification is not intended to preclude subsequent manual operations or bus transfers once sufficient loads have been stripped to assure that the 20 MVA auto-transformer will not be overloaded by these manual actions.

References

1) FSAR - Section 8.2.1
2) NYPA Calculation, IP3-CALC-EG-00217, Revision 3, dated May 25, 1994.
3) **NYPA Calculation, IP3-CALC-EDG-02897, Revision 0, dated December 4, 1998**
4) **NYPA Evaluation, IP3-RPT-ED-02889, Revision 0, dated December 4, 1998**
5) **NYPA Calculation, IP3-CALC-RCS-02903, Revision 0, dated December 17, 1998**
6) **NYPA Calculation, IP3-CALC-SFPC-02959, Revision 0, dated January 15, 1999**