Entergy

Entergy Operations, Inc.
Waterloo Road
P.O. Box 756
Port Gibson, MS 39150
Tel 601 437 6470

Jerry C. Roberts
Director
Nuclear Safety Assurance

GNRO-2002/00054

June 25, 2002

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

SUBJECT: Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
Response to Requests for Additional Information, Part 2
Appendix K Measurement Uncertainty Recovery – Power Uprate Request (TAC MB3972, GGNS LDC 2002-074)

REFERENCE:

1. Entergy letter dated January 31, 2002, Appendix K Measurement Uncertainty Recovery – Power Uprate Request
2. Entergy letter dated June 12, 2002, Appendix K Measurement Uncertainty Recovery – Power Uprate Request, Response to RAIs

Dear Sir or Madam:

Pursuant to 10CFR50.90, Entergy Operations, Inc. (Entergy) requested approval (Reference 1) of changes to the Grand Gulf Nuclear Station, Unit 1 (GGNS) Operating License and Technical Specifications associated with an increase in the licensed power level. The changes involve a proposed increase in the power level from 3,833 MWt to 3,898 MWt.

Entergy also provided responses to questions from the Electrical, Mechanical, and I&C Branches in Reference 2. Responses to questions from the Reactor Systems and Materials Branches are provided in Attachments 1 and 2. In addition, GGNS agreed to provide a response to the Human Performance questions related to the Waterford 3 Appendix K power uprate submittal; these are provided in Attachment 3. There are no technical changes to the original submittal proposed. The original no significant hazards considerations included in Reference 1 is not affected by any information contained in this supplemental letter.

Additional commitments made in these responses associated with the implementation of the power uprate request are summarized in Attachment 4. Should you have any questions or comments concerning this request, please contact Jerry Burford at (601) 368-5755.

A001

I declare under penalty of perjury that the foregoing is true and correct. Executed on June 25, 2002.

Sincerely,

J. C. Roberts
Director, Nuclear Safety Assurance
Grand Gulf Nuclear Station, Unit 1

JCR/FGB

Attachments:
1. Response to RXSB RAI
2. Response to Materials RAI
3. Response to Human Performance RAI
4. Commitment Summary

cc: Mr. Ellis W. Merschoff
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

Mr. D. H. Jaffe
NRR Project Manager Region IV
U. S. Nuclear Regulatory Commission
NRR Mail Stop OWFN/7D 01
Washington, DC 20555-0001

Mr. T. L. Hoeg, GGNS Senior Resident
Mr. D. E. Levanway (Wise Carter)
Mr. L. J. Smith (Wise Carter)
Mr. N. S. Reynolds
Mr. H. L. Thomas

Attachment 1

GNRO-2002-00054

Response to RXSB RAI

Attachment 1

Response to NRC RXS Branch RAI for GGNS Power Uprate

1. Confirm that the Maximum Extended Operating Domain (MEOD) operation was approved for GGNS. Specify the license amendment which approved the MEOD operation.

Response:
GGNS was licensed for the Maximum Extended Operating Domain (MEOD) in Amendment 16 to the operating license.

2. Reference is made to BWR Thermal Power Optimization (TPO) report NEDC-32938P, which is under staff review, for evaluations of several sections in the Grand Gulf safety analysis report. However, the TPO report covers power uprate to 1.5% only. Additional evaluations are required to support the GGNS application. In some cases, reference to TPO with 1.5% may still be valid. In other cases, TPO reference may not be valid. Identify the areas where the TPO is valid, and provide the bases for the additional .2% power uprate.

Response:
Every reference made to the TPO Licensing Topical Report (TLTR) in the Grand Gulf (GGNS) TPO Safety Analysis Report (TSAR) is valid.

The methodology for the evaluation of GGNS for operation at the TPO uprated power level involved various approaches. The discussion in each section of the TSAR presents the applicable approach. Where the generic analysis presented in the TLTR was used as the basis for acceptability, a confirmation was made that the generic analysis at the 1.5% uprate was valid for the GGNS 1.7% uprate.

As an example, TSAR Section 4.1 states that the previous containment evaluations are based on 102% or greater of CLTP and therefore bound the GGNS uprate of 101.7% of CLTP. In another case, TSAR Section 3.2.1 presents the evaluation for the fracture toughness of the reactor vessel based on a new plant specific analysis performed at the GGNS TPO conditions of 101.7% of CLTP. As a third example, TSAR Section 3.8 states that the generic evaluation for the Main Steam Isolation Valves (MSIV) provided in the TLTR is applicable to GGNS because the requirements for the MSIVs remain unchanged for the GGNS TPO conditions at 101.7% of CLTP.

3(a). It is stated that "Some analyses may be performed at 100% TPO RTP (101.7% of CLTP), because the uncertainty factor is accounted for in the methods, or the additional 2% margin is not required (e.g., ATWS)". Describe in detail which methods and which analyses. How much margin is there for ATWS analysis at present? What are the parameters that got the 2% margin?

Response:
The limiting transient analyses used to develop the GGNS core operating limits are all performed at rated power because the uncertainty in core power is included in the MCPR safety limit and LHGR methods. The remaining transient analyses have generally been performed at a bounding power of 104.2% CLTP.

As described in the response to Question 15, the LOCA analyses have been performed at a nominal power of 105% CLTP with the Appendix K analyses performed at 102% of 105% CLTP. Alternatively, had GGNS not already performed the LOCA at this elevated nominal power level, GGNS could have relied on the approach specified in Section 5.3.1 and Appendix D of NEDC-32938P.

The ATWS pressurization analysis has been performed at nominal TPO power consistent with the current licensing basis. As described in Section 9.3.2 of NEDC-33048, this analysis has 237 psi to the pressure limit.

The ATWS containment analysis has been performed at the CLTP of 3833 MW. As described in Section 5.3.5 and Appendix L.3 of NEDC-32938P, the impact of TPO on suppression pool temperature is less than 1°F. This value is based on reactor cores made up of GE fuel, including pre-GE11 fuels, GE11, GE13 and GE14. However, GGNS has a mixed fuel core consisting of GE11 and Atrium-10 fuel.

The primary factors that affect the peak suppression pool temperature are the time to achieve hot shutdown and the average power level during the reactor vessel level control stage. The time required to achieve hot shutdown from boron injection is not strongly affected by fuel types. The reduced core flow and the resulting power are self-regulating and are relatively independent of fuel types. Therefore, it is expected that the impact of the GGNS mixed core on the peak suppression pool temperature for a 1.7% uprate is far less than the current suppression pool temperature margin of 9.3 degrees F.

3(b). It is stated that "This strategy allows the plant to maintain most .... while assuring low power related issues such as stability and ATWS do not change because of the TPO uprate." Why are stability and ATWS characterized as low power related issues?

Response:
The referenced sentence is intended to convey that the strategy employed by TPO uprate is maintained by not increasing power in the low core flow portion of the power/flow operating map beyond that previously licensed for the plant. That strategy is to maintain the existing available core flow flexibility while ensuring adequate reactor stability. Please refer to C.2.1 of the Licensing Topical Report for TPO, NEDC-32938P.

The sentence is not interpreted that an ATWS event is a low-power event. Rather, the sentence could be worded to read, "This strategy allows the plant to maintain most ... while assuring low power related issues such as stability and ATWS **instability** do not change because of the TPO uprate [emphasis added]."

3(c). It is stated that "The operational aspect of the TPO uprate will be demonstrated by performing controller testing." Clarify which controller will be used for the test.

Response:
The controllers referred to the quoted section of the TPO SAR are in the Pressure Control System (PCS) and Feedwater/level control systems. As stated in Section 10.4 of the TPO SAR, setpoint changes will be inserted into the controllers to conduct the testing.

4. Given that GGNS cycle 12 contains about 70% of GE-11 fuel, explain why the GE evaluation models are not listed under Table 1-1, Reactor Core and Fuel Performance.

Response:
Most of the Cycle 12 analyses associated with the GE fuel have been performed with the Framatome methodologies listed in Table 1-1. The few analyses of the GE fuel that have been performed with GE methods include the Appendix K LOCA analysis and fuel thermal-mechanical analyses. However, since these analyses did not require revision for the TPO, these methods were not reported in Table 1-1.

5. Confirm that the analyses performed for reactor performance improvement features bounds 101.7% power level.

Response:
The GGNS reload analyses incorporate the listed reactor improvement features. All of these reload analyses have been performed at a core power level of at least 101.7% CLTP.

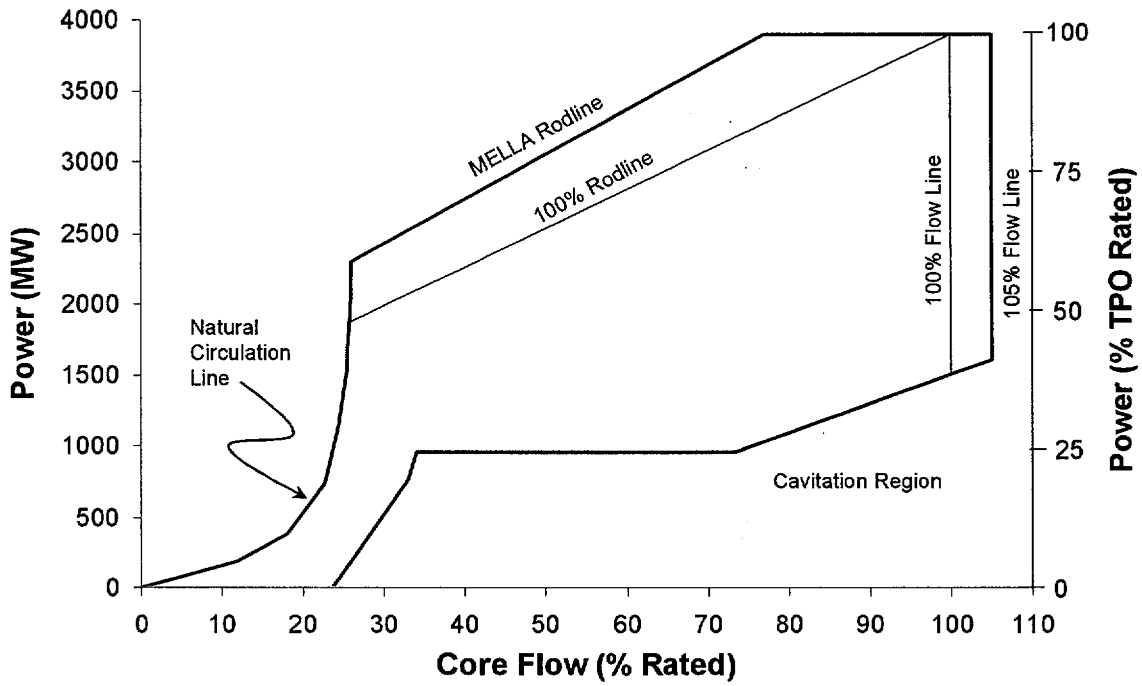
6(a). On Figure 1-1, please identify the Rod Lines.

Response:
The submittal reported the rod line equation in lieu of the actual rodlines. The MELLA and 100% rodlines are illustrated in the figure below.

6(b). This map is different from the typical power/flow map showing the cavitation area, natural circulation area, MELLA line, etc. Please submit the standard power/flow map. What is the significance of the formula starting with RL? What is RL?

Response:
The TPO power/flow map is re-drawn below identifying the typical areas of interest. Consistent with NEDO-32938, the absolute upper flow rodline is unchanged with TPO. The power/flow map in the submittal included the rod line equation used to determine the rodline associated with any combination of power and core flow where:

RL	=	rodline (%),
P	=	power (%), and
W_T	=	core flow (%)



7. The measurement uncertainty for feedwater and steam flows is .33%. What is the uncertainty in measurement of other parameters listed in Table 1-2?

Response:
Table 1-2 was developed to quantify changes in the relevant hydraulic parameters affected by the uprate. The uncertainties of all parameters considered in calculating GGNS core thermal power are reported in Table 1-4.

8. Discuss the impact of the introduction of any new fuel type on power uprate. Confirm the maximum approved burnup limits will not be exceeded without NRC review and approval.

Response:
Upon introduction of any new fuel type numerous evaluations are performed as part of the reload process. These evaluations would not only confirm the approved burnup limits are not exceeded, but would address all other impacts this new fuel type may have on operation at the TPO power level including impacts on stability, thermal hydraulic compatibility, radiological analyses, and hydrogen generation.

The mixed core ATWS pressurization analysis was performed with Framatome's COTRANSA2 computer code. Since an ATWS is effectively a transient with no credit for scram, the ATWS analysis explicitly considered the co-resident GE11 fuel bundles with the identical models used to evaluate transients for development of the core operating limits. Since the ATWS is analyzed to confirm vessel pressurization limits are satisfied, the results are not particularly sensitive to the core configuration. For example, the Cycle 13 results indicate a 2 psi change in the peak ATWS vessel pressure from the Cycle 12 results. Considering the small cycle-to-cycle variations in the primary factors that affect the peak suppression pool temperature as reported in Question 3(a), a similar conclusion can be reached regarding the sensitivity of the containment results to the cycle-to-cycle variations in the core configuration.

9(a). What is the significance of 25% RTP with regard to core thermal monitoring threshold? What is the basis of 25%?

Response:
GGNS Technical Specifications 3.2.1, 3.2.2, and 3.2.3 do not require monitoring for compliance to the core operating limits at powers below 25% RTP. As discussed in the Bases to these GGNS Technical Specifications, this monitoring is not necessary because any transient effects at low power are substantially mitigated by (i) low core void fractions, (ii) the low core flows associated with slow speed operation of the recirculation pumps, and (iii) the use of the Intermediate Range Monitors (IRMs). The need for this monitoring below this power is not reviewed on a cycle-specific basis. Similar technical bases are also reported in Section 3.2.2 of Volume 2 of NUREG-1434, "Standard Technical Specifications General Electric Plants, BWR/6".

As described in Section 5.8 of NEDC-32938, any plant that would exceed the generic bundle power limit would need to provide additional justification to support maintaining the value at 25% RTP. Upon TPO implementation, the GGNS bundle power slightly exceeds the generic limit analyzed by GE. Consequently, a GGNS-specific evaluation was performed to confirm that significant margin continues to exist to the operating limit at 25% RTP after the uprate.

In this GGNS-specific evaluation, the MCPR effects were analyzed based on a bounding radial peaking factor at these low power conditions and concluded that the core MCPR would be sufficiently high that any transient initiated at these low powers would not violate the MCPR safety limit. The LHGR and Average Planar Linear Heat Generation Rate (APLHGR) effects were evaluated in a similar fashion based on high local and axial peaking and demonstrated that the applicable overpower and LOCA criteria would be satisfied.

9(b). It is stated that, "The margins observed in these evaluations were sufficiently large that cycle-specific confirmations are not necessary." Clarify this statement. MCPR, LHGR and APLHGR are all calculated on a cycle-specific basis. Which evaluations don't require cycle-specific confirmation?

Response:
Consistent with current practice, MCPR, LHGR, and APLHGR operating limits will continue to be calculated on a cycle-specific basis at power levels above the core monitoring threshold. Only the evaluation described above, which confirmed the MCPR, LHGR, and MAPLHGR margin at 25% RTP, will not be re-confirmed on a cycle-specific basis.

10. A shutdown margin was calculated for cycle 12. Specify the shutdown margin.

Response:
The GGNS cycle 12 shutdown margin is 1.13% $\Delta k/k$. This value includes the effect of the TPO and is well above the 0.38% value required by Technical Specification 3.1.1

11(a). Reference NEDO-31960-A to support reactor stability Enhanced Option 1A. What is the "Reload Validation Matrix" (RVM)? Describe in detail RVM.

Response:
The Reload Validation Matrix is a set of fully prescribed analyses intended to challenge the stability characteristics of a given plant specific core design. As the name implies, this set of analyses is implemented with each reload based upon the need for such analyses per reload review criteria established in Chapter 8 of NEDO-32339-A. The RVM includes several analytical cases designed to simulate the most severe operational challenges to reactor core stability, based on operating experiences and analytically predicted stability behavior. The RVM includes steady state conditions, evaluations of startup conditions concerning recirculation pump upshift, evaluations of flow runback events, and evaluations of loss of feedwater heating events. This process is described in section 5.4 of NEDO-31960-A, and in Sections 7.0 and 8.0 of NEDO-32339-A.

The decay ratio results from the RVM analyses are compared against vendor code specific acceptance criteria, which are specified by NRC in their review of code topical report. RVM results which meet the acceptance criteria demonstrate that the E1A region boundaries proposed for the reload core design are adequate to protect operations of the core against the onset of various known and predicted stability events. Failure to meet the acceptance criteria indicates the need for either changes to the reload core design or modification of the E1A region boundaries.

11(b). Confirm that RPV level control strategy includes lowering the vessel level below the feedwater sparger.

Response:
Grand Gulf has implemented the RPV level control strategy that includes lowering the vessel level below the feedwater sparger to address stability issues. This strategy was a recommendation in BWROG EPG/SAG Revision 1. This strategy is implemented in GGNS procedure 05-S-01-EP-2.

12(a). In the staff ELTR-2 SER it is stated that "the plant specific submittal for BWR/6 plants must provide assurance that the scram insertion speeds used in the transient analyses are slower than the requirements in the plant TSs." Confirm that this is true for GGNS.

Response:
It is confirmed that the GGNS transient analyses apply scram speeds that are slower than the requirements in the Technical Specifications.

12(b). Describe in detail the "COTRANSA2" methodology and the relation to control rod velocity, steam pressure and control rod position. If there is no pressure increase for TPO uprate, how can addition pressurization take place?

Response:
The control rod scram speed in the COTRANSA2 model is a function of time-dependent steam dome pressure, utilizing bounding (slower) values of the position-specific pressure-dependent scram insertion times in the GGNS Technical Specifications. Effectively, the COTRANSA2 methodology applies a control rod velocity that is a function of both the instantaneous steam dome pressure and the instantaneous control rod position. The scram times applied in the GGNS transient analyses therefore consider the additional pressurization associated with TPO.

For certain events, the pressurization transient associated with TPO can be more severe than that at the current rated power. Even though the initial steam dome pressure is not increased, the higher steam flow associated with TPO results in slightly more severe pressurization transients for those events associated with closure of valves in the steam line.

13(a). Identify the Framatome approved methodology and reference the analyses given in the reload analyses.

Response:
The GGNS Cycle 12 overpressure protection analysis is documented in EMF-2552(P), "Grand Gulf Nuclear Station Cycle 12 Plant Transient Analysis". These calculations were performed with the NRC-approved COTRANSA2 methodology in ANF-913(P)(A), "COTRANSA2: A Computer Program for Boiling Water Reactor Transient Analyses".

13(b). Section 3.1 references analysis assumptions including valve out-of-service options. Section 1.3.2, Reactor Performance Improvement Features, also references out-of-service features including seven safety relief valves out of service, and 3% SRV setpoint tolerance. The assumptions referenced in these reports appear to be inconsistent, please clarify.

Response:
GGNS has licensed all the performance improvement features reported in Section 1.3.2 including seven SRVs out of service and 3% SRV tolerance. As noted in Section 3.1, the overpressurization analyses considered the valve out-of-service option, which has the largest impact on pressurization results out of all the performance improvement features. The remaining performance improvement features including 3% SRV tolerance and MEOD were also considered in the overpressurization analysis but just were not mentioned in Section 3.1.

14. What is the licensed maximum core flow for GGNS? Discuss the pump NPSH and the cavitation interlocks aspects.

Response:
The rated core flow for GGNS is 112.5 Mlb/hr, as stated in the GGNS TPO SAR, Table 1-2. As licensed in Amendment 16 for MEOD, the licensed maximum core flow is 105% of rated or 118.125 Mlb/hr.

As described in Section 4.4.3.3.3 of the GGNS UFSAR, design features have been incorporated to maintain power and flow conditions within the power / flow map. These features include interlocks to ensure that the recirculation pumps and flow control valves do not experience cavitation. The parameters that serve as the inputs to the interlock functions and the setpoints that provide the protection function are not affected by the TPO uprate. Section 4.4.3.3.1 also describes the lower line of the power / flow map as the cavitation protection line. This line is based in part on NPSH requirements and ensures that pump NPSH requirements will be acceptable for TPO operation.

15. In sections 4.2.3, 4.2.4, 4.2.5 and 4.3 it is stated "...demonstrated with previous analyses based on 102% of 105% of CLTP." What is the significance of 105% of CLTP? This statement is confusing. Please clarify the statement.

Response:
There is no significance to 105% of CLTP. The ECCS-LOCA analysis is only performed periodically and is then confirmed to be applicable to each future cycle. Since GGNS is considering a future 5% power uprate, the GGNS ECCS-LOCA analysis was evaluated based on a nominal reactor power level of 105% CLTP. The Appendix K analysis was consequently performed at 102% of 105% of CLTP. The references in Sections 4.2.3, 4.2.4, 4.2.5, and 4.3 all refer to the GGNS Appendix K ECCS-LOCA analysis.

16 (a) Framatome methodology used for the LOCA analyses is not discussed. How is the 10CFR50.46 criteria met? What is the peak cladding temperature (PCT)? What is the limiting break? More discussion is required.

Response:
The Framatome fuel was analyzed with Framatome's NRC-approved RELAX, EXEM, and HUXY models, while the GE fuel is analyzed with GE's NRC-approved SAFER/GESTR model. As reported in the response to Question 15, these analyses were performed at 102% of 105% of CLTP. In both evaluations, the limiting case was the double-ended guillotine break of the recirculation line with failure of the High Pressure Core Spray (HPCS) system. Both of the analyses, for each respective fuel type, yielded PCTs less than 1850 °F, peak local metal water reactions less than 3%, and core-wide metal-water reactions less than 0.1%. These results comply with the 10CFR50.46 requirements with significant margin.

16(b) TPO topical report GE NEDC-32938P, section 5.3.1 states that "For plants near the upper bound PCT limit, plant specific evaluations will be performed to assure that the NRC SER requirements will continue to be met for TPO uprate conditions." For GGNS, the upper bound calculated PCT is 1580 °F, higher than the 1250 °F given in the TPO report Table D-1. Table B-3 states that Nominal LOCA evaluation is required if Upper Bound PCT margin is less than Table D-1. Since the GGNS Upper Bound PCT margin is higher than the value in Table D-1, Nominal LOCA evaluation is required. Confirm that a Nominal LOCA evaluation was performed for GGNS.

Response:
A plant specific evaluation to ensure that the upper bound PCT can be accommodated was not performed for GGNS TPO conditions since the current nominal LOCA analysis satisfies the criteria of the TPO Licensing Topical Report, NEDC-32938P.

The 1250 degrees F value mentioned in this question is not applicable to GGNS. The intent of the referenced statement was to describe that a separate analysis is not required if there is sufficient margin to the Upper Bound PCT limit.

The GGNS Upper Bound PCT was conservatively calculated based on operation at 105% of CLTP and the result was 1580 degrees F. This value has adequate margin to the SAFR/GESTR Upper Bound PCT limit of 1600 degrees F. Since there is sufficient margin to this limit, there is no GGNS-specific analysis required.

16(c) Which is the analysis of record for LOCA analysis? Is it GE analysis or Framatome analysis, or both?

Response:
The GGNS analysis of record for LOCA is both analyses. The GE analysis is applicable to the GE11 fuel in the GGNS core while the Framatome analysis is applicable to the ATRIUM-10 fuel.

17. Why isn't the ELTR-1 methodology related to the non-stability related flow-bias value used?

Response:
The non-stability-related flow-bias values are no longer used with the introduction of stability option E1A. Therefore the ELTR-1 methodology is not applicable to the non-stability-related flow-bias values.

Attachment 2

GNRO-2002-00054

Response to Materials RAI

Attachment 2

Response to NRC Materials Branch RAI for GGNS Power Uprate

1. The submittal stated that a slight increase in fluence is expected as a result of the 1.7% power uprate. With respect to this statement please provide the estimated value for the uprated peak neutron fluence (n/cm^2) for the reactor pressure vessel at the ID surface and the 1/4T thickness at End of Life.

Response:

To demonstrate the slight increase in fluence as a result of the 1.7% uprate, the post-uprate fluence at 32 effective full power years (EFPY) was compared to the pre-uprate fluence at 32 EFPY. This resulted in a peak ID surface fluence of 2.54×10^{18} n/cm^2 and 2.5×10^{18} n/cm^2, respectively. The 35 EFPY end of life uprated peak neutron fluence for the Grand Gulf reactor pressure vessel at the ID surface is 2.8×10^{18} n/cm^2, and at the ¼ T thickness is 1.9×10^{18} n/cm^2. Actual operating time (in EFPY) was used from plant start-up until 8/20/01, and a 100% capacity factor was conservatively applied between 8/21/01 and 6/1/02 (scheduled implementation of the 1.7% uprate), for a projected 13.949 EFPY at time of uprate implementation. Following uprate implementation, a 95% capacity factor was applied for the remainder of plant life; thus, 35 EFPY in 40 years of operation represents end of life conditions.

2. Section 3.11 of Attachment 2 of the licensee's submittal, "Reactor Water Cleanup System," references Section J.2.3.4 of the document NEDC-32938P, "Thermal Power Optimization Licensing Topical Report," as the primary source of information for the evaluation of the RWCU system. The staff requests the licensee to provide a discussion detailing the basis of the iron input assumption stated in section J.2.3.4 of NEDC-32938-P.

Response:

For the GGNS TPO, the feedwater flow increases less than 2% (1.91%). Therefore, the bounding increase for GGNS feedwater iron input at TPO operation is expected to be less than 2 percent, which is not significant.

3. On pages 3-5 and 3-6 of the GE Safety Analysis Report, a table summarizes the evaluation of the piping inside containment. Piping for systems such as main steam and feedwater include erosion/corrosion as a concern under power uprate conditions. However, the following systems do not include erosion/corrosion as a concern: the recirculation system, the RPV bottom head drain line, residual heat removal, low pressure core spray, high pressure core spray, RWCU, and standby liquid control system. The staff requests the licensee to provide information supporting the exclusion of erosion/corrosion for the above listed systems.

Response:

Carbon steel piping can be affected by flow-accelerated corrosion (FAC), which in turn is affected by changes in fluid velocity, temperature and moisture content. GGNS has established a program for monitoring pipe wall thinning in single and two-phase high-energy carbon steel piping. The GGNS FAC program is controlled under Engineering Program Plan MS-041. This program, which considers the guidance of Generic Letter 89-08, defines the criteria for the inspection of piping and components subject to FAC. In order to focus resources on the appropriate issues, guidance for the exclusion of systems from FAC consideration was developed using the EPRI guidance in NSAC 202L (e.g., steam quality >99.5%, fluid temperatures < 200 ^{O}F, usage <2%, fluid types (air, oil, raw water), pipe material content >2.25% chromium).

The piping in the systems in question has been excluded from the FAC program on the above bases. For example, the Reactor Recirculation System is stainless steel; the standby liquid control system is stainless steel, operated at low temperature, and in use less than 2% of the time; the GGNS ECCS are low temperature and low usage systems. While not noted in the table on pages 3-5 and 3-6 of the TSAR (submittal Attachment 2), the RWCU System is included in the FAC monitoring program. The reactor bottom head drain line is being considered for addition into the FAC monitoring program in RF13; the changes in the TPO conditions, however, assure that the uprate will have no measurable adverse effect on FAC in this line. Although the ECCS is excluded from the FAC program, GGNS monitors a certain number of ECCS locations that are susceptible based on industry or operating experience.

4(a). Since the effects of FAC on degradation of carbon steel components are plant-specific, the staff requests the licensee to provide a predictive analysis methodology that must include the values of the parameters affecting FAC, such as velocity and temperature, and the corresponding changes in component wear rates before and after the power uprate. Please include predicted FAC wear rate changes affecting balance of plant components and identify those most susceptible to FAC.

Response:

The GGNS FAC program utilizes the CHECWORKS software to predict the susceptibility of the subject piping to erosion/corrosion effects and to establish a recommended inspection schedule. Based on the small changes associated with TPO relative to previous GGNS operation, GGNS expects average wear rates associated with TPO to increase less than 2 mils/yr for the feedwater and nuclear boiler systems. For other systems, the average wear rates are expected to increase less than 5 mils/yr. The systems affected by the TPO and most susceptible to FAC are identified in the tables on pages 3-5 and 3-6 of the GE TSAR. These include the main steam and feedwater systems and the main steam drain lines.

4(b). The staff requests that the licensee indicate the degree of compliance with the NRC Generic Letter 89-08, "Erosion/Corrosion in Piping." This letter requires that an effective program be implemented to maintain the structural integrity of high-energy carbon steel systems. The licensee should describe how this program was modified to account for the power uprate. If there is a generic computer code (e.g., CHECWORKS) used in predicting wall thinning by FAC, please specify it. However, if the code is plant-specific, please provide its description.

Response:

GGNS provided a response to the NRC regarding Generic Letter 89-08 on July 21, 1989. In that letter, the program to address erosion/corrosion concerns was described. Basically, it was noted that the program was based on significant operating experience up to that date and noted that it provided for expansions in scope as appropriate based on evaluations of inspection results. This program identifies the piping components and locations to be monitored, the acceptance criteria for these locations and components, and the corrective actions to be taken should these acceptance criteria not be met. The GGNS FAC program utilizes the CHECWORKS software to predict wall thinning.

GGNS has reviewed all the previously inspected components that could be affected by TPO and have low margin and high wear rates. These components will all be inspected earlier than scheduled in the upcoming RF12 to accommodate any changes resulting from TPO implementation up to the next outage, RF13. Prior to RF13, GGNS will perform a parametric study at the uprated conditions to quantify the impact of TPO on GGNS wear rates and update the CHECWORKS model if necessary.

Attachment 3

GNRO-2002-00054

Response to Human Performance RAI

Attachment 3
Response to NRC Human Performance Branch RAI for GGNS Power Uprate

Note – GGNS agreed to address the topics questioned by the Human Performance Branch on the Waterford 3 Appendix K Power Uprate Application. These questions are paraphrased below to make them applicable to the GGNS application.

1. Please state whether the physical changes to the simulator will be implemented prior to operation above the current licensed power level.

Response:

No physical changes are required to the simulator to reflect TPO conditions.

2. Please state whether the procedures and simulator training documents required for training regarding plant operation at the uprated power levels will be developed and implemented prior to operation above CLTP.

Response:

The operating procedures changes necessary to reflect uprated power conditions have been identified as part of the associated modification process. As noted in Section 10.6 of the TSAR, no special additional training is required for the uprate; minor changes to the Technical Specifications, power/flow map, flow-referenced setpoint and the like will be communicated through routine operator training prior to operation at the uprated power level.

3. Please indicate how changes to the simulator software will be controlled and whether software changes will be implemented prior to operation above the current licensed power level.

Response:

Simulator changes and validation are controlled in accordance with TQ-202, which references ANSI/ANS 3.5-1998. (note – TQ-202 was revised in March, 2002 to incorporate a newer version of the standard than that referenced in the TSAR.) Simulator software changes reflecting the new full-power Initiating Conditions have been tested to confirm the simulator fidelity at the TPO conditions. These simulator changes will be implemented for operator training in the next training cycle which begins July 2002.

4. Please indicate whether the alarm for indication of LEFM out-of-service will be installed prior to operation above the CLTP. Also, please describe any changes that may be required to the Safety Parameter Display System.

Response:

The LEFM was installed at GGNS during the previous outage and the indication for the LEFM out-of-service will be installed prior to operation above the CLTP.

The power uprate will have negligible impact on the Safety Parameter Display System (SPDS). The SPDS monitors and provides a status board display of key parameters that are entry points into the emergency procedures. None of the entry conditions are affected by the TPO uprate. All points remain within their existing ranges. Affected operating values, such as reactor coolant temperature and pressure, are addressed in the applicable operating procedures (see item 5 below).

5. Please state whether the changes to the normal operating procedures, emergency operating procedures, and the off-normal operating procedures will be revised prior to operation above current licensed thermal power level.

Response:

The GGNS change control process requires the identification and update of the affected operating procedures associated with a modification. The procedures that impact plant operation have been identified and will be revised prior to operation above CLTP.

6. Please state whether the changes to the plant process computer system will be implemented prior to operation above the current licensed level.

Response:

The software changes for the plant process computer for power uprate will be implemented prior to operation above CLTP.

Attachment 4

GNRO-2002-00054

Summary of Commitments

Summary of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check one)	
	ONE-TIME ACTION	CONTINUING COMPLIANCE
The components that could be affected by TPO and have low margin and high wear rates will all be inspected in the upcoming RF12. Prior to RF13, GGNS will perform a parametric study at the uprated conditions to quantify the impact of TPO on GGNS wear rates and update the CHECWORKS model if necessary.	X	
Minor changes to the Technical Specifications, power/flow map, flow-referenced setpoint and the like will be communicated through routine operator training prior to operation at the uprated power level.	X	
The simulator changes reflecting the new full-power Initiating Conditions will be implemented for operator training in the next training cycle which begins July 2002.	X	
The indication for the LEFM out-of-service will be installed prior to operation above the CLTP.	X	
The procedures that impact plant operation have been identified and will be revised prior to operation above CLTP.	X	
The software changes for the plant process computer for power uprate will be implemented prior to operation above CLTP.	X	