July 14, 2000

Mr. James Knubel
Chief Nuclear Officer
Power Authority of the State
of New York
123 Main Street
White Plains, NY 10601

SUBJECT: RELIEF REQUEST FROM AMERICAN SOCIETY OF MECHANICAL ENGINEERS BOILER AND PRESSURE VESSEL CODE SECTION XI RELATED TO THE THIRD TEN-YEAR INTERVAL INSERVICE TESTING PROGRAM - INDIAN POINT NUCLEAR GENERATING UNIT NO. 3 (TAC NOS. MA8211, MA8212, MA8213, MA8214, MA8215 AND MA8216)

Dear Mr. Knubel:

By letter dated January 18, 2000, as supplemented and modified by letter dated April 25, 2000, you submitted your Inservice Testing Program for Pumps and Valves for the third ten-year interval. These submittals contained 11 Relief Requests (PR-1 through PR-8, VR-1, ROJ-1, and ROJ-15).

The NRC staff reviewed the proposed relief requests against the requirements of Section XI of the 1989 Edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code). The results are provided in the enclosed safety evaluation.

The NRC staff has concluded that the alternatives to the ASME Code requirements that you proposed in Relief Requests PR-1, PR-5, PR-6, PR-7, and VR-1 are acceptable. The staff has determined that relief is warranted because compliance with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(ii) these relief requests are granted.

The NRC staff has concluded that the alternatives to the ASME Code requirements that you proposed in Relief Requests PR-2 and PR-4 are acceptable. The staff has determined that relief is warranted because the proposed alternatives provide an acceptable level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(i) these relief requests are granted.

The NRC staff has determined that the proposed alternatives to the Code requirements described in ROJ-1 and ROJ-15 may be approved pursuant to 10 CFR 50.55a(f)(4)(iv) for the third 10-year interval. These alternatives meet the requirements of the 1995 OM Code, paragraph ISTC 4.5.4(c), which has been incorporated by reference into 10 CFR 50.55a (64 FR 51370).

Relief Request PR-3 was withdrawn by letter dated April 25, 2000.

The NRC staff has concluded that the alternatives to the ASME Code requirements that you proposed in Relief Request PR-8 for using the corrective action requirements of the 1995

Edition of the OM Code, paragraph ISTB 6.2.1, for pumps in the required action range is acceptable. The staff has determined that relief is warranted because the proposed alternatives provide an acceptable level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(i) these relief requests are granted.

The NRC staff has concluded that the alternatives to the ASME Code requirements that you proposed in Relief Request PR-8 for using the corrective action requirements of the 1995 Edition of the OM Code, paragraph ISTB 6.2.1, for pumps in the alert range is not acceptable. Relief is denied because the licensee has not shown that relief is warranted pursuant to 10 CFR 50.55a(f)(6)(i), or otherwise proposed an acceptable alternative pursuant to 10 CFR 50.55a(a)(3)(i) or 10 CFR 50.55a(a)(3)(ii).

The staff's safety evaluation is enclosed.

This completes the staff's action on TAC Nos. MA8211, MA9212, MA8213, MA8214, MA8215, and MA8216.

Sincerely,

/RA/

Marsha Gamberoni, Chief, Section 1
Project Directorate 1
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-286

Enclosure: Safety Evaluation

cc w/encl: See next page

Edition of the OM Code, paragraph ISTB 6.2.1, for pumps in the required action range is acceptable. The staff has determined that relief is warranted because the proposed alternatives provide an acceptable level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(i) these relief requests are granted.

The NRC staff has concluded that the alternatives to the ASME Code requirements that you proposed in Relief Request PR-8 for using the corrective action requirements of the 1995 Edition of the OM Code, paragraph ISTB 6.2.1, for pumps in the alert range is not acceptable. Relief is denied because the licensee has not shown that relief is warranted pursuant to 10 CFR 50.55a(f)(6)(i), or otherwise proposed an acceptable alternative pursuant to 10 CFR 50.55a(a)(3)(i) or 10 CFR 50.55a(a)(3)(ii).

The staff's safety evaluation is enclosed.

This completes the staff's action on TAC Nos. MA8211, MA9212, MA8213, MA8214, MA8215, and MA8216.

Sincerely,

/RA/

Marsha Gamberoni, Chief, Section 1
Project Directorate 1
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

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Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE THIRD TEN-YEAR INTERVAL INSERVICE TESTING PROGRAM

POWER AUTHORITY OF THE STATE OF NEW YORK

INDIAN POINT NUCLEAR GENERATING UNIT NO. 3

DOCKET NUMBER 50-286

1.0 INTRODUCTION

The *Code of Federal Regulations*, 10 CFR 50.55a, requires that inservice testing (IST) of certain American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME *Boiler and Pressure Vessel Code* (ASME Code) and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for its facility. Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME Code requirements upon making the necessary findings. NRC guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to the Code requirements which are acceptable. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants."

In a letter dated January 18, 2000, the Power Authority of the State of New York, the licensee for the Indian Point Nuclear Generating Unit No. 3 (IP3), submitted the third ten-year interval IST program for pumps and valves. The program contains 11 relief requests. A conference call was conducted with the licensee on March 31, 2000, to clarify the information provided in the IST program. As a result of the call, the licensee submitted supplemental information in a letter dated April 25, 2000.

The third ten-year IST interval for IP3 begins July 21, 2000, and is scheduled to end July 20, 2010. The IST program was developed in accordance with the requirements of the 1989 Edition of the ASME Code by implementation of the 1987 ASME/ANSI *Operations and Maintenance (OM) Standards* Part 1, Part 6, and Part 10 (OM-1, OM-6, and OM-10) for IST of safety and relief devices, pumps, and valves.

The NRC's findings with respect to authorizing alternatives and granting or denying the IST program relief requests are given below.

2.0 PUMP RELIEF REQUESTS

2.1 Relief Request PR-1

The licensee requests relief from OM-6 paragraph 4.3 which requires that reference values for pump testing be established at points of operation that are readily duplicated during subsequent inservice testing. As an alternative, the licensee proposes to utilize pump curves for evaluating the performance of the service water pumps SWN-31, SWN-32, SWN-33, SWN-34, SWN-35, and SWN-36.

2.1.1 Licensee's Basis for Requesting Relief

The licensee states:

> The Service Water Pumps (SWPs) provide cooling water from the Hudson River to various heat exchangers in the primary and secondary portions of the plant. The SWPs supply cooling water to various heat exchangers for containment heat removal, long term core cooling and equipment cooling during accident conditions. The SWPs provide cooling to systems where throttling for the purpose of testing can lead to undesirable thermal transients on critical operating equipment.
>
> In order to strictly adhere to the OM-6 code requirements to test the SWPs at a fixed flow each time, valves controlling flow to operating equipment would need to be adjusted. In order to minimize the need to adjust these values, the IST test allows for the measured pump flow to vary over the range of the pump curve to allow for expected variations in system alignments/operating conditions from test to test. In developing the pump curves used in the test, the following elements were used:
>
> 1. The pump curves were developed when the pumps were known to operate acceptably. The data used originated from an Engineering Test performed after pump installation.
>
> 2. The instruments used during the Engineering Test either met or exceeded the Code required accuracy.
>
> 3. A minimum of 5 points from the Engineering Test were used to construct the pump reference curve.
>
> 4. The constructed curve uses a range of flows which encompasses the normally expected flow observed from the Engineering Test.
>
> 5. The acceptance criteria established does not conflict with the operability criteria for flow rate and differential pressure in technical specifications or the facility safety analysis report.
>
> 6. Review of the vibration data trend plots indicates that the change in vibration readings over the range of the pump curve being used is insignificant and thus only one fixed reference value has been assigned for each vibration location.

7. After any maintenance or repair that may affect the existing reference pump curve, a new reference pump curve shall be determined or the existing pump curve revalidated by an inservice test.

2.1.2 Alternative Testing

The licensee proposes:

> During pump reference tests when the pump is known to be operable, a reference pump curve may be established or the manufacturer's pump curve confirmed as discussed in the Basis for Relief. In subsequent tests, a flowrate (Qa) will be obtained and recorded along with the corresponding differential pressure (dPa). The differential pressure value (dPa) will then be compared to a reference differential pressure obtained from the reference pump curve using measured flowrate (Qa).

2.1.3 Evaluation

The pumps for which the licensee requests relief are the service water pumps, SWN-31, SWN-32, SWN-33, SWN-34, SWN-35, and SWN-36. These pumps provide cooling water from the Hudson River to various heat exchangers in the primary and secondary portions of the plant. OM-6 paragraph 4.3 requires that reference values for pump testing be established at points of operation that are readily duplicated during subsequent inservice testing. The licensee proposes to follow the guidance described in NUREG-1482, Section 5.2 and use pump curves as an alternative to the Code-required testing.

Where it is difficult to return to the same flow configuration for each subsequent inservice pump test, it is necessary for the licensee to establish a method for evaluating the operational readiness of pumps in variable flow systems. This may be the case for service water or component cooling water systems or other systems where temperature or flow is controlled at a variety of locations. During quarterly pump testing, the licensee may not be able to manually control each of these local stations and duplicate the overall system reference conditions, as required by the Code. In these situations, the guidance in NUREG-1482 states that the NRC will accept the use of pump curves for reference values of flow rate and differential pressure if the licensee demonstrates the difficulty of establishing a fixed set of reference values.

The licensee states that it is a hardship to conduct the testing required by OM-6 paragraph 4.3 because of the need to throttle the cooling water flowrate to the various heat exchangers. As stated in the licensee's basis for relief, throttling the flowrate for the purpose of testing can lead to undesirable thermal transients on critical operating equipment.

NUREG-1482, Section 5.2 provides a list of seven elements that the licensee must perform in preparing pump curves. The licensee has addressed these seven elements in their basis for relief. Adherence to this guidance provides assurance that the proposed reference curves will detect degradation in the pump over the range of the curve bounded by reference points. Therefore, the proposed alternative provides reasonable assurance of operation readiness of the pumps.

2.1.4 Conclusion

The licensee's proposed alternative to the requirements of OM-6 paragraph 4.3, is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified requirements would result in hardship without a compensating increase in the level of quality and safety. The alternative is authorized for the third 10-year interval.

2.2 Relief Request PR-2

The licensee requests relief from the test frequency requirements of OM-6 paragraph 5.1 for the turbine-driven auxiliary feedwater pump, AFW-32. The licensee proposes to test the pump quarterly using a non-instrumented minimum flow line, and during refueling outages, test the pump under full-flow conditions. This proposed alternative is in accordance with GL 89-04 Position 9.

2.2.1 Licensee's Basis for Requesting Relief

The licensee states:

> During normal plant operation no full-flow test loop is available for this pump. Consequently, the only practical method of testing is to circulate water through the minimum flow line; however there is no flow measuring instrumentation in the minimum flow circuit.
>
> Since this pump stands idle, except for periods of testing, significant inservice degradation is unlikely.

2.2.2 Alternative Testing

The licensee proposes:

> This pump will be tested quarterly with the fixed resistance of the minimum flow line. During these tests, all appropriate pump operational parameters will be measured and evaluated with respect to OM-6 Table 3 and associated relief requests with the exception of flowrate.
>
> Every 2 years the #32 Auxiliary Feedwater Pump will be tested under nominal full-flow conditions during pump testing required by Technical Specification 4.8.1.a. All required measurements of parameters will be taken and evaluated in accordance with OM-6 Table 3. This agrees with the guidance provided in NRC Generic Letter (GL) 89-04, Position 9.

2.2.3 Evaluation

The licensee requests relief from the test frequency requirements of OM-6 paragraph 5.1 for the turbine-driven auxiliary feedwater pump, AFW-32. The Code requires that an inservice test be run on each pump every 3 months. The licensee proposes to test the pump quarterly using

a non-instrumented minimum flow line, and during refueling outages, test the pump under full-flow conditions.

Staff Position 9 of GL 89-04 states that in cases where flow can only be established through a non-instrumented minimum-flow path during quarterly pump testing and a path exists at cold shutdowns or refueling outages to perform a test of the pump under full or substantial flow conditions, the staff has determined that the increased interval is an acceptable alternative to the Code requirements provided that pump differential pressure, flow rate, and bearing vibration measurements are taken during this testing and that quarterly testing also measuring at least pump differential pressure and vibration is continued.

The licensee's proposed alternative testing is consistent with the guidance of Position 9 of GL 89-04 and will provide an acceptable level of quality and safety.

2.2.4 Conclusion

The proposed alternative to the test frequency requirements of OM-6 paragraph 5.1 provides an acceptable level of quality and safety and is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the third 10-year interval.

2.3 Relief Request PR-3

This relief request has been withdrawn by the licensee's letter dated April 25, 2000.

2.4 Relief Request PR-4

The licensee requests relief from the gage line requirements of OM-6 paragraph 4.6.2.1 when taking pump suction pressure measurements. Relief is requested for all pumps in the licensee's IST program. The licensee proposes to ensure or determine the presence or absence of liquid in the gage line for the static correction of the calculated value of pump differential pressure.

This alternative was previously authorized for the licensee's second 10-year interval in the staff's SE dated September 13, 1994.

2.4.1 Licensee's Basis for Requesting Relief

The licensee states:

> When this requirement is applied to the measurement of pump suction pressure where measured pressures are at relative low levels, the 0.25% limit is overly restrictive and oftentimes results in complicated venting procedures and unnecessary health physics risks associated with handling and disposal of radioactive contaminated water with no commensurate gain or improvement of test reliability.
>
> Normally, the only quantitative use of suction pressure measurements, where significant accuracy is required, is in determining pump differential pressure or head. In most cases the pump discharge pressure exceeds the suction pressure by at least a factor of

> five (5). This being the case, a .25% error introduced into the suction pressure measurement results in an error of .05% in the differential pressure calculation. This is insignificant in light of the potential 4% error allowance applied to both the suction and discharge pressure instruments (Ref OM-6, Table 1).

2.4.2 Alternative Testing

The licensee proposes:

> If the presence or absence of liquid in a gage line used for sensing pump suction pressure could produce a difference of more than 0.25% in the calculated value of the pump differential pressure, means shall be provided to ensure or determine the presence or absence of liquid as required for the static correction used.

2.4.3 Evaluation

The licensee requests relief from the gage line requirements of OM-6 paragraph 4.6.2.1 when taking pump suction pressure measurements. The Code requires that if the presence or absence of liquid in a gage line could produce a difference of more than 0.25% in the indicated value of the measured pressure, means shall be provided to ensure or determine the presence or absence of liquid as required for the static correction used. The requirement to account for the presence or absence of liquid in pressure sensing lines is intended to ensure that accurate pressure measurements are obtained. Pump suction pressure itself is not required by the Code to determine pump performance and there are no acceptance criteria for it. Its only quantitative use is in calculating pump differential pressure. Therefore, the error in suction pressure measurement is only important to the calculated value of differential pressure. The licensee's proposed alternative to ensure or determine the presence or absence of liquid in the gage line for the static correction of the calculated value of pump differential pressure, provides an equivalent level of quality and safety as that provided by the Code.

2.4.4 Conclusion

The proposed alternative to the gage line requirements of OM-6 paragraph 4.6.2.1 provides an equivalent level of quality and safety as that afforded by the Code and is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the third 10-year interval.

2.5 Relief Request PR-5

The licensee requests relief from OM-6 paragraph 4.3 which requires that reference values for pump testing be established at points of operation that are readily duplicated during subsequent inservice testing. As an alternative, the licensee proposes to utilize pump curves for evaluating the performance of the safety injection circulating water pumps ACC-CW-31, ACC-CW-32 and ACC-CW-33.

This alternative was authorized for the second 10-year interval in the staff's SE dated April 5, 1999.

2.5.1 Licensee's Basis for Requesting Relief

The licensee states:

> In order to ensure that cooling water flow is supplied to the Safety Injection pumps during an SI actuation concurrent with a blackout event, these pumps were supplied with attached shaft driven centrifugal pumps. These SI-CCW Pumps supply cooling water flow to Safety Injection Pump support services (i.e., SI shaft seals, stuffing box and lube oil coolers). In order to ensure that each Lube Oil Cooler receives adequate flow, a preoperational test was performed to flow balance the system. As a result of the flow balance tests, the Component Cooling return from the SI Pump Cooler outlet isolation valve must be throttled. Once these valves are set/throttled, the less they are adjusted and reset, the more reliable the final valve positions would reflect the original flow balance required positions.
>
> In order to strictly adhere to the OM-6 code requirements to test the SI-CCW pumps at a fixed flow each time, valves which are throttled to required positions due to flow balance concerns need to be adjusted. In order to minimize the need to adjust these valves, the IST test allows for the measured pump flow to vary over a small range of the pump curve to allow for expected variations in system alignments/operating conditions from test to test. In developing the pump curve used in the test, the following elements were used:
>
> 1. The manufacturer's pump curves were validated when the pumps were known to operate acceptably. The data used originated from the Modification Acceptance Test after pump installation.
>
> 2. The instruments used during the Modification Acceptance Test either met or exceeded the Code required accuracy.
>
> 3. 18 points from the manufacturer's curve were used to construct the pump reference curve, however only 4 of the points cover the tested flow range which is considered acceptable due to the narrow test range. The full pump curve ranges from 0 to 85 GPM while the test curve ranges from 20 to 35 GPM.
>
> 4. The constructed curve uses a narrow flow range which encompasses the normally expected flow observed from the Modification Test.
>
> 5. The acceptance criteria established does not conflict with the operability criteria for flow rate and differential pressure in technical specifications or the facility safety analysis report.
>
> 6. Review of the vibration data trend plots indicates that the change in vibration readings over the narrow range of the pump curves being used is insignificant and thus only one fixed reference value has been assigned for each vibration location.

7. After any maintenance or repair that may affect the existing reference pump curve, a new reference pump curve shall be determined or the existing pump curve revalidated by an inservice test.

2.5.2 Alternative Testing

The licensee proposes:

> During pump reference tests when the pump is known to be operable, a reference pump curve may be established or the manufacturer's pump curve confirmed as discussed in the Basis For Relief. In subsequent tests, a flowrate (Qa) will be obtained and recorded along with the corresponding differential pressure (dPa). The differential pressure value (dPa) will then be compared to a reference differential pressure obtained from the reference pump curve using measured flowrate (Qa).

2.5.3 Evaluation

The pumps for which the licensee requests relief are the safety injection circulating water pumps ACC-CCW-31, ACC-CW-32, and ACC-CW-33. These pumps supply cooling water flow to the safety injection pump support services, such as the safety injection shaft seals, stuffing box, and lube oil coolers. OM-6 paragraph 4.3 requires that reference values for pump testing be established at points of operation that are readily duplicated during subsequent inservice testing. The licensee proposes to follow the guidance described in NUREG-1482, Section 5.2 and use pump curves as an alternative to the Code required testing.

Where it is difficult to return to the same flow configuration for each subsequent inservice pump test, it is necessary for the licensee to establish a method for evaluating the operational readiness of pumps in variable flow systems. This may be the case for service water or component cooling water systems or other systems where temperature or flow is controlled at a variety of locations. During quarterly pump testing, the licensee may not be able to manually control each of these local stations and duplicate the overall system reference conditions, as required by the Code. In these situations the guidance in NUREG-1482 states that the NRC will accept the use of pump curves for reference values of flow rate and differential pressure if the licensee demonstrates the difficulty of establishing a fixed set of reference values.

The licensee states that it is a hardship to conduct the testing required by paragraph 4.3 because of the need to throttle the component cooling return isolation valve. Once the valve is set in the original flow balanced-required position, adjustments to it decrease the reliability that the valve positions will be correct.

NUREG-1482, Section 5.2 provides a list of seven elements that the licensee must perform in preparing pump curves. The licensee has addressed these seven elements in their basis for relief. Adherence to this guidance provides assurance that the proposed reference curves will detect degradation in the pump over the range of the curve bounded by reference points. Therefore, the proposed alternative provides reasonable assurance of operation readiness of the pumps.

2.5.4 Conclusion

The licensee's proposed alternative to the requirements of OM-6 paragraph 4.3, is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified requirements would result in hardship without a compensating increase in the level of quality and safety. The alternative is authorized for the third 10-year interval.

2.6 Relief Request PR-6

The licensee requests relief from OM-6 paragraph 4.3 which requires that reference values for pump testing be established at points of operation that are readily duplicated during subsequent inservice testing. Instead, the licensee proposes to utilize pump curves for evaluating the performance of the component cooling water pumps CCW-31, CCW-32, and CCW-33.

2.6.1 Licensee's Basis for Requesting Relief

The licensee states:

> The Component Cooling Water (CCW) pumps circulate CCW through the component cooling loops to meet or exceed the minimum required cooling flows to inservice components. The CCW pumps provide cooling to systems where throttling for the purpose of testing can lead to undesirable thermal transients on critical operating equipment.
>
> In order to strictly adhere to the OM-6 code requirements to test the CCW pumps at a fixed flow each time, valves controlling flow to operating equipment would need to be adjusted. In order to minimize the need to adjust these valves, the IST test allows for the measured pump flow to vary over the range of the pump curve to allow for expected variations in the system alignments/operating conditions from test to test. In developing the pump curves used in the test, the following elements were used:
>
> 1. The pump curves were developed or the manufacturer's pump curve validated when the pumps were known to operate acceptably.
>
> 2. The instruments used either met or exceeded the Code required accuracy.
>
> 3. A minimum of 5 points were used to construct the pump reference curve.
>
> 4. The constructed curve uses a range of flows which encompasses the normally expected flow.
>
> 5. The acceptance criteria established does not conflict with the operability criteria for flow rate and differential pressure in technical specifications or the facility safety analysis report.
>
> 6. Review of the vibration data trend plots indicates that the change in vibration readings over the range of the pump curve being used is insignificant and thus only one fixed reference value has been assigned for each vibration location.

7. After any maintenance or repair that may affect the existing reference pump curve, a new reference pump curve shall be determined or the existing pump curve revalidated by an inservice test.

2.6.2 Alternative Testing

The licensee proposes:

> During pump reference tests when the pump is known to be operable, a reference pump curve may be established or the manufacturer's pump curve confirmed as discussed in the Basis for Relief. In subsequent tests, a flowrate (Qa) will be obtained and recorded along with the corresponding differential pressure (dPa). The differential pressure value (dPa) will then be compared to a reference differential pressure obtained from the reference pump curve using measured flowrate (Qa).

2.6.3 Evaluation

The pumps for which the licensee requests relief are the component cooling water pumps, CCW-31, CCW-32, and CCW-33. These pumps circulate component cooling water through the component cooling loops to meet the required cooling flow to inservice components. OM-6 paragraph 4.3 requires that reference values for pump testing be established at points of operation that are readily duplicated during subsequent inservice testing. The licensee proposes to follow the guidance described in NUREG-1482, Section 5.2 and use pump curves as an alternative to the Code-required testing.

Where it is difficult to return to the same flow configuration for each subsequent inservice pump test, it is necessary for the licensee to establish a method for evaluating the operational readiness of pumps in variable flow systems. This may be the case for service water or component cooling water systems or other systems where temperature or flow is controlled at a variety of locations. During quarterly pump testing, the licensee may not be able to manually control each of these local stations and duplicate the overall system reference conditions, as required by the Code. In these situations the guidance in NUREG-1482 states that the NRC will accept the use of pump curves for reference values of flow rate and differential pressure if the licensee demonstrates the difficulty of establishing a fixed set of reference values.

The licensee states that it is a hardship to conduct the testing required by the Code because it would require adjustment of the valves which control flow to operating equipment. Throttling the cooling flow for the purpose of testing, can lead to undesirable thermal transients on critical operating equipment.

NUREG-1482, Section 5.2 provides a list of seven elements that the licensee must perform in preparing pump curves. The licensee has addressed these seven elements in their basis for relief. Adherence to this guidance provides assurance that the proposed reference curves will detect degradation in the pump over the range of the curve bounded by reference points. Therefore, the proposed alternative provides reasonable assurance of operation readiness of the pumps.

2.6.4 Conclusion

The licensee's proposed alternative to the requirements of OM-6 paragraph 4.3, is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified requirements would result in hardship without a compensating increase in the level of quality and safety. The alternative is authorized for the third 10-year interval.

2.7 Relief Request PR-7

The licensee requests relief from OM-6 paragraph 4.3 which requires that reference values for pump testing be established at points of operation that are readily duplicated during subsequent inservice testing. As an alternative, the licensee proposes to utilize pump curves for evaluating the performance of the residual heat removal pumps RHR-31 and RHR-32. This relief request only applies when the plant is in cold shutdown or a cooldown configuration.

2.7.1 Licensee's Basis for Requesting Relief

The licensee states:

> The Residual Heat Removal (RHR) pumps circulate RCS water through the RHR system during plant cooldown, cold shutdown and refueling operations. The RHR pumps provide emergency core cooling during the injection phase of a LOCA and provide backup to the recirculation pumps during the recirculation phase of a LOCA. During plant shutdown, throttling RHR flow for testing creates unacceptable core cooling and mixing complications. When the plant is not in a shutdown condition, RHR pump testing is performed through a miniflow path at a fixed resistance reference point.
>
> In order to strictly adhere to the OM-6 code requirements to test the RHR pumps at a fixed flow each time, valves controlling shutdown cooling flow would need to be adjusted. In order to minimize the need to adjust these valves, the IST test allows for the measured pump flow to vary over the range of the pump curve to allow for expected variations in system alignments/operating conditions from test to test. In developing the pump curves used in the test, the following elements were used:
>
> 1. The pump curves were developed or the manufacturer's pump curve validated when the pumps were known to operate acceptably.
>
> 2. The instruments used either met or exceeded the Code-required accuracy.
>
> 3. A minimum of 5 points were used to construct the pump reference curve.
>
> 4. The constructed curve uses a range of flows which encompasses the normally expected flow.
>
> 5. The acceptance criteria established does not conflict with the operability criteria for flow rate and differential pressure in technical specifications or the facility safety analysis report.

6. Review of the vibration data trend plots indicates that the change in vibration readings over the range of the pump curve being used is insignificant and thus only one fixed reference value has been assigned for each vibration location.

7. After any maintenance or repair that may affect the existing reference pump curve, a new reference pump curve shall be determined or the existing pump curve revalidated by an inservice test.

2.7.2 Alternative Testing

The licensee proposes:

> During pump reference tests when the pump is known to be operable, a reference pump curve may be established or the manufacturer's pump curve confirmed as discussed in the Basis For Relief. In subsequent tests, a flowrate (Qa) will be obtained and recorded along with the corresponding differential pressure (dPa). The differential pressure value (dPa) will then be compared to a reference differential pressure obtained from the reference pump curve using measured flowrate (Qa). Curve comparison will be used only when the plant is in a cold shutdown or cooldown configuration.

2.7.3 Evaluation

The pumps for which the licensee requests relief are the RHR pumps, RHR-31 and RHR-32. These pumps circulate reactor coolant system water through the RHR system during plant cooldown, cold shutdown, and refueling operations. The pumps also provide emergency core cooling during the injection phase of a LOCA and act as a backup to the recirculation pumps during the recirculation phase of a LOCA. OM-6 paragraph 4.3 requires that reference values for pump testing be established at points of operation that are readily duplicated during subsequent inservice testing. The licensee proposes to follow the guidance described in NUREG-1482, Section 5.2 and use pump curves as an alternative to the Code-required testing for situations when the plant is in a cold shutdown or cooldown configuration. During power operation, the pump testing is performed through a minimum flow path at a fixed resistance reference point, in accordance with the Code requirements.

Where it is difficult to return to the same flow configuration for each subsequent inservice pump test, it is necessary for the licensee to establish a method for evaluating the operational readiness of pumps in variable flow systems. This may be the case for service water or component cooling water systems or other systems where temperature or flow is controlled at a variety of locations. During quarterly pump testing, the licensee may not be able to manually control each of these local stations and duplicate the overall system reference conditions, as required by the Code. In these situations, the guidance in NUREG-1482 states that the NRC will accept the use of pump curves for reference values of flow rate and differential pressure if the licensee demonstrates the difficulty of establishing a fixed set of reference values.

The licensee states that it is a hardship to conduct the testing required by the Code when the plant is in cold shutdown or cooldown because throttling the RHR flow creates unacceptable core cooling and mixing complications.

NUREG-1482, Section 5.2 provides a list of seven elements that the licensee must perform in preparing pump curves. The licensee has addressed these seven elements in their basis for relief. Adherence to this guidance provides assurance that the proposed reference curves will detect degradation in the pump over the range of the curve bounded by reference points. Therefore, the proposed alternative provides reasonable assurance of operation readiness of the pumps.

2.7.4 Conclusion

The licensee's proposed alternative to the requirements of OM-6 paragraph 4.3, is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified requirements would result in hardship without a compensating increase in the level of quality and safety. The alternative is authorized for the third 10-year interval.

2.8 Relief Request PR-8

The licensee requests relief from the acceptance criteria of OM-6 paragraph 6.1 for all pumps in the IST program. The licensee proposes to establish new reference values using the 1995 Edition of OM, paragraph ISTB 4.6, for pumps in the alert range, ISTB 6.2.1, and required action range, ISTB 6.2.2.

2.8.1 Licensee's Basis for Requesting Relief

The licensee states:

> OM Part 6 requires doubling of test frequency or declaring a pump inoperable upon reaching the Alert or Required Action Ranges, respectively. In some cases, where a pump has sufficient excess margin to its safety analysis limits and data trending and analysis only indicates a gradual decrease in pump performance, the requirements of OM Part 6 may result in taking unnecessary corrective action.
>
> Paragraph ISTB 4.6 of the 1995 ASME OM Code allows the ability to perform an analysis of the pump and establish new reference values. Paragraph ISTB 6.2.2 states that if the measured test parameter values fall within the required action range....the pump shall be declared inoperable until either the cause of the deviation has been determined and the condition corrected, or an analysis of the pump is performed and new reference values are established in accordance with Paragraph ISTB 4.6. Paragraph ISTB 4.6 requires that the analysis include both a pump level and a system level evaluation of operational readiness, the cause of the change in pump performance, and an evaluation of all trends indicated by available data.
>
> Paragraph ISTB 6.2.1 states that if the measured test parameter values fall within the alert range...the frequency of testing specified in paragraph ISTB 5.1 shall be doubled until the cause of the deviation is determined and the condition is corrected. Paragraph ISTB 4.6 allows a new set of reference values to be established when a pump's parameters are in either the alert or required action ranges using the analysis discussed above.

> If an analysis, in accordance with paragraph ISTB 4.6, supports establishing new reference values in lieu of correcting the condition, then using the requirements of ISTB 4.6 as an alternative to OM(6)-6.1 would provide an acceptable level of quality and safety.
>
> Note: Where ISTB 4.6, ISTB 6.2.1 and ISTB 6.2.2 refer to ISTB tables, OM(6) Table 3 would be inserted. All references to ISTB in the preceding paragraphs refer to the 1995 ASME OM Code.

2.8.2 Alternative Testing

The licensee proposes:

> If supported by an analysis that meets the requirements of ISTB 4.6, corrective action may be to establish new reference values for pumps which fall within the alert or action ranges.

2.8.3 Evaluation

The Code, OM-6 paragraph 6.1, specifies actions required to be taken if any of the measured pump parameters fall within the alert or required action ranges. For test results in the alert range, the test frequency is required to be doubled until the cause of the deviation is determined and the condition is corrected. For test results in the required action range, the pump shall be declared inoperable until the cause of the deviation has been determined and the condition corrected. The licensee requests relief from the requirements of OM-6 paragraph 6.1 for all pumps in the IST program. The licensee proposes an alternative to establish new reference values using the 1995 Edition of OM, paragraph ISTB 4.6, for pumps in the alert range, ISTB 6.2.1, and required action range, ISTB 6.2.2.

Paragraph ISTB 4.6, “New Reference Values” of the 1995 OM Code, which has been incorporated by reference into 10 CFR 50.55a, allows that “[i]n cases where the pump’s test parameters are either within the alert or required action ranges of ISTB 5.2.1.1, Table ISTB 5.2.1-2, Table ISTB 5.2.2-1, or Table ISTB 5.2.3-1, and the pump’s continued use at the changed values is supported by an analysis, a new set of reference values may be established.” This paragraph clarifies that if a pump can be shown to be capable of performing its safety function, it may be returned to service with adjusted reference values. There are pumps that have a significant margin over the safety requirements that might degrade from their initial performance, but still are capable of meeting their safety function. Pumps which do not have margin would not be returned to service without repair or replacement. Paragraph ISTB 4.6 also states that the analysis shall include both a pump level and a system level verification of pump operational readiness, the cause of the change in pump performance, and an evaluation of all trends indicated by available data. Paragraph ISTB 6.2.2, which provides acceptance criteria for the required action range, explicitly states that an analysis may be performed and directly references paragraph ISTB 4.6. Paragraph ISTB 6.2.1, which provides acceptance criteria for the alert range, does not reference paragraph 4.6. It states that the testing frequency shall be doubled until the cause of the deviation is determined and the condition corrected.

The regulations, 10 CFR 50.55a(f)(4)(iv), state that “Inservice tests of pumps and valves may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in paragraph (b) of this section, subject to the limitations and modifications listed in paragraph (b) of this section, and subject to Commission approval. Portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met.” For paragraphs ISTB 4.6, 6.2.1, and 6.2.2 of the 1995 Edition of the Code, the related requirement is the comprehensive pump test, ISTB 5.2.3. The 1995 Edition of the Code provides for pump testing at full or substantial flow conditions whereas the previous Code editions do not. The licensee has not proposed comprehensive testing of all pumps in its IST program. Therefore, use of paragraph ISTB 4.6 to establish new reference values for pumps in the alert range per ISTB 6.2.1, is denied.

However, in GL 91-18 paragraph 6.11, the staff indicates that in cases where the required action range limit is more conservative than its corresponding technical specification limit, the corrective action may not be limited to replacement or repair. The corrective action may consist of an analysis to demonstrate that the specific pump performance degradation does not impair operability and that the pump or valve will still fulfill its function. A new required action range may be established after such an analysis which would then allow a new determination of operability. Because GL 91-18 allows licensees to perform an analysis to determine operability, the staff has approved the use of paragraph ISTB 6.2.2 for pumps in the required action range.

The analysis should include a comparison of the current measurements for the particular parameter (flow rate, vibration, discharge pressure, or differential pressure) to the baseline measurements, an evaluation of the trend of available data for the parameter, and a determination of the cause and the need for corrective action. Alternate available methods, such as vibration spectral analysis, are expected to be used to support the analysis. Any analysis performed is subject to NRC inspection and must provide reasonable assurance that the degradation mechanism will not cause further degradation such that, before the next pump test or before repairs can be performed, the pump would fail. Additionally, it should be noted that changes to the vibration reference values would affect only the vibration relative to the alert and required action limits, and not the absolute limits specified in the Code. If the absolute limits are exceeded, the licensee would be required to declare the pump inoperable in accordance with the Code.

The use of this analysis is expected to be a rare occurrence. It is not intended to be used regularly to evaluate the operabiltiy of all pumps that fall into the required action range in order to declare the pump operable and define new reference values where significant degradation has occurred. Repeated application of analysis could lead to stair stepping the Code limits downward to the safety limits of the pump. The licensee should have an understanding of the margin of each pump above its design-basis requirements. The alternative of using the corrective action requirements of ISTB 6.2.2 will provide an acceptable level of quality and safety for monitoring the pumps and assuring that the pumps are capable of performing their safety function.

2.8.4 Conclusion

The alternative of using the corrective action requirements of the 1995 Edition of the OM Code, paragraph ISTB 6.2.2, for pumps in the required action range is authorized pursuant to

10 CFR 50.55a(a)(3)(i) based on the acceptable level of quality and safety that will be provided. The alternative is authorized for the third 10-year interval.

The alternative of using the corrective action requirements of the 1995 Edition of the OM Code, paragraph ISTB 6.2.1, for pumps in the alert range is denied since the licensee has not shown that relief is warranted pursuant to 10 CFR 50.55a(f)(6)(i), or otherwise proposed an acceptable alternative pursuant to 50.55a(a)(3)(i) or (a)(3)(ii).

3.0 VALVE RELIEF REQUESTS

3.1 Relief Request VR-1

The licensee requests relief from the individual valve seat leakage rate testing requirements of OM-10 paragraph 4.2.2. The licensee proposes to leak test valve pairs with the resulting leak rate evaluated as if a single valve were tested.

This alternative was authorized for the second 10-year interval in the staff's SE dated August 20, 1993.

3.1.1 Licensee's Basis for Requesting Relief

The licensee states:

> The Indian Point 3 Technical Specifications, Section 4.5.B.2.c, requires leak testing of these check valves due to the potential of over-pressurization of the safety injection system (Event V scenario). To ensure that this does not occur, and in accordance with NRC letter dated February 1980, Subject: Event V Scenario, only two valves in series require testing. Due to difficulties with testing a single valve in these cases, it has been decided to test the inner valve individually and the outer two valves as a pair (considering the inner valve as a barrier and the outer two valves as a barrier). This relief applies only to the outer two valves which will be tested as a pair due to the man rem exposure levels associated with performing the test. The valves, which are in a high heat and radiation environment, require a difficult series of making and breaking connections to "jumper" high pressures over the inner check valve(s). The two barriers (one inner check valve and two outer check valves) are to be provided with individual leak tests.

3.1.2 Alternative Testing

The licensee proposes:

> These valve pairs will be leak tested as a pair with the resulting leakrate evaluated as if a single valve were tested. The inner check valves in each of the four flow paths from the reactor coolant system (897A, 897B, 897C, and 897D) will be individually leak tested.

3.1.3 Evaluation

The valves for which the licensee requests relief are reactor coolant system pressure isolation check valves located inside primary containment. They are simple check valves that are not equipped with external operators or position indication. They are installed in series (two valves per line) in the high head safety injection system lines to the reactor coolant system cold legs. There are four valve pairs: 857A and 857G, 857Q and 857R, 857S and 857T, and 857U and 857W.

The Indian Point 3 Technical Specifications (TS), Section 4.5.B.2.c, requires leakage testing of these check valves due to the potential of overpressurization of the safety injection system. The leak rate testing specified in the TS meets the intent of OM-10 Paragraph 4.2.2.3 which requires verification of leak-tight integrity by performance of seat leakage testing. Position 4 of GL 89-04 discusses concerns with the adequacy of testing pressure isolation valves. It states that each pressure isolation valve should be individually leak tested. Testing each valve individually would be a hardship due to the valves' location and their configuration.

The licensee's valve configuration contains two check valves in series with a single check valve located upstream. The single upstream check valve can be considered the first pressure barrier. The pairs of check valves can be tested in series and considered the second pressure barrier. Staff guidance provided in section 4.1.1 of NUREG-1482, states that testing of a pair of valves is acceptable if the configuration does not require two valves and the safety analysis for such a configuration would credit either of the two valves. With the pair acting as one valve and the upstream check valve acting as the other, the requirement that each pressure isolation valve be individually leak tested is satisfied and therefore the proposed alternative will provide reasonable assurance of the valves' operational readiness.

3.1.4 Conclusion

The licensee's proposed alternative to the requirements of OM-10 paragraph 4.2.2, is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified requirements would result in hardship without a compensating increase in the level of quality and safety. This alternative is authorized for the third 10-year interval.

3.2 Relief Request ROJ-1

Refueling Outage Justification ROJ-1 proposes a sample disassembly and inspection program for a group of check valves. This proposed alternative is being reviewed as a relief request because it's a deviation from the valve operator movement requirements of OM-10 paragraph 4.3.2.4(c).

3.2.1 Licensee's Basis for Requesting Relief

The licensee states:

> The only practical method of verifying proper full-stroke operation of these valves in the open direction is to operate the turbine-driven auxiliary feedwater pump at full rated flow with one of the valves manually closed.

During power operation, full stroke exercising these valves as stated would require injection of cold water into the steam generators. This could result in thermal shock to the feedwater supply piping or the steam generator nozzles, which is highly undesirable.

Partial stroke exercising can be performed by operation of the pump in the recirculation mode.

During a normal shutdown period steam is not available for operation of the steam-driven auxiliary feedwater pump. The full flow test is impractical to perform during startup from every cold shutdown because the test causes a plant cooldown which significantly delays the startup of the plant. Full flow testing is only required once every two years by technical specifications. Thus, since full flow operation of this pump is the only practical way of exercising this valve to the full-open position, cold shutdown testing is impractical.

Since there are no position indicating devices on these stop check valves for determining disc position, there is no practical method of verifying full closure without operation of the valve handwheel.

3.2.2 Alternative Testing

The licensee proposes:

During normal plant operation, on a quarterly frequency, these valves will be partial stroke exercised to the open position by operation of the pump in the recirculation mode and exercised closed using the installed handwheel.

Every refueling outage [2 years] both the MS-41 and MS-42 valves will be full stroke exercised open during the 2-year Technical Specification 4.8.1.a, Auxiliary Feedwater Pump 32 full flow testing.

During each reactor refueling outage, at least one of these valves will be disassembled, inspected, and manually exercised closed to verify operability. The schedule will be rotated such that valves are inspected during successive outages. During these inspections, should a disassembled valve prove to be inoperable (i.e., incapable of performing its safety function), then, during the same outage, the other valve will be disassembled, inspected, and exercised to verify operability.

3.2.3 Evaluation

The check valves for which the licensee requests relief, MS-41 and MS-42, open to admit steam to the auxiliary feedwater pump turbine. They close to prevent uncontrolled blowdown of steam generators 32 and 33 in the event a steam leak occurs in the piping associated with one of these steam generators. The Code, OM-10 paragraph 4.3.2, requires that the check valves be exercised nominally every 3 months. As an alternative to demonstrating valve operator movement, the Code allows disassembly every refueling outage to determine operability of the valves (OM-10 paragraph 4.3.2.4(c)). The licensee proposes to disassemble and inspect one valve in the group each refueling outage. The valve to be tested will alternate each refueling

outage. If during the inspection, the disassembled valve is found to be inoperable, then the other valve will be disassembled, inspected, and exercised to verify operability.

The 1995 ASME OM Code, paragraph ISTC 4.5.4(c) allows for a sample disassembly examination program to be used to verify valve operator movement. The sample disassembly examination program shall group check valves of similar design, application, and service condition and require a periodic examination of one valve from each group. The licensee's proposed alternative is consistent with paragraph ISTC 4.5.4(c).

3.2.4 Conclusion

The licensee's proposed alternative to the requirements of OM-10 paragraph 4.3.2.4(c) is approved pursuant to 10 CFR 50.55a(f)(4)(iv). This alternative meets the requirements of the 1995 OM Code, paragraph ISTC 4.5.4(c) which has been incorporated by reference into 10 CFR 50.55a (64 FR 51370). This alternative is authorized for the third 10-year interval.

3.3 Relief Request ROJ-15

Refueling Outage Justification ROJ-15 proposes a sample disassembly and inspection program for a group of check valves. This proposed alternative is being reviewed as a relief request because it's a deviation from the valve operator movement requirements of OM-10 paragraph 4.3.2.4(c).

3.3.1 Licensee's Basis for Requesting Relief

The licensee states:

> This system remains drained during all modes of operation except refueling outages when water is provided to test the recirculation pumps. Because there is no full-flow test line during these tests a minimal amount of water is recirculated to the sump. This flowrate is capable of only partially stroking the discharge valves.
>
> Because these valves are never operated except for pump testing each refueling and they are maintained in a dry condition, there is a low probability of deterioration.

3.3.2 Alternative Testing

The licensee proposes:

> Every refueling outage [2 years] the 886A and 886B valves will be partial stroke exercised in the open direction during the 2-year Technical Specification 4.5.B.1.a Recirculation Pump testing.
>
> Every refueling outage [2 years] the 886A and 886B valves will be full stroke exercised in the closed direction during the 2-year Technical Specification 4.5.B.1.a Recirculation Pump testing.

During every reactor refueling outage, one of these valves will be disassembled, inspected, and manually exercised open to verify operabiltiy. The schedule will be rotated such that valves are inspected during successive outages. During these inspections, should a disassembled valve prove to be inoperable (i.e. incapable of performing its safety function), then, during the same outage the other valve will be disassembled, inspected, and exercised to verify operability.

3.3.3 Evaluation

The valves for which the licensee requests relief, 886A and 886B, are located at the discharge of each recirculation sump pump to prevent backflow through an idle pump. The Code, OM-10 paragraph 4.3.2, requires that the check valves be exercised nominally every 3 months. As an alternative to demonstrating valve operator movement, the Code allows disassembly every refueling outage to determine operability of the valves (OM-10 paragraph 4.3.2.4(c)). The licensee proposes to disassemble and inspect one valve in the group each refueling outage. The valve to be tested will alternate each refueling outage. If during the inspection, the disassembled valve is found to be inoperable, then the other valve will be disassembled, inspected, and exercised to verify operability.

The 1995 ASME OM Code, paragraph ISTC 4.5.4(c) allows for a sample disassembly examination program to be used to verify valve operator movement. The sample disassembly examination program shall group check valves of similar design, application, and service condition and require a periodic examination of one valve from each group. The licensee's proposed alternative is consistent with paragraph ISTC 4.5.4(c).

3.3.4 Conclusion

The licensee's proposed alternative to the requirements of OM-10 paragraph 4.3.2.4(c) is approved pursuant to 10 CFR 50.55a(f)(4)(iv). This alternative meets the requirements of the 1995 OM Code, paragraph ISTC 4.5.4(c) which has been incorporated by reference into 10 CFR 50.55a (64 FR 51370). This alternative is authorized for the third 10-year interval.

4.0 CONCLUSION

The proposed alternatives to the Code requirements described in PR-2 and PR-4 are authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternatives providing an acceptable level of quality and safety. The alternatives are authorized for the third 10-year interval.

The proposed alternatives to the Code requirements described in PR-1, PR-5, PR-6, PR-7, and VR-1 are authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the third 10-year interval. Compliance with the specified requirements of these sections would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The proposed alternatives to the Code requirements described in ROJ-1 and ROJ-15 are approved pursuant to 10 CFR 50.55a(f)(4)(iv) for the third 10-year interval. These alternatives meet the requirements of the 1995 OM Code, paragraph ISTC 4.5.4(c), which has been incorporated by reference into 10 CFR 50.55a (64 FR 51370).

Relief Request PR-3 has been withdrawn by the licensee's letter of April 25, 2000.

The alternative described in PR-8 for using the corrective action requirements of the 1995 Edition of the OM Code, paragraph ISTB 6.2.2, for pumps in the required action range is authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the acceptable level of quality and safety that will be provided. The alternative is authorized for the third 10-year interval.

The alternative described in PR-8 for using the corrective action requirements of the 1995 Edition of the OM Code, paragraph ISTB 6.2.1, for pumps in the alert range is denied since the licensee has not shown that relief is warranted pursuant to 10 CFR 50.55a(f)(6)(i), or otherwise proposed an acceptable alternative pursuant to 50.55a(a)(3)(i) or (a)(3)(ii).

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