Entergy

Entergy Operations, Inc.
P. O. Box 756
Port Gibson, MS 39150

James Nadeau
Regulatory Assurance Manager
Tel. (601) 437-2103

GNRO-2017/00017

May 25, 2017

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

SUBJECT: Relief Request for 10-year Updates to the 120 Month Inservice Testing intervals
Grand Gulf Nuclear Station
Docket No. 50-416
License No. NPF-29

REFERENCE: Grand Gulf Nuclear Station, unit 1 – Three Relief Requests for jockey Pumps for the Third 10-year Inservice Testing Interval (TAC NOS. MD7518, MD7519, and MD7520) (ADAMS Ascension No. ML081010019)

Dear Sir or Madam:

Pursuant to 10 Code of Federal Regulations (CFR) 50.55a (z) (ii), Entergy hereby requests an alternative for Grand Gulf Nuclear Station (GGNS) Inservice Testing Program. These requests are needed to support the 120 month updates for the upcoming 4th interval. These requests are similar to the requests approved for use during the current interval (Reference). The details of the 10 CFR 50.55a requests are provided in the attachments.

Entergy request NRC Staff review and approval of this proposed GGNS alternative on or before March 23, 2018. The 4th ten year interval starts December 1, 2017 and is scheduled to end on November 30, 2027.

There are no regulatory commitments made in this submittal. If you have any questions or require additional information, please contact James Nadeau at 601-437-2103.

Sincerely,

James Nadeau
Regulatory Assurance Manager
JN/sgd

Attachments:
1. Relief Request Number PRR-GGNS-2017-1
2. Relief Request Number PRR-GGNS-2017-2
3. Relief Request Number PRR-GGNS-2017-3

cc: with Attachment and Enclosures

Mr. John P. Boska, Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop O-8-C2
Washington, DC 20555

cc: without Attachment and Enclosures

Mr. Kriss Kennedy
Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
1600 East Lamar Boulevard
Arlington, TX 76011-4511

U.S. Nuclear Regulatory Commission
ATTN: Mr. Siva Lingam, NRR/DORL (w/2)
Mail Stop OWFN/8 B1
11555 Rockville Pike
Rockville, MD 20852-2738

NRC Senior Resident Inspector
Grand Gulf Nuclear Station
Port Gibson, MS 39150

Dr. Mary Currier, M.D., M.P.H
State Health Officer
Mississippi Department of Health
P.O. Box 1700
Jackson, MS 39215-1700
Email: mary.currier@msdh.ms.gov

Attachment 1 to GNRO-2017/00017

Relief Request Number PRR-GGNS-2017-1

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-1
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

1. American Society of Mechanical Engineers (ASME) Code Component(s) Affected

Pump ID	Function	Category	Class
E12C003A	Residual Heat Removal System Jockey Pump A	Group A	2
E12C003B	Residual Heat Removal System Jockey Pump B	Group A	2
E12C003C	Residual Heat Removal System Jockey Pump C	Group A	2

2. Applicable ASME Code Edition and Addenda

ASME OM Code-2004 Edition, with Addenda through and including ASME OMb Code-2006.

3. Applicable Code Requirement(s)

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-3300 Reference Values

(a) Initial reference values shall be determined from the results of testing meeting the requirements of ISTB-3100, Preservice Testing, or from the results of the first inservice test.
(b) New or additional reference values shall be established as required by ISTB-3310, ISTB-3320, or ISTB-6200(c).
(c) Reference values shall be established only when the pump is known to be operating acceptably.
(d) Reference values shall be established at a point(s) of operation (reference point) readily duplicated during subsequent tests.
(e) Reference values shall be established in a region(s) of relatively stable pump flow.
  (1) Reference values shall be established within ± 20% of pump design flow rate for the comprehensive test.
  (2) Reference values shall be established within ± 20% of pump design flow for the Group A and Group B tests, if practicable. If not practicable, the reference point flow rate shall be established at the highest practical flow rate.
(f) All subsequent test results shall be compared to these initial reference values or to new reference values established in accordance with ISTB-3310, ISTB-3320, or ISTB-6200(c).
(g) Related conditions that can significantly influence the measurement or determination of the reference value shall be analyzed in accordance with ISTB-6400.

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-3510 General

(b) Range

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-1
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

(1) The full-scale range of each analog instrument shall be not greater than three times the reference value.

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-3510 General

(c) Instrument Location. The sensor location shall be established by the Owner, documented in the plant records (see ISTB-9000), and shall be appropriate for the parameter being measured. The same location shall be used for subsequent tests. Instruments that are position sensitive shall be either permanently mounted, or provision shall be made to duplicate their position during each test.

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-5121

Group A Test Procedure. Group A tests shall be conducted with the pump operating at a specified reference point. The test parameters shown in Table ISTB-3000-1 shall be determined and recorded as required by this paragraph.

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-5121 Group A Test Procedure

(b) The resistance of the system shall be varied until the flow rate equals the reference point. The differential pressure shall then be determined and compared to its reference value. Alternatively, the flow rate shall be varied until the differential pressure equals the reference point and the flow rate determined and compared to the reference flow rate value.

ASME OM Code-2004 Edition with addenda through OMb Code-2006, TABLE ISTB-3000-1, "INSERVICE TEST PARAMETERS", lists Flow Rate as a required parameter for both Group A and Comprehensive pump tests.

ASME OM Code-2004 with Addenda through OMb Code-2006, TABLE ISTB-5121, "CENTRIFUGAL PUMP TEST ACCEPTANCE CRITERIA", lists fixed Alert and Required Action Range limits at 2.5 times and 6 times, respectively.

4. Reason for Request

Pursuant to 10 CFR 50.55a, "Codes and Standards", paragraph (z)(2), an alternative is requested when using the requirements of ASME OM Code Section ISTB (as listed above).

This alternative is a re-submittal of NRC approved 2nd Interval Relief Request PRR-E12-01 that was based on the ASME/ANSI OM Standard 1987 Edition with addenda through OMa-1988, and the 3rd Interval Relief Request PRR-GGNS-2007-1 that was based on the ASME OM Code-2001 Edition with addenda through OMb Code-2003. This 4th Interval alternative request is based on the ASME OM

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-1
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

Code-2004 Edition with addenda through OMb Code-2006. There have been no substantive changes to this alternative, to the OM Code requirements or to the basis for use, which would alter the previous NRC Safety Evaluation conclusions.

These jockey pumps operate whenever their respective Low Pressure Core Injection/Residual Heat Removal (LPCI/RHR) trains are in the operable condition. As such, the pumps perform continuous duty on a recirculation line and provide makeup as needed.

Pressure taps exist in the jockey pumps suction and discharge piping where pump suction and discharge pressure can be measured for calculation of differential pressure, and throttle valves exist which can be used to set differential pressure equal to the pump's reference value. However, the pump differential pressure information provided is of little use for analyzing the hydraulic condition of the jockey pumps without being able to measure flow rate or set flow rate at a known reference value, as required by ASME OM Code-2004 Edition with addenda through OMb Code-2006, subparagraph ISTB-5121*(b)*.

There is no practical means of measuring the flow rate of these jockey pumps since no flow rate meters, orifices or other measurement devices are installed in the system for measurement of jockey pump flow rate. The installed main LPCI/RHR process flow measurement instrumentation loops, which are discussed below, cannot be used for jockey pump flow measurement. Attempts have been made to use portable ultrasonic flow instruments to measure jockey pump flow rate, however the results have been inconsistent and not repeatable.

Flow orifices 1E12-FE-N014A, B, and C, which are installed in the system to measure flow rate of the main LPCI/RHR Pumps 1E12C002A, B, and C, each have a rated maximum flow rate in excess of 8,000 gpm (System Design Criteria SDC-E12). Each flow instrument loop, which consists of the flow orifice, flow transmitter, flow indicator and signal processing electronics, has an overall loop accuracy of between one and two percent of the maximum measurable flow rate. Even at the lower, more accurate point, one percent accuracy is approximately 90 gpm, which is over twice the jockey pumps' rated flow rate of 40 gpm at 50 psid (UFSAR Section 6.3.2.2.5).

The flow orifices for the LPCI/RHR Pumps are installed in 18-inch NPS piping. Even if the typical operational jockey pump differential flow rate of 40 gpm registered on this flow instrumentation, it would not meet the requirements of ASME OM Code-2004 Edition with addenda through OMb Code-2006, subparagraphs ISTB-3510*(b)(1)* and ISTB-3510*(c)*, since the full-scale ranges of these instruments are more than 200 times the probable reference values for these jockey pumps. Under ideal conditions, the jockey pump flows would be just barely detectable at the lower end of the instrument scales, and accurate measurement would be masked by instrument noise and other conditions.

Additionally, the flow path for each of the jockey pumps in standby operation is through a minimum-

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-1
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

flow return line with a flow-limiting orifice plate (1E12-RO-D002A, B or C), which is sized to hold flow rate reasonably constant at about 40 gpm (UFSAR Figure 5.4-19), while providing adequate margin in jockey pump capacity to make up for any leakage from the main LPCI/RHR pump discharge header. Flow rate through this orifice plate cannot be measured, as discussed above, since there are no installed measurement points and portable flow rate instrumentation has not proven adequate. This flow rate also cannot be considered constant and repeatable enough to meet the requirements of ASME OM Code-2004 Edition with addenda through OMb Code-2006, subparagraph ISTB-3300*(d)*, due to the potential for changes in the main LPCI/RHR discharge header leakage from test to test.

5. Proposed Alternative and Basis for Use

Jockey pump discharge header pressure is continuously monitored, and the RHR PMP A DISCH PRESS ABNORMAL, RHR PMP B DISCH PRESS ABNORMAL or the RHR PMP C PRESS ABNORMAL annunciators alarm in the Control Room if the discharge header pressure drops below a preset value of 40 psig for the Loop A and B jockey pumps, and 28 psig for the Loop C jockey pump. Based on the pumps' rated capacities (40 gpm at 50 psid, per UFSAR Section 6.3.2.2.5) and the required suppression pool level during power operation (greater than, or equal to, 18 feet 4-1/12 inches and less than or equal to 18 feet 9-3/4 inches per Tech Spec LCO 3.6.2.2), these low header pressure annunciators will activate at approximately 100 percent of the Loop A and B jockey pumps' operating differential pressure, and at approximately 65 percent of the Loop C jockey pump's operating differential pressure.

Hydraulic condition of the jockey pumps will be considered acceptable by continuous monitoring of pump discharge header pressures and verifying adequate header pressures as indicated by the absence of low pressure alarms. Corrective action will be taken if a header low pressure alarm sounds, indicating low header pressure.

Also, GGNS Technical Specification SR 3.5.1.1 requires verification every 31 days that the respective LPCI/RHR headers are filled with water by venting the piping at the high point vents. Such continuous monitoring and monthly venting will provide timely warning if a jockey pump has failed, or that system leakage has exceeded the capacity of the jockey pump.

In addition, vibration will continue to be measured on these pumps as required by ASME OM Code-2004 Edition with addenda through OMb Code-2006. If a measured vibration velocity exceeds an Alert or Required Action Range limit according to ASME OM Code-2004 Edition with addenda through OMb Code-2006, Table ISTB-5121-1, "Centrifugal Pump Test Acceptance Criteria," the required actions of ASME OM Code-2004 Edition with addenda through OMb Code-2006, paragraph ISTB-6200, "Corrective Action", will be taken.

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-1
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

Based on the determination that compliance with the ASME OM Code-2004 Edition with addenda through OMb Code-2006 requirements results in a hardship without a compensating increase in the level of quality or safety, this proposed alternative should be granted pursuant to 10 CFR 50.55a(z)(2).

6. Duration of Proposed Alternative

This relief is requested for the fourth ten year IST interval, which begins December 1, 2017 and is scheduled to end on November 30, 2027 for Grand Gulf.

7. Precedent

Use of an alternative for similar requirements was previously granted as Relief Request PRR-E12-01 for Grand Gulf's 2nd 120-month Inservice Testing Interval (TAC-No. MA0196).

Use of an alternative was also granted as Relief Request PRR-GGNS-2007-1 for Grand Gulf's 3rd 120-month Inservice Testing Interval (GNRI-2008-0043).

8. References

1. NUREG-1482, Revision 2, "Guidelines for Inservice Testing at Nuclear Power Plants"
2. UFSAR 3.9.3.2.2.1.3, RHR Jockey Pump Test Summary (LPCS, HPCS, and RHR pumps)
3. UFSAR 6.3.2.2.5, ECCS Discharge Line Fill System
4. UFSAR, 6.7.2.2, Feedwater Leakage Control System, System Description
5. UFSAR Figure 5.4-19, System Flow Diagram Residual Heat Removal System
6. UFSAR Figure 5.4-35, Typical Performance Curves, RHR Jockey Pumps
7. Tech Spec SR 3.5.1.1, ECCS Operating Surveillance Requirement for Gas Intrusion
8. Tech Spec LCO 3.6.2.2, Suppression Pool Water Level
9. System Design Criteria SDC-E12

Attachment 2 to GNRO-2017/00017

Relief Request Number PRR-GGNS-2017-2

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-2
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

1. American Society of Mechanical Engineers (ASME) Code Component(s) Affected

Pump ID	Function	Category	Class
E21C002	Low Pressure Core Spray System Jockey Pump	Group A	2

2. Applicable ASME Code Edition and Addenda

ASME OM Code-2004 Edition, with Addenda through and including ASME OMb Code-2006.

3. Applicable Code Requirement(s)

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-3300 Reference Values

(a) Initial reference values shall be determined from the results of testing meeting the requirements of ISTB-3100, Preservice Testing, or from the results of the first inservice test.
(b) New or additional reference values shall be established as required by ISTB-3310, ISTB-3320, or ISTB-6200(c).
(c) Reference values shall be established only when the pump is known to be operating acceptably.
(d) Reference values shall be established at a point(s) of operation (reference point) readily duplicated during subsequent tests.
(e) Reference values shall be established in a region(s) of relatively stable pump flow.
a. Reference values shall be established within ± 20% of pump design flow rate for the comprehensive test.
b. Reference values shall be established within ± 20% of pump design flow for the Group A and Group B tests, if practicable. If not practicable, the reference point flow rate shall be established at the highest practical flow rate.
(f) All subsequent test results shall be compared to these initial reference values or to new reference values established in accordance with ISTB-3310, ISTB-3320, or ISTB-6200(c).
(g) Related conditions that can significantly influence the measurement or determination of the reference value shall be analyzed in accordance with ISTB-6400.

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-3510 General
(b) Range

(1) The full-scale range of each analog instrument shall be not greater than three times the reference value.

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-2
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-3510 General

(c) Instrument Location. The sensor location shall be established by the Owner, documented in the plant records (see ISTB-9000), and shall be appropriate for the parameter being measured. The same location shall be used for subsequent tests. Instruments that are position sensitive shall be either permanently mounted, or provision shall be made to duplicate their position during each test.

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-5121

Group A Test Procedure. Group A tests shall be conducted with the pump operating at a specified reference point. The test parameters shown in Table ISTB-3000-1 shall be determined and recorded as required by this paragraph.

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-5121 Group A Test Procedure

(b) The resistance of the system shall be varied until the flow rate equals the reference point. The differential pressure shall then be determined and compared to its reference value. Alternatively, the flow rate shall be varied until the differential pressure equals the reference point and the flow rate determined and compared to the reference flow rate value.

ASME OM Code-2004 Edition with addenda through OMb Code-2006, TABLE ISTB-3000-1, "INSERVICE TEST PARAMETERS", lists Flow Rate as a required parameter for both Group A and Comprehensive pump tests.

ASME OM Code-2004 with Addenda through OMb Code-2006, TABLE ISTB-5121, "CENTRIFUGAL PUMP TEST ACCEPTANCE CRITERIA", lists fixed Alert and Required Action Range limits at 2.5 times and 6 times, respectively.

4. Reason for Request

Pursuant to 10 CFR 50.55a, "Codes and Standards", paragraph (z)(2), an alternative is requested when using the requirements of ASME OM Code Section ISTB (as listed above).

This alternative is a re-submittal of NRC approved 2nd Interval Relief Request PRR-E21-01 that was based on the ASME/ANSI OM Standard 1987 Edition with addenda through OMa-1988, and the 3rd Interval Relief Request PRR-GGNS-2007-2 that was based on the ASME OM Code-2001 Edition with addenda through OMb Code-2003. This 4th Interval alternative request is based on the ASME OM Code-2004 Edition with addenda through OMb Code-2006. There have been no substantive changes to this alternative, to the OM Code requirements or to the basis for use, which would alter the previous

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-2
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

NRC Safety Evaluation conclusions.

This jockey pump operates whenever the Low Pressure Core Spray (LPCS) System is in the operable condition. As such, the pump performs continuous duty on a recirculation line and provides makeup as needed.

Pressure taps exist in the jockey pump suction and discharge piping where pump suction and discharge pressure can be measured for calculation of differential pressure, and throttle valves exist which can be used to set differential pressure equal to the pump's reference value. However, the pump differential pressure information provided is of little use for analyzing the hydraulic condition of the jockey pump without being able to measure flow rate or set flow rate at a known reference value, as required by ASME OM Code-2004 Edition with addenda through OMb Code-2006, subparagraph ISTB-5121(*b*).

There is no practical means of measuring the flow rate of this jockey pump since no flow rate meters, orifices or other measurement devices are installed in the system for measurement of jockey pump flow rate. The installed main LPCS System process flow measurement instrumentation loop, which is discussed below, cannot be used for jockey pump flow measurement. Attempts have been made to use portable ultrasonic flow instruments to measure jockey pump flow rate, however the results have been inconsistent and not repeatable.

Flow orifice 1E21-FE-N002, which is installed in the system to measure the flow rate of the main LPCS Pump 1E21C001, has a rated maximum flow rate of 12,000 gpm (GE LPCS System Design Specification 22A3125AC). The flow instrument loop, which consists of the flow orifice, flow transmitter, flow indicator and signal processing electronics, has an overall loop accuracy of between one and two percent of the maximum measurable flow rate. Even at the lower, more accurate point, one percent accuracy is equivalent to 120 gpm, which is over 3 times the jockey pumps' rated flow rate of 40 gpm at 45 psid (UFSAR Section 6.3.2.2.5).

The flow orifice for the LPCS Pump is installed in 16-inch NPS piping. Even if the typical operational jockey pump differential flow rate of 40 gpm registered on this flow instrumentation, it would not meet the requirements of ASME OM Code-2004 Edition with addenda through OMb Code-2006, subparagraphs ISTB-3510(*b*)(*1*) and ISTB-3510(*c*), since the full-scale ranges of these instruments are more than 200 times the probable reference values for this jockey pump. Under ideal conditions, the jockey pump flow would be just barely detectable at the lower end of the instrument scale, and accurate measurement would be masked by instrument noise and other conditions.

Additionally, the flow path for the jockey pump in standby operation is through a minimum-flow return line with a flow-limiting orifice plate (1E21-RO-D003), which is sized to hold flow rate reasonably constant at about 10 gpm (UFSAR Figure 6.3-5), while providing adequate margin in jockey pump capacity to make

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-2
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

up for any leakage from the main LPCS pump discharge header. Flow rate through this orifice plate cannot be measured, as discussed above, since there are no installed measurement points and portable flow rate instrumentation has not proven adequate. This flow rate also cannot be considered constant and repeatable enough to meet the requirements of ASME OM Code-2004 Edition with addenda through OMb Code-2006, subparagraph ISTB-3300(d), due to the potential for changes in the main LPCS discharge header leakage from test to test.

5. **Proposed Alternative and Basis for Use**

Jockey pump discharge header pressure is continuously monitored, and the LPCS PMP DISCH PRESS ABNORMAL annunciator is activated in the Control Room if the main LPCS discharge header pressure drops below 32 psig. Based on the jockey pumps' rated capacity (40 gpm at 45 psid, per UFSAR Section 6.3.2.2.5) and the required suppression pool level during power operation (greater than or equal to 18 feet 4-1/12 inches and less than or equal to 18 feet 9-3/4 inches per Tech Spec LCO 3.6.2.2), this low header pressure annunciator will activate at approximately 70 percent of the jockey pumps' operating differential pressure.

Hydraulic condition of the jockey pump will be considered acceptable by continuous monitoring of pump discharge header pressures and verifying adequate header pressures as indicated by the absence of low pressure alarms. Corrective action will be taken if a header low pressure alarm sounds, indicating low header pressure.

Also, GGNS Technical Specification SR 3.5.1.1 requires verification every 31 days that the main LPCS discharge header is filled with water by venting the piping at the high point vents. Such continuous monitoring and monthly venting will provide timely warning if a jockey pump has failed, or that system leakage has exceeded the capacity of the jockey pump.

In addition, vibration will continue to be measured on the pump as required by ASME OM Code-2004 Edition with addenda through OMb Code-2006. If a measured vibration velocity exceeds an Alert or Required Action Range limit according to ASME OM Code-2004 Edition with addenda through OMb Code-2006, Table ISTB-5121-1, "Centrifugal Pump Test Acceptance Criteria," the required actions of ASME OM Code-2004 Edition with addenda through addenda OMb Code-2006, paragraph ISTB-6200, "Corrective Action", will be taken.

Based on the determination that compliance with the ASME OM Code-2004 Edition with addenda through OMb Code-2006 requirements results in a hardship without a compensating increase in the level of quality or safety, this proposed alternative should be granted pursuant to 10 CFR 50.55a(z)(2).

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-2
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

6. Duration of Proposed Alternative

This relief is requested for the fourth ten year IST interval, which begins December 1, 2017 and is scheduled to end on November 30, 2027 for Grand Gulf.

7. Precedent

Use of an alternative for similar requirements was previously granted as Relief Request PRR-E21-01 for Grand Gulf's 2nd 120-month Inservice Testing Interval (TAC-No. MA0196).

Use of an alternative was also granted as Relief Request PRR-GGNS-2007-2 for Grand Gulf's 3rd 120-month Inservice Testing Interval (GNRI-2008-0043).

8. References

1. NUREG-1482, Revision 2, "Guidelines for Inservice Testing at Nuclear Power Plants"
2. UFSAR 3.9.3.2.2.1.3, RHR Jockey Pump Test Summary (LPCS, HPCS, and RHR pumps)
3. UFSAR 6.3.2.2.5, ECCS Discharge Line Fill System
4. UFSAR Figure 6.3-5, System Flow Diagram Low Pressure Core Spray System
5. UFSAR Figure 5.4-36, Typical Performance Curves, HPCS & LPCS Jockey Pumps
6. Tech Spec SR 3.5.1.1, ECCS Operating Surveillance Requirement for Gas Intrusion
7. Tech Spec LCO 3.6.2.2, Suppression Pool Water Level
8. General Electric Low Pressure Core Spray System Design Specification 22A3125AC

Attachment 3 to GNRO-2017/00017

Relief Request Number PRR-GGNS-2017-3

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-3
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

1. American Society of Mechanical Engineers (ASME) Code Component(s) Affected

Pump ID	Function	Category	Class
E22C003	High Pressure Core Spray System Jockey Pump	Group A	2

2. Applicable ASME Code Edition and Addenda

ASME OM Code-2004 Edition, with Addenda through and including ASME OMb Code-2006.

3. Applicable Code Requirement(s)

ASME OM Code 2004 Edition with addenda through OMb Code 2006
ISTB-3300 Reference Values

Reference values shall be obtained as follows:

(a) Initial reference values shall be determined from the results of testing meeting the requirements of ISTB-3100, Preservice Testing, or from the results of the first inservice test.

(b) New or additional reference values shall be established as required by ISTB-3310, ISTB-3320, or ISTB-6200(c).

(c) Reference values shall be established only when the pump is known to be operating acceptably.

(d) Reference values shall be established at a point(s) of operation (reference point) readily duplicated during subsequent tests.

(e) Reference values shall be established in a region(s) of relatively stable pump flow.

a. Reference values shall be established within ± 20% of pump design flow rate for the comprehensive test.

b. Reference values shall be established within ± 20% of pump design flow for the Group A and Group B tests, if practicable. If not practicable, the reference point flow rate shall be established at the highest practical flow rate.

(f) All subsequent test results shall be compared to these initial reference values or to new reference values established in accordance with ISTB-3310, ISTB-3320, or ISTB-6200(c).

(g) Related conditions that can significantly influence the measurement or determination of the reference value shall be analyzed in accordance with ISTB-6400.

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-3510 General

(b) Range

a. The full-scale range of each analog instrument shall be not greater than three times the reference value.

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-3
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

a. The full-scale range of each analog instrument shall be not greater than three times the reference value.

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-3510 General

(c) Instrument Location. The sensor location shall be established by the Owner, documented in the plant records (see ISTB-9000), and shall be appropriate for the parameter being measured. The same location shall be used for subsequent tests. Instruments that are position sensitive shall be either permanently mounted, or provision shall be made to duplicate their position during each test.

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-5121

Group A Test Procedure. Group A tests shall be conducted with the pump operating at a specified reference point. The test parameters shown in Table ISTB-3000-1 shall be determined and recorded as required by this paragraph.

ASME OM Code-2004 Edition with addenda through OMb Code-2006
ISTB-5121 Group A Test Procedure

(c) The resistance of the system shall be varied until the flow rate equals the reference point. The differential pressure shall then be determined and compared to its reference value. Alternatively, the flow rate shall be varied until the differential pressure equals the reference point and the flow rate determined and compared to the reference flow rate value.

ASME OM Code-2004 Edition with addenda through OMb Code-2006, TABLE ISTB-3000-1, "INSERVICE TEST PARAMETERS", lists Flow Rate as a required parameter for both Group A and Comprehensive pump tests.

ASME OM Code-2004 with Addenda through OMb Code-2006, TABLE ISTB-5121, "CENTRIFUGAL PUMP TEST ACCEPTANCE CRITERIA", lists fixed Alert and Required Action Range limits at 2.5 times and 6 times, respectively.

4. Reason for Request

Pursuant to 10 CFR 50.55a, "Codes and Standards", paragraph (z)(2), an alternative is requested when using the requirements of ASME OM Code Section ISTB (as listed above).

This alternative is a re-submittal of NRC approved 2nd Interval Relief Request PRR-E22-01 that was based on the ASME/ANSI OM Standard 1987 Edition with addenda through OMa-1988, and the 3rd Interval Relief Request PRR-GGNS-2007-3 that was based on the ASME OM Code-2001 Edition with addenda through OMb Code-2003. This 4th Interval alternative request is based on the ASME OM Code-2004 Edition with addenda

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-3
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

through OMb Code-2006. There have been no substantive changes to this alternative, to the OM Code requirements or to the basis for use, which would alter the previous NRC Safety Evaluation conclusions.

This jockey pump is required to operate whenever the High Pressure Core Spray (HPCS) System is in the operable condition. As such, the pump performs continuous duty on a recirculation line and provides makeup as needed.

Pressure taps exist in the jockey pump suction and discharge piping where pump suction and discharge pressure can be measured for calculation of differential pressure, and throttle valves exist which can be used to set differential pressure equal to the pump's reference value. However, the pump differential pressure information provided is of little use for analyzing the hydraulic condition of the jockey pump without being able to measure flow rate or set flow rate at a known reference value, as required by ASME OM Code-2004 Edition with addenda through OMb Code-2006, subparagraph ISTB-5121(*b*).

There is no practical means of measuring the flow rate of this jockey pump since no flow rate meters, orifices or other measurement devices are installed in the system for measurement of jockey pump flow rate. The installed main HPCS System process flow measurement instrumentation loop, which is discussed below, cannot be used for jockey pump flow measurement. Attempts have been made to use ultrasonic flow instruments to measure jockey pump flow rate, however the results have been inconsistent and not repeatable.

Flow orifice 1E22-FE-N007, which is installed in the system to measure the flow rate of the main HPCS Pump 1E22C001, has a rated maximum flow rate of 10,000 gpm (GE HPCS System Design Specification 22A3131AC). The flow instrument loop, which consists of the flow orifice, flow transmitter, flow indicator and signal processing electronics, has an overall loop accuracy of between one and two percent of the maximum measurable flow rate. Even at the lower, more accurate, point, one percent accuracy is equivalent to 100 gpm, which is over 2-1/2 times the jockey pump's rated flow rate of 40 gpm at 45 psid (UFSAR Section 6.3.2.2.5).

The flow orifice for the HPCS Pump is installed in 16-inch NPS piping. Even if the typical operational jockey pump differential flow rate of 40 gpm registered on this flow instrumentation, it would not meet the requirements of ASME OM Code-2004 Edition with addenda through OMb Code-2006, subparagraphs ISTB-3510(*b*)(*1*) and ISTB-3510(*c*), since the full-scale ranges of these instruments are more than 200 times the probable reference value for this jockey pump. Under ideal conditions, the jockey pump flow would be just barely detectable at the lower end of the instrument scale, and

accurate measurement would be masked by instrument noise and other conditions.

Additionally, the flow path for the jockey pump in standby operation is through a minimum-flow return line with a flow-limiting orifice plate (1E22-RO-D003), which is sized to hold flow rate reasonably constant at about 40 gpm (System Flow Diagram SFD1086), while providing adequate margin in jockey pump capacity to make up for any leakage from the main HPCS pump discharge header. Flow rate through this orifice plate cannot be measured, as discussed above, since there are no installed measurement points and portable flow rate instrumentation has not proven adequate. This flow rate also cannot be considered constant and repeatable enough to meet the requirements of ASME OM Code-2004 Edition with addenda through OMb Code-2006, subparagraph ISTB-3300(d), due to the potential for changes in the main HPCS discharge header leakage from test to test.

5. Proposed Alternative and Basis for Use

Jockey pump discharge header pressure is continuously monitored, and the HPCS JKY PMP DISCH PRESS LO annunciator is activated in the Control Room if the jockey pump discharge header pressure drops below 19 psig. Based on the jockey pumps' rated capacity (40 gpm at 45 psid, per UFSAR Section 6.3.2.2.5) and the required suppression pool level during power operation (greater than or equal to 18 feet 4-1/12 inches and less than or equal to 18 feet 9-3/4 inches per Tech Spec LCO 3.6.2.2), this low header pressure annunciator will activate at approximately 40 percent of the jockey pumps' operating differential pressure.

Hydraulic condition of the jockey pump will be considered acceptable by continuous monitoring of pump discharge header pressures and verifying adequate header pressures as indicated by the absence of low pressure alarms. Corrective action will be taken if a header low pressure alarm sounds, indicating low header pressure.

Also, GGNS Technical Specification SR 3.5.1.1 requires verification every 31 days that the main HPCS discharge header is filled with water by venting the piping at the high point vents. Such continuous monitoring and monthly venting will provide timely warning if a jockey pump has failed, or that system leakage has exceeded the capacity of the jockey pump.

In addition, vibration will continue to be measured on the pump as required by ASME OM Code-2004 Edition with addenda through OMb Code-2006. If a measured vibration velocity exceeds an Alert or Required Action Range limit according to ASME OM Code-2004 Edition with addenda through OMb Code-2006, ISTB Table ISTB-5121-1, "Centrifugal Pump Test Acceptance Criteria," the required actions of ASME OM Code-2004 Edition with addenda through OMb Code-2006, paragraph ISTB-6200, "Corrective Action", will be taken.

GGNS, Grand Gulf Nuclear Station
10 CFR 50.55a Relief Request Number PRR-GGNS-2017-3
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(2) Hardship Without a Compensating Increase in Quality and Safety

Based on the determination that compliance with the ASME OM Code-2004 Edition with addenda through OMb Code-2006 requirements results in a hardship without a compensating increase in the level of quality or safety, this proposed alternative should be granted pursuant to 10 CFR 50.55a(z)(2).

6. Duration of Proposed Alternative

This relief is requested for the fourth ten year IST interval, which begins December 1, 2017 and is scheduled to end on November 30, 2027 for Grand Gulf.

7. Precedent

Use of an alternative for similar requirements was previously granted as Relief Request PRR-E22-01 for Grand Gulf's 2nd 120-month Inservice Testing Interval (TAC-No. MA0196).

Use of an alternative was also granted as Relief Request PRR-GGNS-2007-3 for Grand Gulf's 3rd 120-month Inservice Testing Interval (GNRI-2008-0043).

8. References

1. NUREG-1482, Revision 2, "Guidelines for Inservice Testing at Nuclear Power Plants"
2. UFSAR 3.9.3.2.2.1.3, RHR Jockey Pump Test Summary (LPCS, HPCS, and RHR pumps)
3. UFSAR 6.3.2.2.5, ECCS Discharge Line Fill System
4. UFSAR, 6.7.2.2, Feedwater Leakage Control System, System Description
5. SFD1086, System Flow Diagram High Pressure Core Spray System
6. UFSAR Figure 5.4-36, Typical Performance Curves, HPCS & LPCS Jockey Pumps
7. Tech Spec SR 3.5.1.1, ECCS Operating Surveillance Requirement for Gas Intrusion
8. Tech Spec LCO 3.6.2.2, Suppression Pool Water Level
9. General Electric Low Pressure Core Spray System Design Specification 22A3131AC