PSEG Nuclear LLC
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AUG 0 3 2005

PSEG
Nuclear LLC

LR-N05-0214
LCR H04-01

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
REQUEST FOR CHANGE TO TECHNICAL SPECIFICATIONS
ARTS/MELLLA IMPLEMENTATION
HOPE CREEK GENERATING STATION
FACILITY OPERATING LICENSE NPF-57
DOCKET NO. 50-354

Reference: LR-N04-0062, "Request for License Amendment: ARTS/MELLLA Implementation," dated June 7, 2004.

By the referenced letter, PSEG Nuclear LLC (PSEG) requested a revision to the Technical Specifications (TS) for the Hope Creek Generating Station to reflect an expanded operating domain resulting from implementation of Average Power Range Monitor/Rod Block Monitor/Technical Specifications/Maximum Extended Load Line Limit Analysis (ARTS/MELLLA). In the referenced letter, PSEG also proposed to make changes in the methods used to evaluate annulus pressurization (AP) and jet loads resulting from the postulated Recirculation Suction Line Break (RSLB).

In a communication from Mr. D. Collins on February 16, 2005, and in telephone conferences on March 8, 2005 and May 11, 2005, the NRC requested additional information concerning the proposed change. The information requested by the Instrumentation and Control Section is provided in the Attachment to this letter. In accordance with 10 CFR 50.91(b)(1), a copy of this submittal has been sent to the State of New Jersey.

Attachment 1 contains proprietary information as defined by 10 CFR 2.390. General Electric Company (GE), as the owner of the proprietary information, has executed the affidavit included in Attachment 1, which identifies that the attached proprietary information has been handled and classified as proprietary, is customarily held in confidence, and has been withheld from public disclosure. The proprietary information was provided to PSEG in a GE transmittal that is referenced by the affidavit. The

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This letter forwards proprietary information in accordance with 10CFR 2.390. The balance of this letter may be considered non-proprietary upon removal of Attachment 1.

proprietary information has been faithfully reproduced in the attached RAI responses such that the affidavit remains applicable. GE requests that the proprietary information be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17. A non-proprietary version of the RAI responses is provided in Attachment 2.

PSEG has determined that the information contained in this letter and attachment does not alter the conclusions reached in the 10CFR50.92 no significant hazards analysis previously submitted.

If you have any questions or require additional information, please contact Mr. Paul Duke at (856) 339-1466.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 8-3-05
(date)

George P. Barnes
George P. Barnes
Site Vice President
Hope Creek Generating Station

Attachments (2)

This letter forwards proprietary information in accordance with 10CFR 2.390. The balance of this letter may be considered non-proprietary upon removal of Attachment 1.

C: Mr. S. Collins, Administrator – Region I
U. S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Mr. S. Bailey, Project Manager - Hope Creek
U. S. Nuclear Regulatory Commission
Mail Stop 08B1
Washington, DC 20555

USNRC Senior Resident Inspector – Hope Creek (X24)

Mr. K. Tosch, Manager IV (without Attachment 1)
Bureau of Nuclear Engineering
PO Box 415
Trenton, New Jersey 08625

This letter forwards proprietary information in accordance with 10CFR 2.390. The balance of this letter may be considered non-proprietary upon removal of Attachment 1.

GE Proprietary Information

This enclosure contains proprietary information of the General Electric Company (GE) and is furnished in confidence solely for the purpose(s) stated in the transmittal letter. No other use, direct or indirect, of the document or the information it contains is authorized. Furnishing this enclosure does not convey any license, express or implied, to use any patented invention or, except as specified above, any proprietary information of GE disclosed herein or any right to publish or make copies of the enclosure without prior written permission of GE. The header of each page in this enclosure carries the notation "GE Proprietary Information."

GE proprietary information is identified by a double underline inside double square brackets. In each case, the superscript notation{3} refers to Paragraph (3) of the affidavit which documents the basis for the proprietary determination. [[This sentence is an example.{3}]] Specific information that is not so marked is not GE proprietary.

General Electric Company

AFFIDAVIT

I, Dave Robare, state as follows:

(1) I am Project Manager, Performance Services, General Electric Company ("GE") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 2 to GE letter, GE-HGCS-AM-088, *GE Responses to Support NRC RAI 2*, dated May 9, 2005. The proprietary information in Enclosure 2, *GE Reponse to Support NRC RAI 2,* is delineated by a double underline inside double square brackets. Proprietary figures are identified with double square brackets before and after the object. In each case, the superscript notation{3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner, GE relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by General Electric's competitors without license from General Electric constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals aspects of past, present, or future General Electric customer-funded development plans and programs, resulting in potential products to General Electric;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a., and (4)b, above.

(5) To address 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GE, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GE, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Access to such documents within GE is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GE are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2), above, is classified as proprietary because it contains detailed results of analytical model, methods and processes including computer codes, which GE has developed, obtained NRC approval of, and applied to perform evaluations of transient and accident events in the GE Boiling Water Reactor ("BWR"). The development and approval of these system, component, and thermal hydraulic models and computer codes was achieved at a significant cost to GE, on the order of several million dollars.

The development of the evaluation process along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GE asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the

availability of profit-making opportunities. The information is part of GE's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GE.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GE would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GE of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 9TH day of MAY, 2005.

Dave Robare

Dave Robare
General Electric

HOPE CREEK GENERATING STATION
FACILITY OPERATING LICENSE NPF-57
DOCKET NO. 50-354
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
ARTS/MELLLA IMPLEMENTATION

By letter dated June 7, 2004, PSEG Nuclear LLC (PSEG) requested a revision to the Technical Specifications (TS) for the Hope Creek Generating Station to reflect an expanded operating domain resulting from implementation of Average Power Range Monitor/Rod Block Monitor/Technical Specifications/Maximum Extended Load Line Limit Analysis (ARTS/MELLLA). PSEG also proposed to make changes in the methods used to evaluate annulus pressurization (AP) and jet loads resulting from the postulated Recirculation Suction Line Break (RSLB).

In a communication from Mr. D. Collins on February 16, 2005, and in telephone conferences on March 8, 2005 and May 11, 2005, the NRC requested additional information concerning the proposed change. The information requested by the Instrumentation and Control Section is provided below.

2. Instrumentation and Control Section

   a) The Hope Creek technical specifications define Limiting Safety System Settings (LSSS) as an allowable value (AV). During reviews of proposed license amendments that contain changes to LSSS setpoints, the NRC staff identified concerns regarding the method used by some licensees to determine the allowable values (AV) identified in the technical specifications (TS). AVs are identified in the TS as LSSS to provide acceptance criteria for determination of instrument channel operability during periodic surveillance testing. The NRC staff's concern relates to one of the three methods for determining the AV as described in the Instrument Society of America (ISA) recommended practice ISA-RP67.04-1994, Part II, "Methodologies for Determination of Setpoints for Nuclear Safety-Related Instrumentation."

      The staff has determined that, absent additional requirements related to determining the operability of the instrument channel, AVs associated with LSSS established by means of ISA-RP67.04, Part II, Method 3, will not provide reasonable assurance that a plant will operate in accordance with the assumptions upon which the plant safety analyses have been based. Details about the NRC staff's concerns are available on the NRC's public website under ADAMS Accession Numbers ML041690604 and ML041810346.

      In Order for the NRC staff to assess the acceptability of your license amendment request related to this issue, the NRC staff requests the following additional information:

1. Discuss the setpoint methodology used at Hope Creek to establish AVs associated with LSSS setpoints.

PSEG Response:
Basis for APRM Flow Biased Scram

The APRM flow biased (FB) scram setpoint is designed to limit over-power excursions at part-load to a similar magnitude as at rated power conditions. [[

]] The FB scram is basically a design feature with an Allowable Value (AV) that is in the plant Technical Specifications.

Hope Creek Generating Station (HCGS) has a scram on two types of APRM signals. The first is a fixed scram (not a flow biased scram) which uses the raw unfiltered APRM signal (also called the neutron flux signal) as the input signal. The AV for this scram at HCGS is 120% power. This is a fixed scram and is present at all flows and is like a clamp that prevents excursions above 120% of rated throughout the operating domain. The second is a flow biased scram, which uses a filtered APRM signal (called Simulated Thermal Power (STP), with a 6 second filter to reduce noise in the APRM neutron flux signal) as input. This flow biased STP scram has a slope and intercept and is clamped at a lower power than the fixed neutron flux scram. The AV for this FB clamp at HCGS is 115.5% power.

The unfiltered neutron flux fixed scram setpoint is used in the ASME over-pressure analysis for an MSIV closure transient at rated power, as well as other over-power events described in the Updated Final Safety Analysis Report such as fast recirculation flow increase and abnormal startup of an idle recirculation pump. Since these safety analyses take credit for the scram function, this setpoint function has an AL and this AL is used in the analyses. The neutron flux fixed scram setpoint AL has margin to the fixed scram setpoint AV and Nominal Trip Setpoint (NTSP), and these margins are based on instrument uncertainties. The unfiltered neutron flux fixed scram setpoint AL, AV and NTSP are unchanged for Maximum Extended Load Line Limit Analysis (MELLLA) operation.

The filtered STP FB scram setpoints were designed to mitigate slow transients and the FB scram was clamped at a value below the fixed neutron flux setpoint. The STP scram clamp was initially credited in the mitigation of slow overpower transients. The only limiting transient in this category is the loss of feedwater heating at rated power conditions, and the STP FB scram clamp AL to mitigate this event was determined to be 117%. However, with the current application of improved 3D power transient evaluation methods for

this event, credit for the STP scram was not necessary. So HCGS (like most BWR-4 and later plants with STP) does not have an AL for the FB scram clamp. However, for operational reasons, the old FB scram clamp AV was retained for HCGS Technical Specifications. The AV of 115.5% for the STP scram clamp was chosen conservatively with respect to the old AL since the AL/AV margin was larger than the combined allowance for instrument accuracy and calibration uncertainty.

For HCGS, no credit was taken for FB scram at flows below where the scram is clamped, because the requirement to limit total peaking factor insures that the off rated local power will not exceed that allowed at 100% power. Thus, HCGS does not have (and has never had) an AL for the FB scram. However, for operational reasons, a FB scram function based on maintaining approximately the same operational margin (i.e., margin from the operational boundary to the AV) at lower flows as the Fixed Neutron Flux scram AV had to operation at rated power and flow (~20%), has been kept in the plant Technical Specifications.

Establishment of new APRM Flow Biased Scram AV

The FB scram clamp AV and NTSP are unchanged for MELLLA operation. The slope of the scram vs. drive flow line is a design base value selected to approximate the MELLLA operating boundary slope. The FB Scram intercept is determined by making the MELLLA operating margin at the minimum core flow (W_{cmin}) corresponding to 100% power the same as the pre-MELLLA unfiltered neutron flux scram clamp operating margin, which is the margin (in % power) between operating boundary and the scram line. The slope of the scram characteristics is designed to maintain approximately the same operating margin in the unclamped FB region.

For MELLLA operation without power uprate, the FB scram is determined as follows:

a) Based on the MELLLA Power-Flow map, establish the minimum % core flow (W_{cmin}) corresponding to 100% power, [[

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b) Determine the MELLLA FB scram slope as follows:

   i) The slope of the MELLLA FB scram AV is equal to the design basis value of 0.66. (Note: For HCGS the MELLLA slope should have been

reduced by a factor 1.014 to corresponding to the 1.4% Thermal Power Optimization (TPO) uprate for CLTP (Reference 1). However this is justified since it is conservative.)

c) Determine the MELLLA FB scram intercept. Generally, the AV intercept (in % power) is rounded (using conservative rounding) to as many significant figures as necessary to match the values in the current Technical Specifications.

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Establishment of APRM Flow Biased Scram NTSP

The Constant Pressure Power Uprate (CPPU) simplified setpoint methodology, as described in NEDC-333004P-A, "Licensing Topical Report, Constant Pressure Power Uprate," Revision 4, July 2003, was applied for the HCGS MELLLA NTSPs. According to this simplified methodology, the change in ALs ("delta AL") can be applied to the current NTSPs to obtain the new NTSPs as long as the instruments in the loop are not replaced. [[

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Currently, HCGS FB setpoints do not have ALs, only AVs. However, since AVs for MELLLA change per the standard GE MELLLA methodology and the margin between AV and NTSP is based on instrument error, using the change in AV to calculate the change in NTSP is justified by the simplified method, as long as the basic instrument and its errors are unchanged.

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The HCGS MELLLA NTSP value for the FB scram was determined by applying the change in the AVs due to MELLLA to the current NTSPs. As noted in Reference 2, the NTSP is obtained by subtracting the loop drift from the AV. In the current setpoint evaluation, the margin between the AV and NTSP allows for instrument drift that might occur during the established surveillance period. This method is consistent with the design specification for the HCGS neutron monitoring system.

2. Regardless of the methodology used, the NRC staff has the following questions regarding the use of the methodology at [Hope Creek]:

   a. Discuss how the methodology and controls you have in place ensure that the analytical limit associated with an LSSS trip setpoint will not be exceeded (that safety limits will not be exceeded). Include in your discussion information on the controls you employ to ensure the trip setpoint established after completing periodic surveillances satisfies your methodology. If the controls are located in a document other than the TS, discuss how those controls satisfy the requirements of 10 CFR 50.36.

   PSEG Response:
   HCGS specifies APRM and RBM FB trip setpoints in Technical Specifications Table 2.2.1-1 and Surveillance Requirements in the Technical Specifications Table 4.3.1.1-1.

   The instrument calibration establishes the baseline parameters necessary for accurate measurement and presentation of information. Tolerances allow for the basic inaccuracy of a device and establish the acceptable level of performance of the components being calibrated. The as-left tolerance establishes the required accuracy band within which the device must be calibrated. An as-found tolerance establishes the limit of error that a defined device can be found to be performing within during surveillance testing, or between calibrations and still be acceptable.

   The setpoint calculation calculates the as-left and as-found tolerance associated with the surveillance test. The tolerance is applied to the trip setpoint to determine as-left and as-found requirement. HCGS performs the Technical Specifications specified surveillance tests for APRM and FB trip setpoints in accordance with plant procedures. At the conclusion of these surveillance tests, the HCGS procedures require the trip setpoint to be established within the bounds of as-left (i.e., NTSP) requirement.

PSEG performed an analyzed drift evaluation to ensure that the drift experienced by APRM FB trip setpoints between successive surveillances is reasonable. The analyzed drift is a method of statistically analyzing historical instrument surveillance data to characterize the performance of an instrument. The historical data for the three year period from 2001 through 2004 is in the form of as-found and as-left measurements recorded during periodic surveillance testing of the instruments. The previous as-left data is subtracted from the current as-found data to determine the drift for a given period. The analysis of instrument drift is documented in the APRM setpoint calculation to ensure that the inputs used in the setpoint calculation are reasonable and valid.

The controls employed to ensure that the APRM FB trip setpoint established after completing periodic surveillances satisfies HCGS requirements are located in plant procedures. Procedural controls are adequate because, as discussed in the response to Question 2.a.1, [[

]] The FB scram is basically a design feature with an Allowable Value (AV) that is in the plant Technical Specifications.

b. Discuss how the TS surveillances ensure the operability of the instrument channel. Specifically, relate the surveillance test results to the technical specification AV and describe how these are used to determine the operability of the instrument channel. If the requirements for determining operability of the LSSS instrument being tested are in a document other than the TS (e.g., plant test procedure), discuss how this meets the requirements of 10 CFR 50.36.

PSEG Response:
The AV for the APRM FB scram function is listed in TS Table 2.2.1-1. The actual instrument setpoint is compared to the AV during channel calibrations performed in accordance with TS Surveillance Requirements. If the instrument setpoint is less conservative than the AV in Table 2.2.1-1, the associated channel is declared inoperable in accordance with TS 2.2.1, and the applicable ACTION statement requirements of TS 3.3.1 are taken until the channel is restored to OPERABLE status with its setpoint adjusted consistent with the Trip Setpoint value.

As noted in the response to RAI 2.a.2.a above, HCGS procedures require the trip setpoint to be established within the bounds of the NTSP requirement after each channel calibration.

b) In your submittal, you state that the APRM flow control trip reference (FCTR) cards will be modified to implement the proposed setpoint changes. Please elaborate on this modification. Are the FCTR cards analog or digital, and if digital, will the modifications be accomplished by software or firmware changes?

PSEG Response:

FCTR Card Change Description

The Flow Control Trip Reference Unit is an analog device comprised of discrete, passive electronic parts, such as transistors, diodes, zener diodes, operational amplifiers, metal-film resistors, carbon composition resistors, capacitors, and others. The amplifier and biasing circuit have stated performance specifications, as listed GE Performance Specification 235A1332 Rev 3. This performance specification was originally issued for FCTR card 136B3109AAG001. It was later applied to 136B3109AAG001 through G005 because each design incorporated only minor feature changes for which the performance specification was still valid. The system design changed to require the addition of an analog computer output circuit, and this FCTR card design was identified as 198B6918AAG001 through G003. The same performance specification was used for both FCTR cards because the 198B6918AA designs were essentially a copy of the 136B3109AA designs utilizing the same components. The 235A1332 performance specification was applied by similarity. The 198B6918AAG001 design was the original FCTR card used at the Hope Creek Generating Station, and the design was changed to use 198B6918AAG003 for the implementation of MELLLA.

One of the change features from 198B6918AAG001 to 198B6918AAG003 was the addition of a copy of the "scram clamp" circuitry to the APRM level alarm circuit to act as a rod-block clamp. The scram clamp and rod-block clamp circuitry are identical designs applied to identical amplifier output circuits. Therefore, an uncertainty specification for the scram clamp circuit directly applies to the rod-block circuit by similarity.

Another feature change of the 198B6918AAG003 FCTR card was the change in one resistor value, R16 as shown on schematic 177D4987, from 54.9 k-ohms to 49.9 k-ohms. This resistor is in the amplifier feedback circuit and the change does nothing but alter the adjustability range of the amplifier gain (slope) from 0.55 – 0.75 to 0.50 – 0.70 in order to envelope the future possibility of setting a slope at 0.55, or slightly less.

The resistor change is one of ohmic value only. The resistor is a fixed metal film component of the RN65C family with a resistance temperature coefficient of 0.005% per degree C. Although the circuit design uncertainties were originally derived using the 54.9 k-ohms design, a change to 49.9 k-ohms with such a small temperature effect by temperature variation has an insignificant affect on the overall uncertainty specifications for the card.

FCTR Card Performance Specification

As stated above, the official performance specification for the FCTR card trip functions is contained in 235A1332, and this specification is the same for both the previous (G001) and the new (G003) card. Performance specifications based on original design documents are also found in the Power Range Neutron Monitor System Operation and Maintenance Manual, GEK-90341A. The pertinent accuracy (which includes linearity and stability) and drift specifications from both sources, applicable to both the scram and rod block functions, are listed in Table 2b-1.

Conclusion

The performance uncertainties of the previous (198B6918AAG001) and new (198B6918AAG003) designs are identical. The addition of the rod block clamp circuit and change in slope resistor does not affect the accuracy and drift uncertainties stated in the performance specification.

Table 2b-1: Trip Uncertainties

Flow-Biased Trip Uncertainty Category	Flow Condition	Perf Spec (235A1332 Para. 6.1)	GEK Manual (GEK-90341A Table 1.2)
Accuracy (restricted conditions, Note 1)	50 - 125% flow	± 1%	± 1%
	0 - 50% flow	± 2%	± 2%
Accuracy (full conditions, Note 2)	50 - 125% flow	± 2%	± 2%
	0 - 50% flow	± 3%	± 3%
Drift (room temperature)	N/A	± 0.5% / 700 hours	Not specified

Note 1 – Restricted Conditions: – 60 - 90°F, 25 - 75% RH (from 175A9680)
Note 2 – Full Conditions: – 40 - 120°F, 20 - 90% RH (from 175A9680)

References

1. Amendment No. 131, Facility Operating License No. NPF-57, July 30, 2001 (TAC No. MB0644)

2. Amendment No. 26, Facility Operating License No. NPF-57, June 5, 1989 (TAC No. 72699)