SERIAL: HNP-11-079
10 CFR 50.90

Progress Energy

AUG 31 2011

U.S. Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/RENEWED LICENSE NO. NPF-63
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
REGARDING MEASUREMENT UNCERTAINTY RECAPTURE
POWER UPRATE LICENSE AMENDMENT REQUEST

References:

1. Letter from B. Mozafari, Nuclear Regulatory Commission, to W. Jefferson Jr., "Shearon Harris Nuclear Power Plant, Unit 1 – Request for Additional Information Regarding Measurement Uncertainty Recapture Power Uprate (TAC No. ME6169)," dated August 5, 2011. (ADAMS Accession ML11213A179)

2. Email from B. Mozafari, Nuclear Regulatory Commission, to J. Caves, "MUR RAI (EEB) (ME6169)", dated August 4, 2011

3. Letter from W. Jefferson to the Nuclear Regulatory Commission (Serial: HNP-11-065), "Shearon Harris Nuclear Power Plant, Unit 1, Docket No. 50-400/Renewed License No. NPF-63, Supplement to Measurement Uncertainty Recapture Power Uprate License Amendment Request," dated June 23, 2011. (ADAMS Accession ML11179A052)

4. Letter from C. L. Burton to the Nuclear Regulatory Commission (Serial: HNP-11-001), "Shearon Harris Nuclear Power Plant, Unit 1, Docket No. 50-400/Renewed License No. NPF-63, Request for License Amendment, Measurement Uncertainty Recapture Power Uprate," dated April 28, 2011. (ADAMS Accession ML11124A180)

Ladies and Gentlemen:

On August 4, 2011, the Harris Nuclear Plant (HNP) received a request from the NRC (Reference 2) for additional information needed to facilitate the review of the License Amendment Request to increase the rated thermal power (RTP) level from 2900 megawatts thermal (MWt) to 2948 MWt, and make Technical Specification changes as necessary to support operation at the uprated power level. The proposed change is an increase in RTP of approximately 1.66 percent. The proposed uprate is characterized as a measurement uncertainty recapture using the Cameron Leading Edge Flow Meter CheckPlus System to improve plant calorimetric heat balance measurement accuracy. This original request was submitted as Serial: HNP-11-001 (Reference 4).

Progress Energy Carolinas, Inc.
Harris Nuclear Plant
P. O. Box 165
New Hill, NC 27562

A001
NRR

The Enclosure to this submittal contains HNP's response to the NRC's request for additional information.

This document contains no new Regulatory Commitment.

In accordance with 10 CFR 50.91(b), HNP is providing the state of North Carolina with a copy of this response.

Please refer any questions regarding this submittal to Mr. David Corlett, Supervisor – HNP Licensing/Regulatory Programs, at (919) 362-3137.

I declare under penalty of perjury that the foregoing is true and correct. Executed on
[8-31-11].

Sincerely,

Keith Holbrook
Manager - Support Services
Harris Nuclear Plant

RKH/kab

Enclosure: Response to Request for Additional Information

cc: Mr. J. D. Austin, NRC Sr. Resident Inspector, HNP
Mr. W. L. Cox, III, Section Chief, N.C. DENR
Mr. V. M. McCree, NRC Regional Administrator, Region II
Mrs. B. L. Mozafari, NRC Project Manager, HNP

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Summary

By letter dated April 28, 2011, (ADAMS Accession No. ML11124A180), Carolina Power & Light Company (CP&L), now doing business as Progress Energy Carolinas, Inc. (PEC), submitted a proposed amendment for the Shearon Harris Nuclear Power Plant, Unit 1 (HNP). The proposed amendment will increase the rated thermal power (RTP) level from 2900 megawatts thermal (MWt) to 2948 MWt, and make Technical Specification (TS) changes as necessary to support operation at the uprated power level. The proposed change is an increase in RTP of approximately 1.66 percent. The proposed uprate is characterized as a measurement uncertainty recapture (MUR) using the Cameron Leading Edge Flow Meter (LEFM) CheckPlus System to improve plant calorimetric heat balance measurement accuracy. The proposed change will revise Renewed Operating License NPF-63 Maximum Power Level; Appendix A, TS definition of RTP; Reactor Core Safety Limits; Reactor Trip System Instrumentation; Minimum Allowable Power Range Neutron Flux high setpoint with Inoperable Steam Line Safety Valves; and TS Bases Section 3/4.7.1 to reflect the uprated reactor core power level.

By letter dated June 23, 2011, (ADAMS Access No. ML11179A052), CP&L submitted a supplement to the proposed amendment for HNP. The information in the supplement provided updates to Enclosure 2, Section V, "Electrical Equipment Design," of the proposed license amendment request.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information submitted by the licensee, and based on this review determined the following information is required to complete the evaluation of the subject amendment request:

Request 1:

In Enclosure 2, Section V.1.B, "Station Blackout - Class 1E Battery Capacity," the licensee stated that Shearon Harris Nuclear Power Plant, Unit 1 (HNP) has two Class 1E battery systems with sufficient capacity, including 10% margin, to power station blackout (SBO) loads for 4 hours.

Provide a summary of the Class 1E battery sizing calculations that demonstrates sufficient capacity exists for the 4-hour SBO coping duration under MUR power uprate conditions. Discuss and provide details of any load-shedding, if considered, in the 4-hour coping duration.

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Response:

HNP calculation E4-0008, *125VDC 1E Battery Sizing and Battery/Panel Voltages for Station Blackout*, is the basis for verification of the 10 percent margin for SBO. It is based on the equipment loading during a SBO. The only possible impact of the MUR power uprate on this calculation would be due to increased decay heat removal. Decay Heat Removal is performed via the Turbine Driven Auxiliary Feedwater (AFW) Pump, and by Steam Generator (SG) Power Operated Relief Valves (PORVs). Calculation E4-0008 established the design loading for the equipment used during SBO and then used a computer program to vary the voltage and loads connected for the four hours. As the equipment being used is un-changed, and the calculation uses design electrical load numbers, there is no impact on this calculation by the MUR power uprate, and the calculation remains bounding.

The load shedding used in the SBO coping analysis is unchanged from the analysis prior to the MUR power uprate. As stated in HNP calculation 8S44-P-101, *Station Blackout Coping Analysis Report*, "Load shed assumptions and requirements in calculations E4-0009 and E4-0010 have been incorporated into EOP-EPP-001." E4-0009 is the HNP calculation for *125VDC Non-1E Battery Load Data and Duty Cycle*, E4-0010 is the HNP calculation for *125VDC Non-1E Battery Sizing & Battery/Panel Voltages,* and EOP-EPP-001 is the HNP Emergency Operating Procedure for *Loss of AC Power to 1A-SA and 1B-SB Buses.*

From HNP calculation E4-0006, *Safety Batteries 1A-SA & 1B-SB Load Profile Determination (LOCA/SBO),* "During an SBO event, Reference 2.13 directs that both ESS panels' feeder breakers (circuit no. 8 on 125V DC panels DP- 1A-SA and DP- 1B-SB) be manually opened. This analysis conservatively assumes that they are opened at 60 minutes after the initiation of the SBO event." Reference 2.13 in the above statement refers to EOP-EPP-001.

Step 11.b in EOP-EPP-0001 states, "Locally de-energize control power to the emergency safeguards sequencers:

- DP-1A-SA CKT #8
- DP-1B-SB CKT #8

The remaining load shedding requirements are listed in Attachment 3 of EOP-EPP-001, *DC Load Shed List*, as follows:

1. 125 VDC Non-Safety Loads, RAB 286 South Switchgear Room
    - 125 VDC Panel 1A (DP-1A)

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- 125 VDC Panel 1A-1 (DP-1A-1)

2. 125 VDC Safety Loads , RAB 286 South Switchgear Room
   - 125 VDC Panel 1A-SA (DP-1A-SA)
3. 125 VDC Non-safety Loads , RAB 286 North Switchgear Room
   - 125 VDC Panel 1A-2 (DP-1A2)
4. 120 VAC UPS Loads, RAB 286 North Switchgear Room
   - 125 VDC Panel 1B-SB (DP-1B-SB)
5. 120 VAC UPS Loads, RAB 286 North Switchgear Room
   - UPP-1A
   - UPP-1B VITAL
   - UPP-1: BAY 7
   - UPP-1: BAY 8
6. 125 VDC Non-safety Power, TB 286
   - DP-1A11

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Request 2:

In Enclosure 2, Section V.1.C, "EQ (environmental qualification) of Electrical Equipment," the licensee stated that they conducted an evaluation and concluded that the power uprate will not impact the equipment qualification.

Provide temperature, pressure, and radiation levels (curves or tables) to demonstrate that the EQ of all equipment remains bounding for both normal operating and under accident conditions for the proposed MUR power uprate.

Response:

The EQ evaluations performed for the HNP MUR power uprate have demonstrated that the current analyses of record (AORs) remain bounding for EQ, and as a result the EQ Program is not affected by the HNP MUR power uprate. The EPITOME software's mass and energy (M&E) release errors result in new temperature/pressure profiles that have been shown to remain within the existing margins of EQ equipment tests.

The purpose of the EQ evaluation is to determine if the electrical equipment identified in the EQ Program for environmental qualification will continue to operate satisfactorily and continue to perform the intended functions at the uprated conditions to satisfy the requirements outlined in 10 CFR 50.49 "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants."

The following conditions were evaluated:

- Loss of coolant accident (LOCA) and main steam line break (MSLB) pressure/temperature inside containment
- MSLB/main feedwater line break (MFWLB) pressure/temperature outside containment
- Other high energy line breaks (HELBs) pressure/temperature outside containment
- Radiation – accident and normal

The effect of the MUR power uprate on each of the bulleted topics is discussed below, and for each topic it was concluded that the current AORs remain bounding.

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LOCA and MSLB Pressure/Temperature Inside Containment

A review of the HNP Final Safety Analysis Report (FSAR) Section 3.6A.2, *High Energy Pipe Break Outside Containment,* indicates that the pressure/temperature profile calculations for both a LOCA and a MSLB in containment were performed using a power level of 102 percent of rated power. HNP FSAR Section 3.11C, *Supplemental Environmental Qualification of Inside Containment Safety Related Electrical Equipment*, also indicates that the M&E release calculations were performed assuming a 102 percent power level.

Calculation HNP-M/MECH-1008, *Revised Containment Analysis for an Increase in the Initial Temperature from 120 °F to 135 °F*, indicates that the MSLB calculation uses 102 percent of rated power. For LOCA, the double-ended pump suction (DEPS) and double-ended hot leg (DEHL) analyses within HNP-M/MECH-1008 use M&E release output from Westinghouse. Westinghouse indicates that their methodology for M&E release is to use 102 percent of rated power.

MSLB/MFWLB Pressure/Temperature Outside Containment

The MSLB and MFWLB analyses were performed using a power level of 102 percent of the rated power level. HNP FSAR Section 3.11E, *Supplemental Environmental Qualification of Safety Related Electrical Equipment Inside the Main Steam Tunnel*, indicates that the M&E release calculations were performed assuming a 102 percent power level.

The HNP AOR for the inside and outside containment long-term steam line breaks assumes a 2 percent calorimetric uncertainty added to the reactor power of 2,900 MWt, with an addition of 12.4 MWt reactor coolant pump heat. Therefore, as long as the sum of the power increase and power calorimetric uncertainty does not exceed 2 percent, there is no effect on either the current licensing basis long-term steam line break M&E release analysis or the FSAR conclusions.

Other HELBs Pressure/Temperature Outside Containment

The HNP FSAR, Section 3.6A.2.3, *Environmental Effect of High Energy Line Breaks Outside Containment*, identifies that the following high energy pipe systems were considered for pipe rupture analysis outside of containment:

- Chemical and volume control system
- Steam generator blowdown system
- Main steam and feedwater
- Auxiliary feedwater

- Extraction steam and auxiliary steam lines
- Safety injection system

All FSAR conclusions related to the long-term and short-term M&E releases remain valid for the HNP MUR power uprate.

<u>Radiation Environments to Support Equipment Qualification, Accident and Normal Conditions</u>
NUREG-0800, Standard Review Plan (SRP), Section 3.11, *Environmental Qualification of Mechanical and Electrical Equipment*, states that the radiation environment for component qualification shall be based on the integrated effects of the normally-expected radiation environment over the equipment's installed life, plus that associated with the most severe design basis event during or following which the equipment is required to be functional. Thus, for the HNP MUR power uprate, the normal operation and accident environments for safety-related components are required to be estimated based on a core power level of approximately 2,948 MWt and 2,958 MWt, respectively.

Because the current licensed core power level of 2,900 MWt adjusted for calorimetric error of +2 percent of power (that is, 2,958 MWt) was assumed in the AORs supporting the above assessments, and the sum of the HNP MUR power uprate power increase (1.66 percent) and the power calorimetric uncertainty (0.34 percent) does not exceed 2 percent, it is concluded that the HNP MUR power uprate operation will have no effect on the accident dose estimates inside and outside containment and will continue to be conservative for the normal operation dose estimates in the Reactor Auxiliary Building.

The normal operation dose inside containment is primarily dependent on the N-16 concentration in the Reactor Coolant System. The normal operation doses inside containment developed in support of the HNP Steam Generator Replacement power uprate reflect the increase in specific activity of N-16 and are based on a core power level of 2,900 MWt. Subsequent to the HNP MUR power uprate, the normal operation dose rate inside containment areas influenced by N-16 will increase by 1.66 percent.

A review of the source documents supporting the current normal operation doses inside containment indicates that the values reported in HNP EQ design basis document represent 60 years of operation at 2,900 MWt (that is, no credit is given to the fact that HNP operated for 14 years at a core power level of 2,775 MWt).

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Subsequent to the HNP MUR power uprate, the actual power history of HNP would be: 14 years at a core power level of 2,775 MWt; 10 years at a core power level of 2,900 MWt; and 36 years at a core power level of 2,948 MWt. For the above operation history, the effective power level averaged over the 60 year period is approximately 2,900 MWt.

Therefore, it is concluded that due to available margin resulting from current methodology, the current normal operation dose estimates for inside-containment locations remain applicable for the HNP MUR power uprate.

EPITOME Errors – HNP EQ Program Impact

Westinghouse found that the M&E release software code EPITOME contains an error which could result in an increase in the containment pressure and temperature for the DEPS LOCA. This deficiency has been identified in the HNP Corrective Action Program. EQ evaluations have been performed to show that the EQ Program's existing test limits provide sufficient margin to address the increases that result from correcting M&E releases for the DEPS LOCA. These evaluations concluded that the HNP EQ Program equipment located within containment can be shown to remain fully qualified for a corrected temperature/pressure profile that incorporates corrections to M&E errors in the EPITOME software.

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Request 3:

In Enclosure 2, Section V.1.D, "Grid Stability - Power Flow Analysis," the licensee stated that based on summer 2010 study results extrapolated for future years, no thermal or voltage impacts were identified.

Provide a summary of the power flow analysis. Confirm whether the power flow analysis also included winter loading in addition to the summer loading. If not, explain why winter loading was not considered.

Response:

The power flow analysis examined the impact on the transmission grid of operating the HNP generating unit at the increased power level under both normal and contingency operating conditions. Contingencies included the loss of various transmission lines, as well as the loss of the HNP unit itself. This analysis is performed by PEC Transmission Planning using Siemens Power System Simulator for Engineering (PSSE) software. PSSE is used by the majority of the utilities in the Eastern Interconnection for these types of studies. Since the power increases were to be implemented in several steps beginning in 2010, Transmission Planning examined the impact from that point forward. "Summer 2010" means that a power flow case was used which reflected transmission system loading conditions during the summer peak period. "Extrapolated for future years" means that the same summer peak conditions for future years were examined, based on load forecast projections for those years. Since HNP is within a summer peaking utility, forecasted transmission system loads for a given year are higher in the summer than during the winter. Therefore, analysis results using summer loading conditions would bound results for expected winter loading conditions. The study results indicated that no transmission line overloads (thermal issues) or unacceptable voltages would be expected as a result of the proposed power increase.

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Request 4:

In Enclosure 2, Section V.1.D, "Grid Stability – Large Generator Interconnect Power Factor Requirement," the licensee stated that for a 66 Mega Watt electric (MWe) increase on HNP Unit 1, a generator nameplate rating of 1155 Mega Volt Ampere at 0.94 Power factor lagging was required.

Provide a summary of the calculation that confirms that the capability of the replacement main generator will bound the MVAs Reactive requirement corresponding to the 66 MWe increase.

Response:

PEC Transmission Planning determines the MVAR requirement for generation additions, including MW increases of existing generators. The requirement is that the generation must be capable of delivering the additional MW output to the point of interconnection (POI) at a 0.95 lagging power factor. For an existing generating unit which is being uprated, this requirement applies only to the MW increase. The existing MW output of the unit is grandfathered at the unit's present MVAR capability or a MVAR capability equivalent to 0.95 lagging power factor at the POI, whichever is less. This information is used to determine what the required generator MVA/Power Factor nameplate must be to meet the MVAR capability requirement. Figure 1 below illustrates how this was done for the HNP MUR power uprate 66 MW increase. The *Grandfathered Capability* is shown as a power triangle for the original generator, rated at 1045 MVA. Using the 1045 MVA and the maximum gross MW output prior to uprate (1005 MW) yields a grandfathered MVAR capability of 286.4 MVAR. By agreement between HNP and Transmission Planning, an *Incremental Increase* of 80 MW was assumed to allow some margin over the proposed 66 MW increase. This 80 MW was used only for purposes of calculating the MVAR requirement and generator nameplate requirement. Using the 80 MW increase, an additional 51.9 MVAR would be required at the generator terminals. This value takes into account the additional losses in the main (step up) transformer, referred to as *GSU* in Figure 1, due to the increase. The *Resultant Capability* triangle is the geometric sum of the *Grandfathered Capability* and *Incremental Increase* triangles. From the *Resultant Capability* triangle, a generator nameplate of 1136.5 MVA at 0.9547 power factor is required. Based on this, the actual installed generator nameplate was chosen to be 1155 MVA at 0.94 power factor. As can be seen in the figure, this does not mean that the entire MW output of the unit conforms to the 0.95 lagging power factor at the POI requirement.

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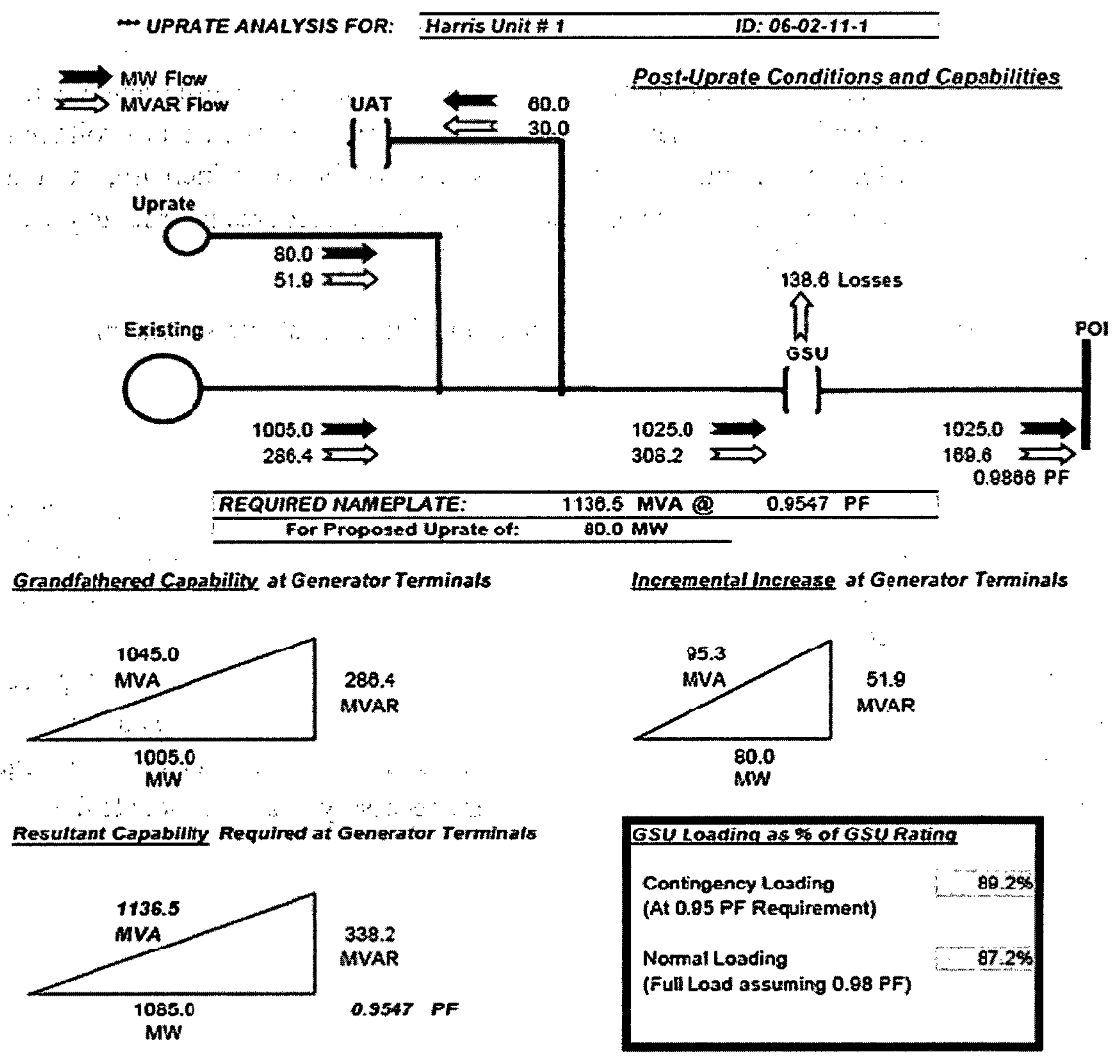

Figure 1. MVAR Capability and Generator Nameplate Requirement Example

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Request 5:

In Enclosure 2, Section V.1.D, "Grid Stability – Stability Analysis," the licensee stated that Nuclear Plant Interface Requirements (that include a minimum required switchyard voltage and plant post-trip auxiliary loading), remain unchanged as a result of the MWe increase, and that no changes are necessary to existing transmission system operating procedures in order to provide adequate voltage support to HNP.

Provide a summary of the analysis that was performed to validate the above statement.

Response:

"Minimum required switchyard voltage" is the voltage necessary in the HNP 230 kV switchyard to ensure proper operation of emergency loads following a trip of the HNP generator (for either LOCA or non-LOCA caused trips). Both the minimum required switchyard voltage and the plant post-trip auxiliary loading are provided by HNP Engineering to PEC Transmission Planning as required by NERC Reliability Standard NUC-001-2. Transmission Planning uses this as input in determining how the transmission grid must be operated to ensure adequate switchyard voltage is available from offsite power. Since neither of these values were changed, no transmission system operating procedure changes were necessary to accommodate the proposed power increases.

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Request 6:

In Enclosure 2, Section V.1.D, "Grid Stability – Short Circuit Analysis," the licensee stated that the evaluation results indicate that the interrupting capability of the transmission equipment in the surrounding area would not be adversely impacted by the proposed generation uprate.

Provide a summary of the analysis that was performed to validate the above statement.

Response:

The short circuit analysis was performed by PEC Transmission Protection and Control Engineering using Aspen OneLiner software. The analysis considered the change in short circuit current contribution due to the new 1155 MVA HNP generator, as well as the future impact of a new transmission line to be terminated in the HNP 230 kV switchyard (currently scheduled for June 2014). The analysis showed that the maximum available switchyard fault current would be less than 45,000 amps. The short circuit interrupting capability of the existing HNP switchyard breakers are 63,000 amps, except for one 50,000 amp breaker. The 50,000 amp breaker is also acceptable, but is currently scheduled to be replaced for other reasons with a 63,000 amp breaker in the fall of 2011.

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Request 7:

In Enclosure 2, Section V.1.E, "Onsite Power Systems – Alternating Current (AC) Distribution System," the licensee stated that the electrical changes resulting from the power uprate occur in the balance of plant equipment, primarily at the 6.9 kiloVolt (kV) level. The licensee noted that the following loads were affected: main feedwater pumps, condensate pumps, condensate booster pumps, heater drain pumps, and reactor coolant pumps. The licensee stated that the net increase in break horse power (hp) for the motors associated with these pumps is small, in the range of 100-200 hp.

Provide the rated horsepower (hp) for the motors associated with the above pumps, and the break hp requirements for pre- and post-MUR power uprate conditions. Also provide a summary of the worst case steady-state voltages at the 6.9 kV buses for pre- and post-MUR power uprate conditions, in a table form, to validate that the voltages remain above the degraded voltage relay settings at the 6.9 kV emergency buses under MUR power uprate conditions.

Response:

See the table below.

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Description	Rated HP	BHP		6.9kV Bus	6.9kV Bus Steady State Voltages (Note-1)	
		Pre MUR	Post MUR		Pre MUR	Post MUR
Main Feed Water Pump-1A	9000	8582	8736	1A	6393	6391
Main Feed Water Pump-1B	9000	8582	8736	1B	6316	6314
Condensate Pump-1A	2000	1830	1841	1A	6393	6391
Condensate Pump-1B	2000	1830	1841	1B	6316	6314
Condensate Booster Pump-1A	3000	2905	2886	1A	6393	6391
Condensate Booster Pump-1B	3000	2905	2886	1B	6316	6314
Heater Drain Pump-1D	1500	1260	1280	1D	6664	6663
Heater Drain Pump-1E	1500	1260	1280	1E	6672	6671
Reactor Coolant Pump-1A	7000	7000	7000	1A	6393	6391
Reactor Coolant Pump-1B	7000	7000	7000	1B	6316	6314
Reactor Coolant Pump-1C (Bus 1C - normally fed from bus 1A. Alternatively fed from bus 1B.	7000	7000	7000	1C (Fed from Bus 1A/1B)	6392 / 6316	6390 / 6313
Emergency 6.9kV Bus 1A-SA	N/A	N/A	N/A	1A-SA	6663	6662
Emergency 6.9kV Bus 1B-SB	N/A	N/A	N/A	1B-SB	6671	6670

Notes:

1. Special Case:
   - Minimum switchyard voltage Limit - 222 kV. Scheduled switchyard voltage is 232.5 kV.
   - Minimum generator voltage 20.9 kV(95% of 22 kV). Scheduled generator voltage is 21.78 kV.
   - Normal loading on 6.9kV buses and Plant Operating Load Factor for 6.9kV buses 1D and 1E.

Degraded Voltage Relay nominal setpoint @6.9kV emergency buses 1A-SA & 1B-1SB is 6420 kV.

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Request 8:

In Enclosure 2, Section V.1.F.i, "Main Generator," the licensee stated that the 29.8 MWe includes approximately 19 MWe associated with the MUR assumed by the uprate and the balance from the other upgrades. Also, the main generator capability indicates that at 1021.8 MWe, the main generator is capable of exporting approximately 430 MVAR.

Clarify "other upgrades" in the above statement. Provide a copy of the main generator capability curve to validate that the generator will be operating within the limits of its capability curve.

Response:

The basis for predicting gross generation at uprated conditions was a heat balance calculation that included contributions from the MUR power uprate (the subject of this license amendment request), cooling tower fill replacement, and high pressure turbine modifications. "Other upgrades" in the above statement refer to the cooling tower fill replacement and high pressure turbine modifications.

The Generator Capability Curve is a proprietary document that demonstrates the main generator is capable of exporting approximately 430 MVAR at 1021.8 MWe. The generator capability curve is available for audit at HNP.

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Request 9:

In Enclosure 2, Section V.1.F.ii, "Isolated Phase Bus," the licensee stated that the normal conditions are defined as full real power (1021.8 MWe) with reactive power at the maximum HNP administrative limit (currently 175 MVAR lagging) and 100% nominal voltage (22 kV).

Explain the basis of the 175 MVAR lagging limit corresponding to 1021.8 MWe. Also, discuss the MVAR lagging requirement corresponding to the 66 MWe increase for which grid stability has been carried out and its impact on the isolated phase bus rating.

Response:

The 175 MVAR gross output is an administrative limit established by PEC Transmission Planning for operation of HNP under normal conditions. By limiting the HNP generator MVAR output during normal operation, the amount of local area voltage support the unit itself provides is also limited, which limits the grid impact of a trip of the HNP generator. The 175 MVAR value was chosen such that the HNP generator essentially supplies the MVARs for main (step up) transformers and unit auxiliary transformer (UAT) losses. This makes the HNP generator essentially "voltage support neutral" in that, upon a unit trip, the MVAR output and the MVAR losses will both go away. The proposed uprate of 66 MW is small enough that it is not necessary to revise the 175 MVAR limit. It should be noted that, on rare occasions, the Transmission System Operator could request HNP to exceed the 175 MVAR, if deemed appropriate for system conditions. Therefore, the 175 MVAR limit should not be used as a "hard limit" for determining potential equipment loading.

The basis of the "MVAR lagging requirement" is to ensure that the generator has sufficient capability to respond to transient conditions (e.g. faults on the transmission system) or more extreme contingencies (e.g. the loss of multiple transmission lines or localized voltage problems). Under these conditions an increased MVAR output for transient periods of several seconds to possibly several hours may be necessary. This level of support is never used as a part of routine operations and would be extremely rare. The MVAR lagging requirement (which is established as described in the response to Question #4) is somewhat independent of the 175 MVAR administrative limit.

The existing isophase bus will require increased cooling to accommodate the increase in MWe. The plant will implement a modification to the isophase bus duct cooling during the planned spring 2012 refueling. The modification will result in sufficient cooling margin to increase the

bus rating to accommodate the increased MWe production. As part of this modification package an engineering study to determine whether or not modifications to the bus insulators will be necessary to address the increase fault current will be performed. In the event a modification to the insulators is necessary, this will also be accomplished during the spring 2012 refueling. The modification design has not yet been completed; however the resultant modification will be such that the isophase bus rating will be increased to make the isophase bus capability consistent with the generator output rating at the new uprate condition.

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Request 10:

Provide a discussion on any protective relaying changes due to installation of the replacement main generator and main transformers.

Response:

The Main Generator replacement project, completed in November 2010, included replacement of the generator protective relaying. The discrete electromechanical relays were replaced by multifunction digital relays for generator protection. These multifunction relays provide the following generator protective functions: Phase Distance (21), Overexcitation (Volts/Hz) (24), Reverse Power (32), Loss of Field (40), Negative Sequence (46), Inadvertent Energization (50/27), Neutral Overvoltage (59N), Loss of Potential (60), Ground (64/37G), Underfrequency (81) and Differential (87G). In addition, a new Generator and Main Transformer Differential digital relay was installed.

It is anticipated that the Main Transformer protective relay functions, which are currently provided by discrete electromechanical relays, will be provided by one multifunctional digital relay as part of the transformer replacement project.

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Request 11:

Provide a discussion on the auxiliary power requirement for the Cameron Leading Edge Flow Meter CheckPlus System, such as direct current or AC power requirements, and its loading impact on the associated safety-related or non-safety-related bus.

Response:

The LEFM CheckPlus System consists of an electronic cabinet installed in the Secondary Sampling Equipment Enclosure located in the Turbine Building, and measurement spool pieces installed in each of the three main feedwater lines. Two 120 VAC, single phase, 60 Hz power sources are supplied to the LEFM CheckPlus system.

LEFM Electrical Load Description

The LEFM Check Plus system is not required to function during a postulated accident or event. Therefore, the system uses non-safety power sources, and emergency diesel generator loading is unaffected. There are two independent measurement systems (A and B) in one cabinet. Each measurement system has its own independent power supply. Each power supply is fed by a separate circuit from a separate power source to maintain independence.

LEFM Electronic Cabinet Power

Power Panel PP-1D341 and Power Panel PP-1E341 provide the LEFM Check Plus system electronic cabinet's two power sources. Both are existing panels with excess capacity and spare breakers and are supplied from different plant electrical busses. These power sources are not safety-related. Therefore, the LEFM Check Plus system does not impact any safety-related power supplies or emergency diesel generator loading.

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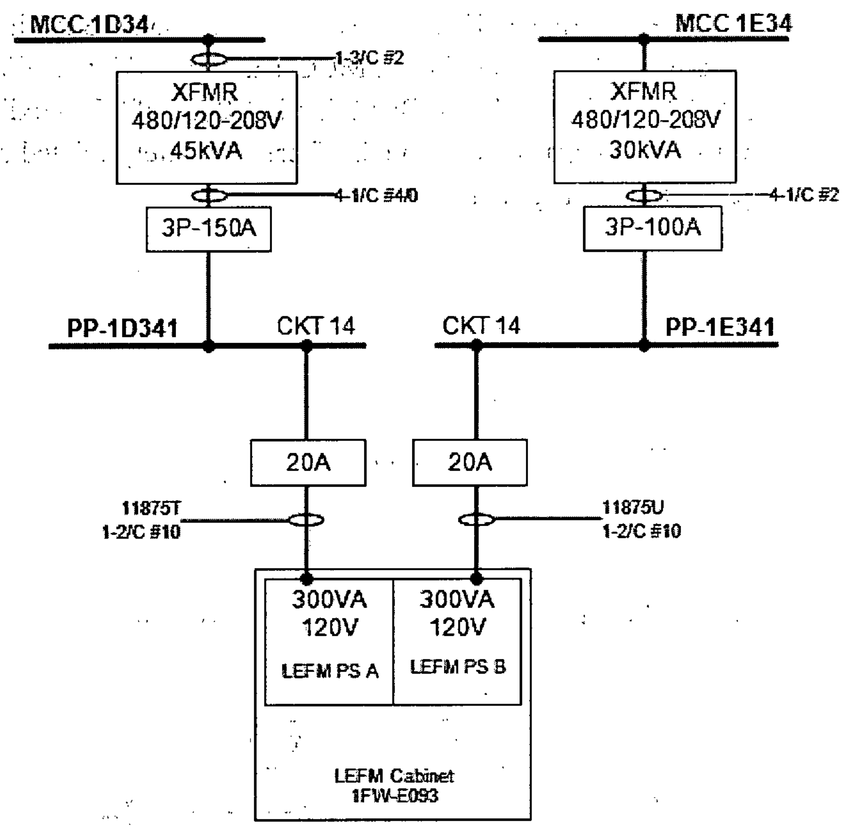


Load Changes to PP-1D341

Panel PP-1D341 had a spare three pole 20 A breaker that was originally designed for a 3200 VA load. This breaker was removed and replaced with three single pole 20 A breakers. One is used for the 600 VA LEFM load and the other two are spares. The overall impact to the panel load calculation is a decrease in total load by 2600 VA (+600 – 3200).

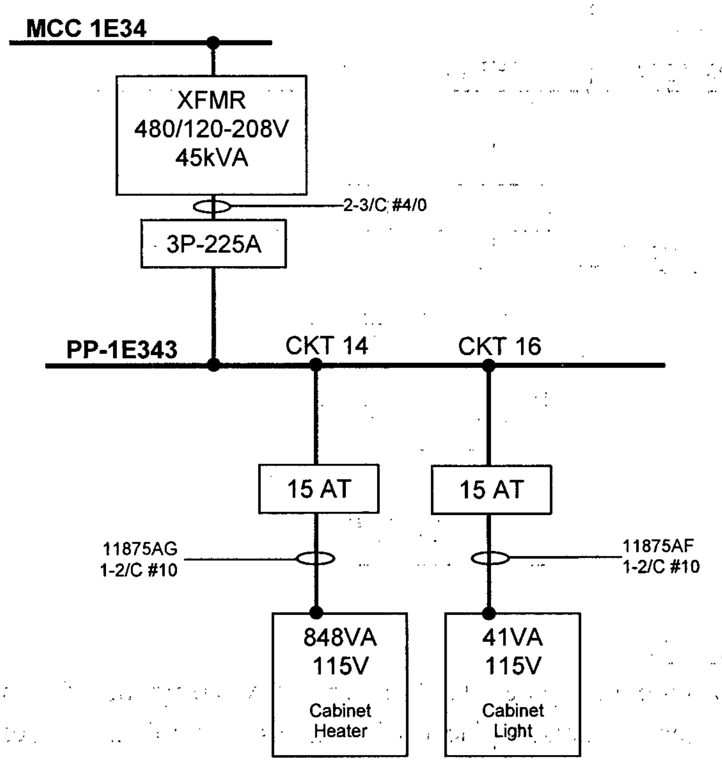
Load Changes to PP-1E341

Panel PP-1E341 had a spare single pole 40 A breaker. This breaker was removed and replaced with a single pole 20 A breaker for the 600 VA LEFM load. The panel is rated for 30 kVA and currently carries a normal load of 11.3 kVA. The overall impact to the panel load calculation is an increase in total load by 0.6 kVA to 11.9 kVA.

Pressure Transmitter Cabinet and Secondary Sampling Equipment Enclosure Air Handler Power

Power Panel PP-1E343 supplies power to the new pressure transmitter cabinet (1CAB-T1-C31) loads. Cabinet 1CAB-T1-C31 contains a space heater for freeze protection, and a light with a

120 VAC receptacle. Power Panel PP-1E343 also powers the Secondary Sampling Equipment Enclosure air handlers. Panel PP-1E343 is fed from MCC 1E34 via a 45 kVA 480 – 120/208 volt transformer. MCC 1E34 is fed from 480 V Bus 1E3 via 6.9 kV/480 V Auxiliary Transformer. This power source is not safety-related. Therefore, safety-related power supplies and emergency diesel generator loading is unaffected.



Load Changes to PP-1E343

Two new single pole 15 A breakers were added to panel PP-1E343. The space heater is an 848 VA load, and the cabinet light is a 41 VA load. The new air handlers each add 0.5 A (5.5 A old unit compared to 6.0 A new unit) to their respective circuits. The total increase load to PP-1E343 for the two new air handlers is 2 x 0.5A x 208 VAC = 208 VA. The supply transformer is rated for 45 kVA and currently carries a normal load of 27.7 kVA. The overall impact to the panel load calculation is an increase in total load of 1.1 kVA to 28.8 kVA, which is well within the supply transformer's 45 kVA rating.

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Conclusion

The LEFM CheckPlus system is powered from non-safety related busses and does not impact safety-related power supplies or the emergency diesel generator's loading. The additional LEFM CheckPlus system loading is within the capacity of the existing electrical supply busses.