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RECIP.NAME RECIPIENT AFFILIATION
VARGA,S.A. Operating Reactors Branch 1

SUBJECT: Application for amend to license DPR-23,proposing reduced primary coolant temp operation to improve steam generator operating conditions.Revised Tech Specs & Class III fee encl.

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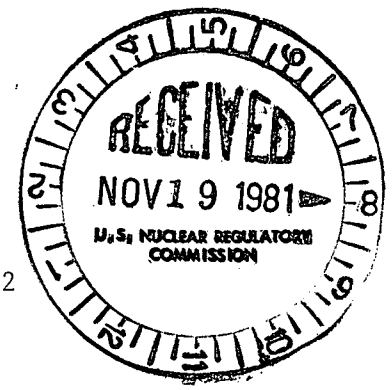

Office of Nuclear Reactor Regulation
ATTN: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
United States Nuclear Regulatory Commission
Washington, D.C. 20555

H. B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
REQUEST FOR LICENSE AMENDMENT -
REDUCED PRIMARY COOLANT TEMPERATURE OPERATION

Dear Mr. Varga;

Summary

In accordance with the Code of Federal Regulations, Title 10, Part 50.90 and Part 2.101, Carolina Power & Light Company (CP&L) hereby requests revisions to the Operating License for the H. B. Robinson Steam Electric Plant (HBR) Unit 2.

The degradation of the HBR Unit 2 steam generators is a function of temperature as evidenced by the large differences in degradation in the cold legs (T_c, 100% = 547°F) versus the hot legs (T_h, 100% = 605°F). These proposed revisions will enable operation of HBR at reduced temperature, which will improve the operating conditions within the HBR Unit 2 steam generators.

The proposed reduced temperature program can be described in terms of the following parameters. This program is expected to result in a maximum power output of 76% of rated power (2300 MWT). This limitation corresponds to the maximum expected capability of the steam turbine resulting from the reduced secondary parameters.

Current Program	Reduced Temperature
T, zero power = 547°F	T, zero power = 530°F
T_c, 100% = 546°F	T_c, 76% = 513°F
Tavg, 100% = 575°F	Tavg, 76% = 537°F
T_h, 100% = 605°F	T_h, 76% = 560°F
P steam, 100% = 800 psig	P steam, 76% = 580 psig
F_q, 100% = 2.2	F_q, 85% = 2.2

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Operation of HBR Unit 2 under the reduced temperature program will require revisions to some reactor protection system (RPS) setpoints. All of these revisions will be in the conservative direction with respect to the current (2300 MWT) values, except the steamline break protection setpoints. The following describes the safety analyses performed regarding each of the setpoints and the proposed modifications to the HBR Unit 2 operating license.

Safety Analysis

A preliminary analysis has been performed to determine the effects of operating HBR Unit 2 at reduced temperature on calculated LOCA ECCS results. This analysis includes previous calculations for HBR and calculations for a plant similar to HBR, that has been analyzed for a reduced temperature program. To provide operational flexibility at the expected maximum power level (76% of rated power) the analysis was performed assuming 85% of rated power. The conclusions of this analysis are that reduced temperature operation at 85% rated power with the current ECCS allowed $F_q = 2.2$ will lead to enhanced LOCA ECCS margins, and an expected increase in Peak Cladding Temperature (PCT) of no more than 200°F will be more than offset by the currently available margin of 200°F and the reduction in PCT of 300°F due to reduced power operation (85%). See enclosure 2 for the basis of estimates of PCT effects and graphs demonstrating the similarity between HBR Unit 2 and the other plant.

A review of anticipated operational transients at the proposed operating conditions and RPS setpoints has been performed. As part of this review thermal hydraulic calculations have been performed which show a substantial increase in the initial MDNBR. This increase in initial MDNBR assures increased thermal margins for anticipated operational transients, since the changes in MDNBR during these transients will not be substantially affected from those previously evaluated. See Enclosure 3 for additional information regarding MDNBR changes. This review specifically addressed those FSAR Section 14 transients previously demonstrated to be most limiting with respect to thermal margin. These transients include the reactor coolant pump coastdown and locked rotor loss-of-flow transients, rod withdrawal transients, and the large steam line break accident. The other transients identified in the FSAR will continue to remain non-limiting for the reduced temperature and power operating conditions.

Action

All of these new setpoints provide protection which is more conservative with respect to current Technical Specifications (TS) except the steamline break protection setpoints. With regard to the steamline break protection setpoints, changes are proposed which will establish these values such that protection equivalent to or more conservative than the current values is provided. A review of the affected sections of the TS and respective RPS setpoints is covered in the following paragraphs.

The Basis for Section 2.1, SAFETY LIMIT, REACTOR CORE, (page 2.1-5) refers to the Reactor Coolant System average temperature limit of 575.4°F. This value will now be 537.9°F, which is more conservative and will be controlled administratively with no change required to the TS.

Specification 2.3.1.2.a refers to a high flux set point (109%) for Core protection. This value will now be 92%, which is more conservative. Specification 2.3.1.2.d uses Tavg = 575.4°F for calculated Overtemperature ΔT. This value will now be 537.9°F. In the same specification ΔT_o has a value of 57.5°F at rated power. This value will now be 54.4°F at the analyzed power of 85% rated power. Specification 2.3.1.2.e uses T' which has a value of 575.4°F for calculating Overpower ΔT. This value is now 537.9°F. In the same specification ΔT_o has a value of 57.5°F at rated power. This value will now be 54.4°F at the analyzed power of 85% rated power. The proposed changes to TS are attached for your review.

Table 3.5-1, item 5, refers to a Setting Limit of 541°F Tavg, and 600 psig steam line pressure for High Steam Flow Coincident with Low Tavg or Low Steam Line Pressure. These values will now be 524°F and 450 psig, respectively, which is a non-conservative change, with respect to the present 100% power setpoints, but they will provide a margin to the reduced temperature operating conditions that is equivalent to or conservative with that margin which exists between the 100% power setpoints and the normal 100% power operating conditions. These new setpoints will be inserted into TS via a footnote. This method will enable the plant to operate up to 100% power with the original setpoints or operate under the reduced temperature program with the new setpoints. The proposed change is attached for your review.

Table 3.5-3, notation "****", refers to a primary temperature of 547°F. This value does not provide adequate protection for reduced temperature operation. The value of 530°F was chosen to be consistent under the new reduced temperature program. The proposed change is attached for your review.

Specification 3.10.2.1 refers to P (Reactor Power) which has an understood value of 1 at 100% Power for calculating F_q. The new value for P will be 1 at 85% power, which is more conservative and will be controlled administratively with no change required to the TS.

The steam generator license condition 3.I.a refers to figure 4.3.3 in Attachment B of CP&L's letter of August 27, 1981. This figure describes the effect of temperature on corrosion rate by plotting the corrosion allowance factor in terms of reactor power, assuming the current Tavg program. In order to more directly describe the effect of temperature on corrosion rate which will be valid for the proposed reduced temperature program, the attached plot of the corrosion allowance factor vs. temperature should be used instead of fig. 4.3.3. Also included is a lowering of the ΔP to be used in the pressure test. This new ΔP is the largest value that can be obtained and still remain within Technical Specifications pressure-temperature restrictions.

Finally, the interval for future pressure tests has been clarified to include the corrosion allowance factor. A revised license condition 3.I.a is provided which reflects this change.

In addition to the above Technical Specification changes, the following items have been addressed by CP&L and its contractors in developing the proposed reduced temperature program.

1. Moisture carryover from the steam generator is not expected to exceed the .25% limit. Modifications made to the HBR2 steam generators in 1980 have reduced the moisture carryover to .04% at full power, which is significantly below the required limits. This reduction in carryover is expected to more than compensate for any increase in moisture carryover as a result of the reduced temperature program. In fact, some preliminary calculations show that the moisture carryover may actually be reduced under the proposed operating conditions.

2. The new reduced temperature program will result in a higher ΔP (ΔP current = 1400 psia, ΔP proposed = 1620 psia) across the steam generator tube sheet, due to the reduced secondary system pressure. The HBR steam generator problems are due predominantly to temperature related effects and not mechanical stresses, therefore, a reduction in primary pressure is not necessary as a result of the small increase in mechanical stress.

3. No changes to the secondary water chemistry have been recommended as a result of the proposed reduced temperature program. (HBR2 has phosphate secondary chemistry).

4. It is not anticipated that there will be any significant impact on turbine disc cracking from the proposed reduced temperature operating conditions. The new operating conditions will require the turbine governors to be fully open. This will decrease the current pressure drop across the partially closed governor valves which will partially compensate for the lower steam line pressure. In addition, the turbine inspection performed last refueling outage (fall 1980) showed no indications in the low pressure turbine disks.

5. Relative to the reactor vessel integrity issue, the proposed reduced temperature program will result in slightly lower temperatures at the reactor vessel beltline. This reduced temperature could reduce self-annealing of the reactor vessel, however, this effect is expected to be minimal and no noticeable change in the rate of RT_{NDT} increase is anticipated during the short period of time (couple of years) during which the reduced temperature program is expected to be in effect. In addition, reactor power will be at a reduced level (76%) which should more than compensate for any reduction in self-annealing.

Another compensating factor is that overcooling transients are expected to be less severe at the reduced temperature conditions due to the expected smaller rate of temperature decrease. The effect of reduced temperature operation along with long term corrective measures will be addressed within the on-going Reactor Vessel Integrity Program.

The requested changes to the TS constitute one Class III Amendment in accordance with 10CFR170.22. Accordingly, our check for $4,000.00 is enclosed.

We request that you give this request prompt attention in light of the outage scheduled to begin November 6, 1981 for Steam Generator ΔP testing and instrument recalibration for the reduced Tavg program.

If you should have any questions regarding this matter, please contact us.

Yours very truly,

E. E. Utley
Executive Vice President
Power Supply and
Engineering & Construction

FMG/DS/1r (7274)
Enclosures

cc: Mr. W. J. Ross (NRC)

Sworn to and subscribed before me this 11th day of November, 1981.

Franklin Murray
Notary Public

My commission expires: Oct. 4, 1986

FRANKLIN MURRAY
NOTARY PUBLIC
WAKE COUNTY, N. C.

ENCLOSURE 1