Mr. James Knubel
Chief Nuclear Officer
Power Authority of the State
of New York
123 Main Street
White Plains, NY 10601

September 14, 1999

SUBJECT: ISSUANCE OF AMENDMENT FOR INDIAN POINT NUCLEAR GENERATING UNIT NO. 3 RE: NUMBER OF EMERGENCY DIESEL GENERATORS REQUIRED TO BE OPERABLE IN COLD SHUTDOWN (TAC NO. MA4677)

Dear Mr. Knubel:

The Commission has issued the enclosed Amendment No. 194 to Facility Operating License No. DPR-64 for the Indian Point Nuclear Generating Unit No. 3. The amendment consists of changes to the Technical Specifications in response to your application transmitted by letter dated January 28, 1999, as supplemented April 29, 1999, and May 17, 1999. The amendment reduces the number of Emergency Diesel Generators required to be operable during cold shutdown from 2 to 1 under certain conditions.

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next regular biweekly Federal Register notice.

Sincerely,

ORIGINAL SIGNED BY:

George F. Wunder, Project Manager, Section 1
Project Directorate 1
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-286

Enclosures: 1. Amendment No. 194 to DPR-64
2. Safety Evaluation

cc w/encls: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 14, 1999

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Docket No. 50-286

Enclosures: 1. Amendment No. 194 to DPR-64
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cc w/encls: See next page

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Unit No. 3

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

POWER AUTHORITY OF THE STATE OF NEW YORK

DOCKET NO. 50-286

INDIAN POINT NUCLEAR GENERATING UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 194
License No. DPR-64

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by the Power Authority of the State of New York (the licensee) dated January 28, 1999, as supplemented April 29, 1999, and May 17, 1999, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-64 is hereby amended to read as follows:

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(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 194, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance to be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

S. Singh Bajwa, Section Chief, Section 1
Project Directorate 1
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical Specifications

Date of Issuance: September 14, 1999

ATTACHMENT TO LICENSE AMENDMENT NO. 194

FACILITY OPERATING LICENSE NO. DPR-64

DOCKET NO. 50-286

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contain marginal lines indicating the areas of change.

Remove Page	Insert Page
3.7-3a	3.7-3a
	3.7-3b
3.7-4	3.7-4
	3.7-4a
	3.7-4b
3.7-6	3.7-6

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 of fuel 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 AND (3) the necessary portion of AC, DC and 120 VAC vital instrument bus electrical power distribution subsystems shall be operable to support equipment required to be operable.

5. If either of the required diesel generators specified in 3.7.F.4 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 OR the offsite power source specified in 3.7.F.2 OR the necessary portion of AC, DC and 120 VAC vital instrument bus electrical power distribution subsystems specified in 3.7.F.4 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 or offsite power source or the necessary portion of AC, DC and 120 VAC vital instrument bus electrical power distribution subsystems 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: (1) 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; (2) The reactor cavity is flooded to at least 23 feet above the flange OR no fuel in the reactor or cavity. This 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;

(3) The necessary portion of the AC, DC and 120 VAC vital instrument bus electrical power distribution subsystems is operable. This provides assurance that: (a) Systems which provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core, (b) Systems needed to mitigate a fuel handling accident are available, (c) Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available and (d) 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 actions which are to be pursued without delay in response to the loss of a required on-site EDG power source or loss of required offsite power supply feeder or loss of a necessary portion of the AC, DC and 120 VAC vital instrument bus electrical power distribution subsystems. With the required on-site EDG(s), offsite power supply feeders, or necessary portion of the AC, DC and 120VAC vital instrument bus electrical power distribution subsystems 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 electrical sources or necessary electrical power distribution subsystems and to continue this action until restoration is accomplished in order to provide the necessary electrical 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.

Specification 3.7.B.1.a provides an allowance to avoid unnecessary testing of operable emergency diesel generators (EDG) upon discovery of an inoperable EDG (Reference 3). If it can be determined by evaluation that the cause of the inoperable EDG does not exist on the operable EDGs, the operability test for those EDGs does not have to be performed. If the cause of inoperability does exist on one or both of the other EDGs, the affected EDG(s) would be declared inoperable upon discovery and Specification 3.7.C would be entered. If the cause of the initial inoperable EDG cannot be confirmed not to exist on the remaining EDGs, performance of the surveillance test that starts the affected EDG(s) suffices to provide assurance of continued operability of those EDGs.

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 preplanned 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.

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) NRC Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," dated July 2, 1984.
4) NYPA Calculation, IP3-CALC-EDG-02897, Revision 0, dated December 4, 1998
5) NYPA Evaluation, IP3-RPT-ED-02889, Revision 0, dated December 4, 1998
6) NYPA Calculation, IP3-CALC-RCS-02903, Revision 0, dated December 17, 1998
7) NYPA Calculation, IP3-CALC-SFPC-02959, Revision 0, dated January 15, 1999

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 194 TO FACILITY OPERATING LICENSE NO. DPR-64

POWER AUTHORITY OF THE STATE OF NEW YORK

INDIAN POINT NUCLEAR GENERATING UNIT NO. 3

DOCKET NO. 50-286

1.0 INTRODUCTION

By letter dated January 28, 1999, as supplemented April 29, 1999, May 17, 1999, and August 11, 1999, the licensee submitted an amendment to Section 3.7.F of the Indian Point Unit 3 (IP3) Technical Specifications (TSs). The amendment proposes to reduce the number of emergency diesel generators (EDGs) that must be operable in cold shutdown from two to one under certain conditions. No action statements currently exist for those situations in which TS 3.7.F.4 requirements are not met; the amendment provides new action statements for such situations. By letters dated April 29, 1999, and May 17, 1999, the licensee revised the original submittal dated January 28, 1999, in response to questions raised by the NRC staff. The staff's original finding of no significant hazards published on April 21, 1999 (64 FR 19563) was superseded by the proposed finding dated June 2, 1999 (64 FR 19737). The licensee's submittal of August 11, 1999, corrected a grammatical error in a TS page and did not change the staff's proposed finding of no significant hazards considerations.

The Westinghouse Standard Technical Specifications (STSs), NUREG-1431, limiting condition for operation (LCO) for cold shutdown and refueling conditions, states that one EDG capable of supplying one train of the onsite Class 1E ac electrical power distribution subsystems must 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 STSs state that licensees are not required to assume a single failure along with a concurrent loss of offsite power when the unit is in cold shutdown or a refueling condition. The rationale for this practice is that many design-basis accidents (DBAs) that are analyzed in operating conditions from hot shutdown to 100-percent power have not been analyzed in cold shutdown or refueling operations. Worst case bounding events are not deemed to be credible in cold shutdown and refueling conditions because the energy contained within the reactor pressure boundary, the reactor coolant temperature/pressure, and the corresponding stresses result in a significantly reduced probability that a DBA would occur, and if it did, it would ultimately have minimal consequences. These differences from DBA analysis assumptions and design requirements during cold shutdown and refueling conditions are recognized by this LCO.

On the basis of its review, the licensee has identified an improvement in the TSs that would provide flexibility in reducing the duration of refueling outages, while still maintaining an acceptable level of safety. IP3 has three 480-Vac emergency power trains, including an EDG as a backup power source for each of the associated trains. Current auxiliary electrical

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systems TSs require two EDGs to be operable when in cold shutdown and refueling operations. This requirement causes maintenance on the EDGs to be completed in series, which could lengthen an outage and interfere with the sequencing of activities. Based on whether the preventive maintenance on the EDGs is performed every 2, 4, 6, 8, 12, or 16 years, the potential outage time savings is 6 to 10 days, with some or all of these savings possibly on the critical path. The proposed change provides added flexibility for outage management in these situations and minimizes the impact of the EDG maintenance on the outage schedule.

2.0 SAFETY EVALUATION

2.A Electrical

During some shutdown conditions, the minimum requirements of the shutdown TS are supplemented with additional voluntary measures to ensure an acceptable level of risk is maintained. This is accomplished by the proposed change to IP3 TS LCO 3.7.F.4 and addition of 3.7.F.5 and 3.7.F.6. The staff's evaluation of the licensee's proposed changes to the TSs follows:

2.A.1 Proposed Change to TS LCO 3.7.F.4

The licensee proposed to change the IP3 TS LCO 3.7.F.4, which currently reads as follows:

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

The proposed change to this TS LCO 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[1] OR no fuel is in the reactor or refueling cavity AND (3) the necessary portions of AC, DC and 120 VAC vital instrument bus electrical power distribution subsystems shall be operable to support equipment required to be operable.

2.A.2 New Action Statements 3.7.F.5 and 3.7.F.6

The licensee proposed to add the following two new Action Statements 3.7.F.5 and 3.7.F.6 to TS LCO 3.7.F:

> The new Action Statement 3.7.F.5 reads as follows:

---

[1] The plant configuration must allow water in the refueling cavity to circulate freely through the core; therefore, the vessel head must be removed and either (1) the upper internal must be removed or (2) the internals must allow a sufficient flow rate. This is discussed in Section 2B below.

If either of the required diesel generators specified in 3.7.F.4 is 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 reactivitv 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.

The new Action Statement 3.7.F.6 reads as follows:

If the one required diesel generator specified in 3.7.F.4 OR the offsite power source specified in 3.7.F.2 OR the necessary portions of AC, DC, and 120 VAC vital instrument bus electrical power distribution subsystems specified in 3.7.F.4 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 or offsite power source or the necessary portions of AC, DC and 120 VAC vital instrument bus electrical power distribution subsystems to operable status.

2.A.4 Deterministic Evaluation

The licensee stated that operation of the IP3 480-Vac electrical distribution system (EDS) is required during plant shutdown and refueling conditions to maintain safe shutdown conditions to mitigate analyzed DBAs, such as a LOOP and a loss of decay heat removal. The 480-Vac EDS consists of a distribution bus arrangement with the capability to supply power from diverse power sources. When the unit is shut down, these power sources include both offsite (138-kV and 13.8-kV feeders) and onsite (EDG) capability. The safety-related 480-Vac EDS includes four 480-Vac buses: 2A, 3A, 5A, and 6A. These 480-Vac EDS buses distribute power to engineered safety feature (ESF) motors and to safety-related motor control centers (MCCs) 36A, 36B, 36C, 36D, and 36E. The ESF motors and the safety-related MCCs 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 480-Vac EDS buses also supply power to various non-safety-related loads, including MCCs. The 480-Vac EDS can be fed from a number of independent offsite power sources. The preferred offsite source is the 138-kVac tie from Buchanan. Power from the 138-kVac EDS is distributed to 6.9-kV buses 5 and 6 through the station auxiliary transformer. The 6.9-kV buses 2, 3, 5, and 6, in turn, feed the 480-Vac EDS buses 2A, 3A, 5A, and 6A respectively, through station service transformers 5 and 6. If the preferred power source is not available, two independent 13.8-kV feeders and an independent 138-kV 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 13.8-kV feeders and a gas turbine generator (approximately 21-MW) located at 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 the 480-Vac EDS through 6.9-kV EDS switchgear if offsite power or any EDGs cannot be restored.

There are three onsite 1750-KW EDGs 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 safety-related 480-Vac EDS. Each EDG is separate and independent from the others. Safety-related 480-Vac EDS bus tie breakers between buses 2A, 3A, 5A, and 6A are 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 480-Vac bus. Power sources to each of the EDG support systems and controls are also associated with the same 480-Vac EDS bus as the EDG. Normally, each EDG is in standby condition and aligned to power its associated 480-Vac bus. During a LOOP, each EDG automatically starts and energizes its associated 480-Vac EDS bus. EDG 31 supplies power to buses 2A and 3A. EDGs 32 and 33 provide power to buses 6A and 5A, respectively. When an undervoltage condition exists on any of the 480-Vac EDS buses, the affected bus is stripped of its loads, with the exception of the associated safety-related MCCs. The respective EDG is started automatically and connected to the affected bus when the EDG is up to proper speed and voltage. Once the EDGs 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 EDGs. 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 480-Vac EDS buses to allow one EDG to supply electrical loads from an EDG-supplied 480-Vac bus to deenergized 480-Vac 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 (in accordance with TS 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 if an electrical fault occurs. If needed, and in accordance with approved operations procedural guidance, these tie breakers can be closed for powering 480-Vac 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 480-Vac EDS also provides power to its respective 125-Vdc EDS battery charger as well as to its respective 120-V vital ac EDS voltage-regulating transformers. The four 480-Vac 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.

The maximum required electrical load on each EDG during cold shutdown and refueling conditions is bounded by the required loading during DBAs and other considerations reviewed in these plant operating conditions. A single EDG is capable of supplying the necessary DBA mitigation electrical power to its connected 480-Vac bus loads, as well as to those 480-Vac EDS bus loads manually connected through closure of the bus tie breakers in the event of those DBAs analyzed in the IP3 final safety analysis report. The licensee provided the list of specific safe-shutdown plant equipment required when the plant is in cold shutdown or a refueling condition. The licensee performed a bus loading analysis/calculation to verify those loads associated with equipment needed for applicable DBA and LOOP mitigation under both cold shutdown and refueling conditions. From an accident analysis 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 exhaust fan, dc battery chargers, a fan cooler unit (FCU), various safety-related MCC loads (which also include an 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 that 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 and equipment previously mentioned also meet those functions that must be satisfied during cold shutdown and refueling conditions, the licensee reviewed these functional requirements. This review indicated a connection between those systems able to be provided by one EDG in the event of a LOOP and/or postulated DBAs 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 licensee provided a list of those necessary functional requirements versus the plant systems required to meet them.

A review of the postulated DBAs in cold shutdown and refueling provided further input and verification of those plant systems needed to mitigate the postulated DBAs 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 breakers for the various loads will be manually closed by the operating crew using administrative controls. Plant operators have sufficient time (about 3 hours or more), and margin exists to restore a decay heat removal method (RHR/SFP cooling) before a reactor cavity or an SFP heat up from 140 °F to 200 °F occurs. In light of this need to provide the necessary time for restoration of decay

heat removal, the proposed TS for one EDG in cold shutdown will allow one EDG in cold shutdown only when the reactor has been subcritical for sufficient time so that about 3 hours or more is available for operator action. This shutdown time frame, 5 days subcritical, corresponds to the time frame that is recommended because of the loss of RHR and SFP cooling and the subsequent times it takes for reactor core/SFP heatup to occur. These heatup values are as described in engineering calculations IP3-CALC-RCS-02903 and IP3-CALC-SFPC-02959. These analyses determined that if the reactor was in cold shutdown or a refueling condition and the water level in the refueling cavity was at least 23 feet above the reactor pressure vessel flange or there was no fuel in the reactor or cavity, upon a LOOP and a loss of RHR, the reactor core/cavity and SFP heatup (the time to reach 200 °F) would occur in 3 hours or more, if starting from an initial RCS or SFP temperature of 140 °F and the reactor was subcritical for 5 days. This means that RHR or SFP cooling would have to be reestablished by energizing 480-Vac EDS buses 3A, 5A, or 6A, along with the necessary support cooling systems, SW 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 SFP after a LOOP with one EDG available, with a freshly discharged reactor core after being subcritical for 5 days, will take approximately 3.2 hours. This ensures that one EDG is used at a time when the decay heat removal capability is maximized in the event of a LOOP and one EDG is called upon to restore RHR cooling in a short period.

The licensee also provided a list of specific 480-Vac bus supplies to the various electrical equipment that could be available in the case of a LOOP in cold shutdown and refueling. Depending upon which EDG is operable (when the reactor is subcritical for at least 5 days), the sequential automatic loading of that EDG will occur first.

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

Depending upon which EDG is operable, the operator can then manually close the appropriate 480-Vac bus tie breakers to place other safe-shutdown loads in service. By closing these tie breakers and having the necessary portion of ac, dc, and 120-Vac vital instrument bus electrical power distribution subsystems operable as required by the proposed TS, the needed electrical power for necessary safe-shutdown equipment is available. This scenario, using the 33 EDG as the lone operable EDG, was run on the simulator to provide further verification of bus sequencing and tie breaker closure requirements and timing. The integrated picture of 480-Vac EDS bus loading and bus tie breaker closure to energize safe-shutdown equipment was verified in an engineering evaluation (IP3-RPT-ED-02899). This evaluation specifically involved non-safety injection (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. 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 deenergized 480-Vac bus. Additional loads (RHR, SFP, charging

pump, etc.) may be manually started after 480-Vac bus power is reestablished through the bus tie breakers. The appropriate bus tie breakers are also assumed to be racked in with their control power fuses installed before the LOOP event occurring in cold shutdown. Following the closure of the tie breakers, the operator's actions to restart required loads (i.e., RHR, SFP, FCU, charging pump, etc.) are the same as currently required once power is reestablished 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 a refueling condition. The previously discussed report of bus load sequencing examined various scenarios and determined that with any one of the three EDGs 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 or more heatup time (to reach 200°F) with the reactor subcritical for 5 days. This 3-hour or more value was put into the TS bases in order to demonstrate that ample time was available to meet the established (1-hour) margin, which is a result of the expected 1-hour time needed for operators to restore electrical power with the one EDG and 1 hour added for conservatism in this restoration process.

The licensee also reviewed all other technical and operational specifications to identify any other specifications that would be affected and would have to be changed as a result of this proposed amendment. The licensee determined that no other specifications require revision because the operability of the RHR equipment and its associated support equipment is maintained upon a LOOP with one operable EDG in cold shutdown by virtue of the existing TS 3.7.G. The lone EDG, through 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.

The licensee concluded that all required systems, when operating in conformance with the proposed TS, can accomplish the following:

- Perform their required safety function(s) during postulated DBAs in both cold shutdown and refueling conditions.

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

2.B Nuclear

The principle difference between Cold Shutdown and Refueling Mode operation where two EDGs are required, and Refueling Mode operation where the proposed amendment requests that one EDG be required, is the presence of a large body of water in the refueling cavity to provide extended core cooling if the RHR system is not in operation. The licensee stated that, following 5 subcritical days, it would take more than 3 hours after loss of all RHR before this large volume of water begins to boil. In the absence of an event that drains the refueling cavity, It would also take more than a day before core cooling was jeopardized. These characteristics may be contrasted to midloop operation, where boiling would initiate in about 15 minutes and

core uncovery could occur in roughly an hour, an operating condition where the licensee would retain two EDGs.

Key considerations that ensure refueling cavity water will provide core cooling are that (1) the RV head be removed and (2) there be sufficient circulation between the refueling cavity water and the core to ensure core cooling. Reference in the licensee's action item IPN-99-009-01 for revising operating procedures to have the RV head removed as a condition for going to one EDG addresses the first consideration. The licensee's Daily Shutdown Risk Assessment, a part of the licensee's "Outage Risk Assessment," identifies "RV upper internals removed during refueling" as an item contributing to maintenance of key safety functions that is used for assessing risk, which shows that the licensee understands the second consideration.[2]

As part of its justification, the licensee states in its amendment request that "[t]he 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 1 hour identified as margin for the operating crew." A review of the licensee's "Outage Risk Assessment" showed that it provides guidance for assessment of an outage prior to and during the outage. It addresses such topics as outage review, risk, and schedule revisions; and assigns responsibilities. The licensee, therefore, is consistent with the existing initiatives and voluntary actions identified by the Commission.

The staff finds that the proposed amendment is consistent with existing regulations and that licensee procedures and plans for the conduct of shutdown operations, as referenced above, are consistent with the Commission's understanding of voluntary operations that control operational risk to acceptable levels.

2.5 Conclusion of the Deterministic Review

The staff evaluated the proposed change to reduce the number of EDGs that must be operable in cold shutdown from two to one under certain conditions (that is, the reactor is in cold shutdown or a refueling condition and has been subcritical for at least 5 days and 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, and the necessary portions of the ac, dc, and 120-Vac vital instrument bus electrical power distribution subsystems shall be operable to support the equipment that must be operable). The staff concludes that the licensee's request of one operable EDG required in cold shutdown or in a refueling condition under certain conditions is acceptable. The staff's conclusion is based on the following information: (1) one EDG has adequate capacity and capability to mitigate applicable DBAs and LOOPs during both cold shutdown and refueling conditions, (2) an independent Appendix R diesel generator with a rating greater than the EDG rating will be available to supply ac power if offsite power or any EDGs cannot be restored, (3) in addition to 138-kV and 345-kV offsite power, there are two gas turbine generators at the Buchanan substation connected to the 13.8-kV underground feeders and a gas turbine generator located at the IP3 site, (4) the decay heat level is relatively low

[2]This administrative procedure is to be rewritten to support the LAR-requested change.

because of the time that has elapsed since the initial reactor shutdown, and (5) there is sufficient time (at least 3 hours) to respond to a LOOP event before the water temperature reaches 200 °F from the initial temperature of 140°F when the reactor cavity is flooded or the SFP is completely loaded with fuel. Also, the staff finds that the changes to the TS Bases Section are consistent with the requested change to TS LCO 3.7.F.4 and the addition of two new Action Statements 3.7.F.5 and 3.7.F.6 and are, therefore, acceptable.

2.6 Risk Evaluation

The staff evaluated the risk associated with the proposed change in the EDG configuration during shutdown. The change involves reducing the number of EDGs that must be operable in cold shutdown from two to one under certain conditions.

The licensee indicated that the proposed change is intended to provide operational flexibility and reduce the duration of the refueling outage while maintaining an acceptable level of safety. The proposed TS change would be used only under the following conditions: (1) the reactor is in cold shutdown or a refueling condition and has been subcritical for at least 5 days AND (2) the water level in the refueling cavity above the top of the vessel flange is equal to or greater than 23 feet OR no fuel is in the reactor or refueling cavity AND (3) the necessary portions of ac, dc, and 120-Vac vital instrument bus electrical power distribution subsystems shall be operable to support equipment that must be operable.

The proposed change would have an impact on the reliability of emergency power given a loss of offsite power. It stems mainly from the potential increase in human error rates and hardware failure rates associated with cross-tie operations. The relevant accident scenario is associated with a LOOP initiating event, followed by a total loss of emergency power. This scenario would result in a complete loss of the decay heat removal capability for the plant and an eventual damage to the reactor core unless either offsite power or the emergency power supply were recovered.

A typical shutdown risk analysis divides an outage into different states called plant operating states (POSs) to represent the changing plant condition and configuration during low-power and shutdown operation. The POS in which the plant would be placed during the proposed condition is characterized by the following aspects: (1) the RCS temperature is relatively low, (2) reactor head is removed and the refueling cavity is filled with the water from the refueling water storage tank, and (3) the decay heat level is relatively low because of the time elapsed since the initial reactor shutdown. Previous shutdown risk studies, including NUREG/CR-6144 ("Evaluation of Potential Severe Accidents During Low Power and Shutdown Operations at Surry, Unit 1," October 1995) and NUREG-1449 ("Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States," September 1993), found that reduced inventory or mid-loop configuration and human errors are dominant contributors to the plant risk during low-power and shutdown operations. Further, plant risk was found to be substantially lower when the refueling cavity was filled for refueling. The proposed configuration is not associated with reduced inventory or mid-loop operations. In fact, the Surry shutdown study, NUREG-6144, found that this proposed POS is one of the safest among all POSs representing low-power and shutdown operations at Surry, which is of the same Westinghouse four-loop vintage as IP3. The water in the refueling cavity has an unrestricted access to the core region;

therefore, the time to heat up and boil off the substantially larger volume of water would be much longer than is the case for most, if not all, other POSs.

The provision of the 5 days in subcriticality ensures that the amount of decay heat would be substantially reduced, thus providing a much longer time for operator response following a loss of decay heat removal event during shutdown. The licensee's engineering analysis indicates that there would be more than 3 hours available for operators to respond to a LOOP event before the water temperature reaches 200°F from an initial temperature of 140°F. In the meantime, the licensee indicates that the amount of time to cross-connect the safety buses would take approximately 1 hour. Therefore, there would be sufficient time for an operator to cross-connect the safety buses. In addition, there would be an additional, extensive amount of time available for operators to act before the beginning of core damage because of the large volume of water in the refueling cavity and in the core. This would significantly enhance the probability of recovery of either offsite power or an emergency power supply. The Surry study found that operators would have more than 3 days available given a station blackout in this POS before the onset of core damage.

The relevant accident sequences are associated with long-term station blackout scenarios (late release). Therefore, combined with the small core damage risk impact, the risk impact on large early release is also small. In this staff risk evaluation, the risk is considered "small" in the sense that the impact on plant risk meets the acceptance guidelines set forth in Regulatory Guide 1.174 ("An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," July 1998).

In summary, the staff finds that the POS in which the plant would be placed during the proposed condition is among the safest plant configurations during an outage. This finding stems mainly from the considerable amount of time available for operators to respond to a potential loss of decay heat removal capability as a result of a station blackout event. More specifically, because of the considerable amount of time available, the relevant key parameters for a shutdown risk analysis would be far less significant than for other POSs. For example, the human error rates associated with the manual cross-tie operations would be small as a result. The non-recovery probability of offsite power or emergency power given a station blackout would also be low as a result. In the end, the overall impact on the reliability of emergency power would be small, and the risk impact on core damage and large early release would consequently be small.

Therefore, the staff concludes that the risk impact of the proposed change in EDG configuration would be small, and risk findings and insights support the proposed change.

The licensee submitted an amendment to TS Section 3.7.F.4 to reduce the number of EDGs that must be operable in cold shutdown from two to one under the following conditions: (1) the reactor is in cold shutdown or a refueling condition and has been subcritical for at least 5 days AND (2) the water level in the refueling cavity above the top of the vessel flange is equal to or greater than 23 feet OR no fuel is in the reactor or the refueling cavity AND (3) the necessary portions of ac, dc, and 120-Vac vital instrument bus electrical power distribution subsystems shall be operable to support the equipment that must be operable. The amendment also included two new action statements.

The NRC staff has reviewed the proposed changes from a deterministic and risk perspective. We conclude that the risk findings and insights and the deterministic evaluation support the reduction of the number of EDGs that must be operable in cold shutdown from two to one under the stated conditions.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New York State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (64 FR 29713). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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AMENDMENT NO. 194 TO FACILITY OPERATING LICENSE NO. DPR-64-INDIAN POINT UNIT 3

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