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AUTH.NAME AUTHOR AFFILIATION
PARRISH,J.V. Washington Public Power Supply System
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SUBJECT: Forwards response to RAI related to response time testing. W/related info.

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April 15, 1997
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Docket No. 50-397

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

Gentlemen:

Subject: **WNP-2, OPERATING LICENSE NPF-21**
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION RELATED TO RESPONSE TIME TESTING (TAC NO. M98214)

References:

1) NEDO-32291, "System Analyses for Elimination of Selected Response Time Testing Requirements," January, 1994

2) Letter dated December 28, 1994, BA Boger (NRC) to RA Pinelli (BWROG), BWROG Licensing Topical Report NEDO-32291, "System Analysis for Elimination of Selected RTT Requirements"

3) Generic Letter 93-08, "Relocation of Technical Specification Tables of Instrument Response Time Limits"

4) Letter dated July 12, 1994, JV Parrish (SS) to NRC, "Request For Amendment To The Technical Specifications, Relocation of Technical Specification Tables For Instrument Response Time Limits"

5) Letter dated June 26, 1995, JW Clifford (NRC) to JV Parrish (SS), "Issuance of Amendment For The Washington Public Power Supply System Project No. 2 (TAC No. M89907)"

6) Letter dated March 22, 1997, PR Bemis (SS) to NRC, "Request For Amendment, Under Exigent Circumstances, To Operating License Regarding Technical Specification Response Time Testing"

7) Letter dated April 9, 1997, PR Bemis (SS) to NRC, "Response To Request For Additional Information Regarding Response Time Testing"

A001

8) Letter dated April 10, 1997, TG Colburn (NRC) to JV Parrish (SS), "Request For Additional Information For The Washington Public Power Supply System (WPPSS) Nuclear Project No. 2 (WNP-2) (TAC No. M98214) "

9) Letter dated December 8, 1995, JV Parrish (SS) to NRC, "Request For Amendment To Technical Specifications"

10) Letter dated March 24, 1997, WH Bateman (NRC) to JV Parrish (SS), "Notice Of Enforcement Discretion For Washington Public Power Supply System Regarding Washington Nuclear Project No. 2 (WNP-2) - NOED No. 97-6-006 (TAC No. M98201)"

10) ABB Report CE NPSD-791-P, "Conditions for Design WNP-2: Cycle 12 Reload Analysis," January 1996

11) ABB Report CE NPSD-841-P, "Conditions for Design WNP-2: Cycle 13 Reload Analysis," October 1996

12) General Electric, "Power Uprate with Extended Load Line Limit Safety Analysis for WNP-2," NEDC-32141P, June 1993 (Proprietary)

13) ABB, "WNP-2 LOCA Analysis Report," CE NPSD-801-P, Rev.1, June 1996 (Proprietary)

Based on a review of the references, as summarized below, the Supply System determined that the calculation or determination of the required instrument response times associated with the Reactor Protection System (RPS), Primary Containment Isolation System (PCI), and Emergency Core Cooling System (ECCS), are governed by the requirements of 10 CFR 50.59 rather than the requirements of the Technical Specifications. This determination is based on the staff's conclusions as presented in References 3 and 5. In Reference 3 the staff stated:

> "Licensees would submit any subsequent changes to these limits in the FSAR as an update of the FSAR as required by 10 CFR 50.71(e). Related changes to plant procedures would be subject to the provisions that control changes to plant procedures as stated in the administrative controls section of the TS."

Further, in Reference 5 the staff stated:

> "The NRC staff considers the response times themselves to be an operational detail related to the licensee's safety analyses, which are generally discussed in the FSAR and controlled by review of changes against the criteria of 10 CFR 50.59."

In order to support staff review of the Supply System requested Technical Specification amendment request dated March 22, 1997, related to response time testing (RTT) requirements, this letter and attachments to it provide the additional information requested in Reference 8.

Reference 1 (NEDO-32291), developed by the Boiling Water Reactor Owner's Group (BWROG), documents a proposed change in the RTT requirements of certain sensors and instrument loops for Boiling Water Reactors (BWRs). Reference 1 documented the review of plant specific hardware and the instrument reliability history for participating plants, including the Supply System's WNP-2. This proposed elimination of RTT requirements for certain sensors and instrument loops was described in the executive summary of Reference 1 as follows:

> "The report concludes that response times are maintained with the current practices and that response time testing is unnecessary based on plant operating history and experience. The other existing Technical Specification required surveillance tests (calibration tests, functional tests, and logic system functional tests) ensure instrumentation health. Results of the BWROG evaluation confirm that response time tests are of no safety significance, cause unnecessary personnel exposure, reduce availability of safety systems during shutdown, and are a significant burden to utility resources.
>
> As a supplement to the above evaluations, participants will update test procedures and training (if required) to assure that the instrument technicians recognize response time delays in instrumentation. A BWROG survey has concluded that instrument response time delays of 5 seconds can be reasonably detected by instrument technicians. A safety evaluation has confirmed that a 5 second increase in the response time of individual specific trip functions has a very low safety significance. The 5 second delay in response time represents a factor of fifteen (15) increase in the specified response time of the fastest trip functions selected for elimination. This realistic bases evaluation showed that significant margin exists in the licensing analysis. Within a trip function, redundancy exists in individual instrument channels (e.g., 1 out of 2 twice) and diversity existed in most safety trip functions (e.g., neutron flux, water level, drywell pressure). Also, for most of these instruments the response times are insignificant compared to the safety system actuation times."

The BWROG stated in the Introduction section of Reference 1:

> "The proposed elimination of selected RTTs is also consistent with the current Maintenance Rule implementation. The Maintenance Rule is performance based and permits specific instrumentation monitoring or calibration methodology to be set by the licensee based on: 1) safety significance of the instrumentation; and 2) whether performance or condition of instrumentation is effectively controlled by appropriate preventive maintenance (PM). This report will show that response time changes beyond acceptable limits, including the detection of maintenance preventable functional failures (MPFFs), can be detected during other periodic tests.

The principal objective of this BWROG program was to eliminate unnecessary Technical Specification response time testing requirements that could potentially degrade plant safety. This objective was accomplished by conducting failure mode analyses to show with reasonable assurance that there is no failure mode which affects response time or, when a response time failure mode exists, show it can be detected during surveillances or other testing before the response of the instrument degrades beyond acceptable limits.

Most of the instrumentation response time testing targeted for elimination involves tests where the instrumentation loop response time is a small fraction of the total allowable system response time requirement. This typically occurs when the total allowable system response time is equal to or greater than ten seconds. In addition, selected pressure and differential pressure sensor response time testing can be eliminated on the basis of work done by EPRI (References 1 and 9) and supplemented by the BWR Owners' Group."

The BWROG evaluation methodology documented in Reference 1 was predicated on the ability of an instrument technician being able to detect gross instrument response degradation. As stated in Section 6.0 of Reference 1:

"The BWROG has surveyed instrumentation departments at participating plants and selected PWR plants and has determined that a technician can typically qualitatively detect an instrument with a sluggish response prior to the time the response time reaches 5 seconds. To assure that a degradation in response of this magnitude will not affect the margin of safety of affected systems, a realistic bases safety evaluation was made assuming a 5 second delay in sensing a degraded condition. The details of this evaluation are included in Section 5.0 and Appendix J. Participating utilities will make provisions to assure operators and technicians are aware of the consequences of instrument response degradation. Applicable procedures may need to be revised by individual plants to assure that technicians monitor for response time degradation during the performance of calibrations and functional tests."

In Section 8.0 of Reference 1, the BWROG concluded:

"(1) Response time test elimination provides an improvement to plant safety and operation by:

- o Reducing the time safety systems are unavailable
- o Reducing safety system actuations
- o Reducing shutdown risk
- o Limiting radiation exposure to plant personnel
- o Eliminating the diversion of key personnel to conduct unnecessary testing

(2) Plant operating history and experience clearly show that response times are maintained with the current practices.

(3) Existing surveillance tests (calibration tests, functional tests, channel checks, and logic system function tests) ensure instrument health based on the following:

- o Analysis of instrumentation failure modes confirm with reasonable assurance that failures which affect response times can be detected during other surveillance tests required by current Technical Specifications.

- o Instrument response time delays on the order of 5 seconds can be reasonably detected by instrument technicians. Test procedures and training will be revised (if necessary) as part of RTT elimination to provide additional assurance that the instrument technician recognizes response time delays in instrumentation.

(4) Individual instrument channel response time delays for specific trip functions and components (on the order of milliseconds) are a small fraction of response times assumed in safety analyses. Analyses of design basis events indicate that a 5 second delay in the fastest required response times in selected RPS and MSIV closure signals (0.33 to 2.0 seconds) would have no significant safety impact. This 5 second time delay would with reasonable assurance be detected by an instrument technician."

The BWROG went on to state in Section 8.0 of Reference 1:

"(2) Components such as radiation detectors are exempt from response time testing in the Technical Specifications. Similarly, logic cards with a self-test feature used in solid-state plants are exempt.

(3) RTTs of instrumentation loops for the following trip functions in the Isolation Actuation System instrumentation and ECCS instrumentation can be eliminated based on other Technical Specification surveillance of the instrumentation loops and/or other techniques as required:

- All ECCS actuation instrument loops

- All Isolation System Actuation instrumentation loops except for Main Steam Isolation Valves (MSIVs) sensors

(4) RTTs of sensors for the following trip functions in the RPS and MSIV isolation surveillance requirements can be eliminated based on other required Technical Specification surveillance tests:

- Reactor Water Level 3 (RPS)
- Reactor Water Level 8 (RPS)
- Reactor High Steam Dome Pressure (RPS)
- Reactor Water Level 1 (MSIV Closure)
- Main Steam Line Radiation - High (MSIV Closure)
- Main Steam Line Pressure - Low (MSIV Closure)
- Main Steam Line Flow - High (MSIV Closure)"

Reference 2 documented the staffs review and approval of Reference 1. In Section 2.0 of Reference 2, the staff discussed the existing Technical Specification RTT requirements as follows:

> "Current Standard Technical Specifications (STS) require nuclear power plants to periodically perform RTT for instrument channels in the RPS, ECCS and IAS. The intent of these tests is to ensure that changes in response time of instrumentation beyond the limits assumed in safety analyses are detected, and combined with instrument calibration, to ensure that the instrument is operating correctly. The response time tests do not demonstrate that the instrument response time design value is met, but rather that the specified performance requirements of the TSs are satisfied."

Relative to the subject instrumentation system performance, the staff stated in Section 2.0 of Reference 2:

> "The response times for the IAS and ECCS instrumentation are a small fraction of the total system response time requirements (i.e., 10 to 13 seconds for IAS, and 27 to 64 seconds for ECCS). Instrumentation components that may experience response time degradation will continue to respond in the microsecond-to-millisecond range prior to complete failure.
>
> For the RPS and main steam isolation valve (MSIV) actuation instrumentation, the BWROG proposed elimination of just the sensor RTT. For the RPS and MSIV actuation instrumentation loops, the overall TS response time requirements are much shorter (0.33 to 2.0 seconds). As a result, changes in instrumentation response time beyond acceptable limits given in TS may not be readily detected during other surveillance tests. To address this, the BWROG referenced EPRI analyses in NP-7243 as indicating that those failure modes which affect sensor response times beyond acceptable limits can also be detected during calibrations or other tests. In addition, the BWROG indicated that a delay in these trip functions of about 5 seconds, which the BWROG believes can be detected during other surveillance tests, would not have any significant effect on plant safety and longer delays could be detected during other required surveillance tests."

The staff concluded in Section 3.0 of Reference 2:

> "The staff concurs with the BWROG that delays of about 5 seconds for the selected RPS, ECCS, IAS and MSIV functions would have no significant effect on plant safety and longer delays can be detected by other testing, primarily calibration, if properly performed. Thus, the guidance in IEEE 338 is satisfied by performance of calibration as an alternative to specific RTT for delays greater than five seconds."

The staff discussed several concerns in Section 3.0 of Reference 2, such as:

> "The staff notes that an additional important issue is the detection method used in the performance of the calibration. If the calibration is done with equipment with an inherent time delay, such as a slow ramp in the process variable, an additional delay of about 5 seconds in actual instrument response may be difficult to notice. With a slow ramp in the process variable, a sluggish response can be mistaken for a change in setpoint. If, however, the calibration is done with the calibrating equipment using a step function or a fast ramp of significantly less than five seconds, the recognition of a delay of about 5 seconds in instrument response is reasonably assumable.
>
> A further potential problem inherent in the manner in which calibrations are done is that the sensor is almost always calibrated separately from the trip circuitry. Since both the sensor and trip unit could have undetected delays on the order of five seconds, it may be possible for any one function to have double the delay. However, the staff does not consider this a significant safety concern, because a response time failure without a corresponding calibration failure is unlikely, and the possibility of two such failures occurring in a single channel is even more unlikely. While the BWROG has not presented a statistical determination of this possibility, the staff believes the probability is very small.
>
> In Appendix J of the topical report the BWROG provided a safety assessment of a delayed or sluggish instrumentation response on the order of five seconds for the trip functions selected for RTT elimination. The staff reviewed the effect on plant safety of a delayed instrumentation response on the order of five seconds for the trip functions selected for RTT elimination, and agrees with the BWROG that a five second delay would not affect the capability of these systems to initiate reactor trip or to provide the required core cooling function. This includes the RPS and MSIV actuation instrumentation functions with overall response time requirements of 0.33 to 2.0 seconds. The staff concurs with the BWROG's conclusion that significant margin exists in the analysis assumptions such that an additional response delay in the selected trip functions on the order of 5 seconds has minimal safety significance. In order to guard against longer delays, licensees taking advantage of this elimination of RTT must ensure that operators and technicians continue to be aware of the consequences of instrument response time degradation and are familiar with the alternative means for detecting this degradation. Applicable plant-specific procedures may need to be revised to assure that technicians monitor for response time degradation during the performance of calibrations and functional test.

The staff notes that requirements related to the operability, applicability, and surveillance requirements, including performance of testing to ensure response times, for RTS and ESFAS systems are retained due to those systems importance in mitigating the consequences of an accident. However, the elimination of response time testing requirements does not constitute a condition or limitation on operation necessary to obviate the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety, in that the ability of the RTS and ESFAS systems to perform their safety functions are not adversely impacted since the response times of the devices are verified by other means.

Specifically, to meet the guidance of R.G. 1.118, RTT is needed unless it has been shown that the response time of the instrument or channel will be verified by other means. The staff has determined that calibration and other surveillance testing, combined with technician awareness of the RTT requirement, will adequately ensure that the response time is verified for the devices identified in Table 1 when the devices are used in systems listed in Table 2."

In Section 4.0, CONCLUSION, of Reference 2, the staff stated:

"Based on its review of the information presented by the BWROG, the staff agrees with the BWROG that, significant degradation of instrumentation response times (i.e., delays greater than about 5 seconds) can be detected during the performance of calibrations and other currently required surveillance tests; furthermore, delays on the order of 5 seconds do not have any significant impact on plant safety. This includes the selected RPS and MSIV actuation features which have overall TS response time requirements of 0.33 to 2 seconds. Thus, the staff concludes that the other existing surveillance requirements for the instrumentation provide confidence that the safety function of the plant instrumentation will be satisfied without the need for a specific RTT.

The staff, therefore, accepts BWROG Licensing Topical Report NEDO-32291, "System Analyses for Elimination of Selected Response Time Testing Requirements," and the letter from T. Green (BWROG) to P. Loeser (NRC), dated April 15, 1994 (Ref. 12), as a basis for elimination of RTT from TSs for the instruments/components identified in Table 1 when used in the systems identified in Table 2."

Reference 3 (Generic Letter 93-08) provided a Technical Specification line item improvement for relocation of the instrument response time limits to the FSAR. The staff stated in Generic Letter 93-08:

"Each licensee that wishes to implement this line-item TS improvement should confirm that the plant procedures for response time testing include acceptance criteria that reflect the RTS and ESFAS response time limits in the tables being relocated from the TS to the updated FSAR. The licensee should also provide a commitment to include the RTS and ESFAS response time limits in the next update of the FSAR.

> Licensees would submit any subsequent changes to these limits in the FSAR as an update of the FSAR as required by 10 CFR 50.71(e). Related changes to plant procedures would be subject to the provisions that control changes to plant procedures as stated in the administrative controls section of the TS."

In Reference 4 the Supply System requested an amendment to the WNP-2 Technical Specifications to relocate the response time limit tables to the FSAR in accordance with the guidance of Generic Letter 93-08. In Reference 5 the staff issued the Technical Specification Amendment to relocate the response time limit tables to the FSAR. The staff stated in the Safety Evaluation associated with Reference 5 that:

> "The Commission's final policy statement recognized, as had previous statements related to the NRC staff's TS improvement program, that implementation of the policy would result in the relocation of existing TS requirements to licensee-controlled documents such as the FSAR. Those items relocated to the FSAR would in turn be controlled in accordance with the requirements of 10 CFR 50.59, "Changes, tests, and experiments." Section 50.59 provides criteria to determine when changes to a facility, procedures, or tests and experiments planned by a licensee require prior Commission approval in the form of a license amendment in order to address any unreviewed safety questions or changes to the TS. NRC inspection and enforcement programs also enable the NRC staff to monitor facility changes and licensee adherence to FSAR commitments and to take appropriate remedial action."

The staff went on to state:

> "Relocation of the specific values of the required response times does not change the licensee's responsibility to evaluate any changes to response time requirements in accordance with the requirements of 10 CFR 50.59. If the licensee wanted to change any of the response times in the relocated table, the licensee would have to determine whether the change involved an unreviewed safety question. If the licensee determined that any such proposed change involved either (1) an increase in the probability or consequences of accidents or malfunctions of equipment important to safety, (2) the creation of a possibility for an accident or malfunction of a different type than any evaluated previously, or (3) a reduction in a margin of safety, the licensee would have to obtain prior NRC approval of a license amendment before implementing the proposed change."

Further, the staff stated in Reference 5:

> "The NRC also determined that 10 CFR 50.36 does not require that the response time tables be retained in the TS. The TS will retain the requirements related to operability, applicability, and the surveillance requirements, including the requirement to conduct testing to ensure the response times for RPS, IAS, and ECCS are within applicable limits, because of the importance of these systems in mitigating the consequences of an accident. The NRC staff considers the response times themselves to be an operational detail related to the licensee's safety analyses, which are generally discussed in the FSAR and controlled by review of changes against the criteria of 10 CFR 50.59. The continued

> processing of license amendments related to modification of the affected instrument response times, where the revisions to those times do not involve an unreviewed safety question under 10 CFR 50.59, would afford no significant benefit with regard to protecting the public health and safety. Further, the response time limits do not constitute a condition or limitation on operation necessary to obviate the possibility of an abnormal situation or event posing an immediate threat to the public health and safety, since the ability of the RPS, IAS, and ECCS to perform their safety functions is not affected by the relocation of the response time tables from the TS to the FSAR.
>
> The NRC staff concludes that the changes do not alter the TS requirements to ensure that the response times of the RPS, IAS, and ECCS instruments are within their limits. In addition, the TS changes are consistent with the guidance provided in GL 93-08 and the requirements of 10 CFR 50.36. On these bases, the NRC staff concludes that the relocation of these response time limit tables from the TS to the FSAR is acceptable."

As a part of the implementation activities for Reference 1 the Supply System performed reviews to ensure that the conclusions reached in Reference 1, as reviewed and approved by the staff in Reference 2, remained valid for WNP-2. Below is a summary of the activities performed to ensure that the implementation of Reference 1 at WNP-2 would not unacceptably impact safety or the protection of the health and safety of the public.

For the RPS sensors for which testing was to be eliminated (Technical Specification Table 3.3.1.1-1, Function 3, Reactor Vessel Steam Dome Pressure, and Function 4, Reactor Vessel Water Level-Low, Level 3), the BWROG performed analysis of the effects of a five second delay in the response of the subject sensors. As stated in Section 5.3.1 of Reference 1, the BWROG concluded that:

> "A 5 second delay in the sensors for the above RPS trip functions was determined to have no significant impact on plant safety. For the level 3 sensors, a slight delay in the scram actuation would not affect plant thermal limits or fuel integrity and the core cooling function.
>
> A delay in the reactor high steam dome pressure sensors would not affect the integrity of the reactor vessel or core thermal limits."

For the RPS functions listed above, the Supply System had plant specific analyses performed to determine the impact of a five second delay in response. This evaluation was performed using the NRC reviewed and approved analysis codes listed in Section 5.6.5 of the WNP-2 Technical Specifications. The results demonstrate that plant performance under limiting accident and transient scenarios is acceptable as documented in References 10 and 11.

The following is a summary of the results of the BWROG evaluations presented in Appendix J of Reference 1 related to the three Main Steam Isolation Valve (MSIV) functions for which a change to the RTT requirements has been requested. The Supply System has concluded that these evaluations, based on the manner in which they were performed, are valid for WNP-2.

Primary Containment Isolation (PCI) Main Steam Line (MSL) isolation on Level 2: The increase of response time to 5 seconds would not impact the safety margins in transients and accidents involved with MSIV closure at Level 2. The limiting accident condition for this case is a Design Basis Accident (DBA) Loss Of Coolant Accident (LOCA). In this case, the extension of response time (Main Steam Isolation Valve (MSIV) closure time extension from approximately 5.5 seconds to approximately 10.5 seconds) does not change the consequences of the LOCA scenario. The main function of the MSIV isolation is to reduce the radiation release. However, peak clad temperature in a DBA LOCA does not occur until about 150 seconds into the accident. Therefore, the delay of MSIV closure does not impact the LOCA results.

PCI MSL isolation on Low Pressure: The increase of this trip sensing response time to 5 seconds would not impact the safety margins. The MSL low pressure isolation is used primarily for protection against a pressure regulator malfunction event. This is not a limiting event in setting the thermal limits for the core. In terms of the concern for a large cooldown rate due to de-pressurization, the low pressure trip setpoint for WNP-2 is 837 psig. Analysis has shown that the setpoint can be lowered to 750 psig without affecting vessel integrity (Reference 1). The reactor vessel is designed to accommodate a more rapid de-pressurization than this event. Therefore, a 5 second delay would not affect vessel integrity or plant safety.

PCI MSL isolation on High Flow: The increase of trip sensing response time to 5 seconds would not impact the safety limits. The MSL high flow isolation trip is designed primarily to protect against a MSL break outside containment. Fuel integrity would be maintained for this event as the break would be isolated before the reactor water level drops to an unacceptable level. The off-site release for this event is only a small fraction of the allowable 10 CFR 100 limits. Studies by General Electric (GE) (Reference 1) indicate that a 5 second delay in the MSIV closure on high steam flow still meets the requirements of 10 CFR 100. Therefore, the 5 second trip delay for this function does not affect plant safety.

The following discussion is based on an evaluation performed by the Supply System for WNP-2. To evaluate the radiation release it was assumed that the MSIV closure time, and consequent release, is doubled. Using the consequence numbers from FSAR Table 15.6-8 (2.3E-02 Rem Whole Body and 9.59E-01 Rem Thyroid), doubling them for the increased MSIV stroke time, and comparing them to the Safety Evaluation Report for WNP-2 (NUREG-0892), Table 15.2 (<0.1 Rem Whole Body and 14 Rem Thyroid), significant margin remains to the NRC SER numbers and remains only a small fraction of the 10 CFR 100 guidelines.

For relocation of the Emergency Core Cooling System Instrumentation RTT requirements to the ECCS Technical Specification, and exclusion of the instrumentation from the system testing requirement (proposed Technical Specification 3.5.1.8), the following discussion is provided of the evaluation to determine that there is no unacceptable safety impact.

The Diesel Generator (DG) start time of 15 seconds is part of the revised ECCS performance parameters used in the LOCA analysis performed by GE for WNP-2 for Reactor Power Uprate (RPU) (Reference 12) as compared to ECCS performance parameters used in the pre-RPU LOCA analysis. In the subsequent LOCA analysis to license Asea Brown Boveri (ABB) SVEA-96 fuel, the same revised parameters were used (Reference 13).

Because of the revised ECCS parameters used in the WNP-2 LOCA analysis, the plant has ample margins to allow the increased time delay. Specifically, in the DBA LOCA analysis (References 12 and 13), the revised analysis parameters allow injection valve stroke times of 19 seconds for High Pressure Core Spray (HPCS), 24 seconds for Low Pressure Core Spray (LPCS) and 28 seconds for Low Pressure Core Injection (LPCI). Before this stroke time is reached, there is no assumed ECCS flow injected into the vessel. Based on surveillance results at the WNP-2 plant from 1992 to 1994, the injection valve stroke times were 10.1 seconds for HPCS, 9.5 seconds for LPCS, 12.1 seconds for LPCI-A, 12.5 seconds for LPCI-B, and 12.8 seconds for LPCI-C. There is more than 5 seconds margin between the analysis and the actual plant performance. In addition to injection valve stroke time, the revised instrument delay time and DG start time also have considerable margins since the DGs continue to perform as before with start times of about 10 seconds. Therefore, a 5 second delay in the ECCS response time does not affect plant safety.

Based on the information provided in this letter and in the references, a delay of up to five seconds for the selected functions will not have an unacceptable impact on plant safety or protection of the health and safety of the public. The microsecond to millisecond response attributable to the logic when only the sensors are exempted from testing is also insignificant compared to the five second evaluated delays.

In Reference 6 the Supply System requested a Technical Specification Amendment under exigent circumstances to support implementation of the RTT methodology outlined in Reference 1, and to eliminate the need for the Notice Of Enforcement Discretion issued in Reference 10. Attachment 1 provides the responses to the questions posed by the staff in Reference 8.

Should you have any questions or desire additional information regarding this matter, please contact D.A. Swank at (509) 377-4563.

Respectfully,

DA Swank For

J.V. Parrish per telecon
Chief Executive Officer
(Mail Drop 1023)

DAS
Attachments

cc: EW Merschoff - NRC RIV
KE Perkins, Jr. - NRC RIV, Walnut Creek Field Office
TG Colburn - NRR
NRC Sr. Resident Inspector - 927N
DL Williams - BPA/399
PD Robinson - Winston & Strawn

ATTACHMENT 1

The NRC questions are presented in italics for ease of reference, followed by the Supply System response.

1. On page 1 of the April 9, 1997 letter, WNP-2 states that the determination of sensor response time were based on engineering judgement, supported by published vendor information, WNP-2 design information, WNP-2 operational data, or available industry data. Provide the engineering judgement and information/data used to determine the sensor response times.

1. The following data was used to support engineering judgement in the determination of sensor response time:

   a. Published vendor information is provided by General Electric Co. and contained in the attached GE proposed revision to NEDO-32291 sent to the BWR Owners Group (BWROG) OG97-121-964 dated Feb. 12, 1997 (refer to pages B-21 and B-55). The information utilized from this report relates to the HFA relay and SCRAM contactor de-energization response times. These times were used in the determination of the logic response time acceptance criteria. Refer to a more complete discussion in the response to Question 5 below. Refer also to raw data input to the statistical analysis discussed in the response to Question 3 below.

   b. WNP-2 design information consists of the attached former FSAR Table 7.5-2, Data Sheets provided by General Electric and the results of accident and transient analysis evaluations (refer to the response to Question 2 below). Note that the FSAR table provides a breakdown of the response times for RPS components (sensor and logic). These values were used formerly in the Technical Specifications and have now been moved to the Licensee Controlled Specifications (LCS).

   c. WNP-2 operational data consists of individual component response times identified by testing performed since 1991. The specific component response times used are provided as "raw data" to the statistical analysis discussed in the response to Question 3 below.

   d. Available industry data consists of instrumentation response time "raw data" from another BWR. This will be discussed in the response to Question 3 below. This data was used to supplement the available WNP-2 individual component raw data and is applicable since the components are the same manufacturer and model for both plants. Since this data is for another licensee

it would be inappropriate for the Supply System to docket it. This data is available for your review, we would be happy to discuss this information by phone, and would be happy to sit down and go through the information with your resident inspector.

e. Engineering judgement was used to collate, evaluate and draw conclusions from the data described above. Specifics of the methods used will be described in the response to questions below.

2. *Provide the specific design information that is discussed on page 2, paragraph 4, of the April 9, 1997 letter.*

2. The specific design information referred to in paragraph 4 of the April 9, 1997 letter is attached. This information is comprised of: former FSAR Table 7.2-5 (refer also to the response to Question 4. below), the General Electric RPS Design Spec. Data Sheets 23A1877AA, sheets 9 and 16. Additionally, as presented in the cover letter the accident and transient analysis confirms that the inclusion of a total of 5 seconds instrumentation response time does not affect the conclusions of the WNP-2 accident and transient analysis.

3. *Provide the statistical calculations performed, the raw data used in the statistical calculations, and the results of the calculations.*

3. The statistical calculations performed, the raw data used in the statistical calculations, the results of the calculations and the value and source of each T_s and $T_{x(logic)}$ are attached. Since only the sensor and logic are considerations for RTT elimination, T_x has been redefined to be $T_x = T_{x(logic)} + T_{x(actuated\ device)}$. A summary of the statistical results is also attached.

4. *Provide the values used in each response time testing calculation for Tx, and specify if the value was calculated or if the manufacturer's data was used.*

4. The values for T_X used are provided as part of the statistical calculation results described in the response to Question 3 above. The source of the values is also provided in the calculation.

5. *On page 3, paragraph 2 of the April 9, 1997 letter, WNP-2 stated: "This breakdown was not available for the total response time of 1.0 seconds specified for the PCI function. As acceptable criteria of 0.05 seconds for Tx was selected, consistent with the acceptance criteria for the other logic subject to response time measurements." Explain what "the other logic" was, why it is considered sufficiently similar, and why this method is acceptable.*

5. The "other logic" is RPS. A breakdown of the assumed sensor and logic response times is provided in former FSAR Table 7.2-5 provided in response to Question 1b above. From that Table, the RPS logic and actuated device, for both Steam Dome High Pressure and Low Reactor Vessel Water Level, are assumed to operate in 0.05 seconds. A similar table did not exist in the WNP-2 FSAR for the Primary Containment Isolation function for the Main Steam Line Valve closure. However, the basic logic structure for RPS and PCI are similar, i.e., HFA relays de-energizing to actuate a solenoid valve. The difference between RPS and PCI is that RPS has a single HFA relay de-energizing a single CR305 contactor which in turn de-energizes a solenoid valve and PCI has 3 series HFA relays which de-energize to de-energize a solenoid valve. Individual component response time data is provided by General Electric (9ms for each HFA and an expected 40ms for the contactor) in the attached excerpts from the proposed revision to NEDO-32291. Using this data the assumed 0.05 seconds (found in FSAR Table 7.2-5 for RPS) bounding acceptance can also apply to MSIV isolation logic. This assumption has been validated by evaluating the individual logic RTTs for RPS and MSIV isolation indicating that the logic de-energization, including the solenoid valve de-energization, occurs within the specified 50 ms. Refer to the raw data provided with the statistical analysis provided in the response to Question 3 above.

6. *Explain how the assumed response time will be used in each instance where response time testing measurement in no longer required.*

6. The assumed response time for the instrumentation sensors, which no longer require quantitative response time testing, will be utilized only as acceptance criteria for bench testing following refurbishment or replacement per the WNP-2 commitment to the NRC SER endorsing the NEDO. The assumed response time for the sensor logic components (relays) which continue to require RTT is procedurally used as the acceptance criteria for individually tested logic strings. Within ECCS, the assumed sensor response time (5 seconds) is subtracted from the total loop RTT acceptance criteria to produce a new acceptance criteria for the remainder of the loop.

7. *Explain how WNP-2 will know to either redo the calculations or resume response time testing if, in the future, the instrument is replaced with one not listed in Table 1 of the staff safety evaluation report on NEDO-32291.*

7. WNP-2 will control the replacement of instrumentation and associated logic components through revision to Engineering Instruction EI 2.8, Generating Facility Design Change Process. This will ensure that replacement of instrumentation and associated logic components which no longer require RTT will continue to be the same model number and manufacturer as specified in NEDO 32291 Table 1. If the revision requires a change to the manufacturer or model number not supported by the previous evaluations, evaluations (FMEA, operating history, manufacturer

information, etc.) similar to those provided by the Supply System for the Barksdale pressure switches and the ASEA relays will be performed to validate the acceptability of a new instrument or RTT will be resumed for the specific component. Any change of components will be subjected to the requirements of 10CFR50.59.

8. *Provide a FMEA for Barksdale B2T, Barton 288A, and Static-O-Ring 29-N6-B45 and 103AS-BB203. (The FMEA should be similar to those performed in EPRI NP-7243).*

8. EPRI Report NP-7243 evaluated the failure modes and effects of the Barton 288A, and generic SOR pressure and differential pressure switches. Please refer to attached Table 3-5 on page 3-22 from the EPRI report for FMEA discussion of the Barton 288 and Table 3-33 and Table 3-35 on pages 3-158 and 3-164, respectively, from the EPRI report for FMEA discussion relating to SOR instrumentation.

The Barksdale B2T, although not specifically evaluated by the EPRI report by model was indirectly evaluated as a bourdon tube sensor (EPRI page 2-4 attached) and was specifically evaluated by the BWROG in NEDO 32291, Section K.6.2.1 which states "...B2T series are bourdon tube instruments and do not have components that can cause response time related failures."

9. *Revise the proposed technical specification surveillance requirements (SR) as follows:*

a. SR 3.3.1.1.15, Note 2

The sensor response times for functions 3 and 4 need not be measured and may be assumed to be the design sensor response time.

b. SR 3.3.6.1.7, Note

The sensor response time for functions 1.a, 1.b, and 1.c need not be measured and may be assumed to be design sensor response time.

9. The SRs define the testing that must be performed. The Supply System requested that the Notes in the subject Technical Specifications specify that the sensors be excluded. Since the SRs define testing to be performed, and since the sensors are to be excluded from testing, the Supply System continues to request these proposed words.

The words suggested by the staff, as originally submitted by the Supply System in a December 8, 1995 letter, regarding "and may be assumed to be the design sensor response time" are related to how the acceptance criteria for the specified test is determined. These words add no clarification as to the type of testing to be performed or the manner in which the testing shall be conducted. This type of clarification, unrelated to the test method, is more appropriately contained in the

ATTACHMENT 1

Bases. The staff proposed wording would create an inconsistency with Note 1 in SR 3.3.1.1.15 while adding no information needed to successfully complete the required test. The intent of the Note, as inserted by the Supply System, was to clarify the scope of testing to be performed.

The Supply System will include the requested clarification in the Technical Specification Bases.