Duke Energy

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March 26, 2002

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

Subject: Duke Energy Corporation
McGuire Nuclear Station, Units 1 and 2
Docket Numbers 50-369 and 50-370
Proposed Technical Specifications and Bases Amendment
1.1, Definitions, Response Time
3.3.1, Reactor Trip System Instrumentation
3.3.2, Engineering Safety Feature Actuation System Instrumentation

In accordance with the provisions of 10CFR50.90, Duke Energy Corporation (Duke) proposes to revise the McGuire Nuclear Station Facility Operating Licenses and Technical Specifications (TS) to allow verification in lieu of demonstration (i.e. measurement/testing) of response time associated with selected sensors and selected protection channels. The proposed amendment is in accordance with the basis and methodologies outlined in WCAP-13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," and WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests."

The amendment request further seeks NRC acceptance of the results of a similarity analysis performed between the ITT Barton 386A differential pressure transmitter and the ITT Barton 764 differential pressure transmitter listed in WCAP-13632-P-A, Revision 2. The analysis concludes that the ITT Barton 386A and the ITT Barton 764 are essentially the same transmitter, having the same response time range,

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with the only difference being the temperature compensation design.

The proposed amendment modifies the TS Definitions for "ENGINEERING SAFETY FEATURE (ESF) RESPONSE TIME" and "REACTOR TRIP SYSTEM (RTS) RESPONSE TIME" to provide for the verification of response time for selected instruments provided that the instruments and methodology for verification have been previously reviewed and approved by the NRC. The associated Bases revisions to the SURVEILLANCE REQUIREMENTS clarify that allocations for sensor response times may be obtained from: 1) historical records based on acceptable response time tests; 2) in place, onsite or offsite (e.g., vendor) test measurements; or 3) utilization of vendor supplied engineering specifications. WCAP-13632-P-A, Revision 2, provides both the technical basis for deleting periodic pressure and differential pressure sensor response time testing and the methodology for verifying the total channel response time using an allocated sensor response time. The NRC reviewed WCAP-13632-P-A, Revision 2, and found it acceptable as documented by letter dated September 5, 1995, Mr. B. A. Boger (NRC) to Mr. R. A. Newton [Westinghouse Owners Group (WOG)]. Additionally, the associated Bases revision clarifies that allocation for signal processing and actuation logic response times may also be used in the verification of the overall protection system channel response times. WCAP-14036-P-A, Revision 1, provides the basis and methodology for the utilization of allocated signal processing and actuation logic response times in the overall verification of protection system channel response times. The NRC reviewed WCAP-14036-P-A, Revision 1, and found it acceptable as documented by letter dated October 6, 1998, Mr. T. H. Essig (NRC) to Mr. L. Liberfatori [Westinghouse Owners Group (WOG)].

The requested relaxation in instrument response time testing will result in reduced radiation exposure and maintenance testing hours. This will result in a substantial cost savings over the remaining life of the units without compromise to plant safety.

The proposed change in response time testing involves tests that are performed during refueling outages. McGuire plans to implement the approved amendment prior to the Unit 1

End-of-Cycle 15 refueling outage. Consequently, Duke requests approval of the proposed changes by August 30, 2002. NRC approval will allow McGuire to use either the current process for measurement of response times or a verification option. Station procedures and processes will not require change when using the current process for measurement of response times. Procedures will be revised prior to implementation of the verification option for that application. Duke has determined that the NRC's standard 30 day grace period will be sufficient for the implementation of this amendment.

The contents of this amendment package are as follows:

Attachment 1 provides marked copies of the affected TS and Bases pages for McGuire showing the proposed changes. Attachment 2 contains reprinted pages of the affected TS and Bases pages for McGuire. Attachment 3 provides a description of the proposed changes and technical justification. Pursuant to 10CFR50.92, Attachment 4 contains the results of the No Significant Hazards determination. Pursuant to 10CFR51.22(c)(9), Attachment 5 provides the basis for the categorical exclusion from the performance of an Environmental Assessment/Impact Review. Attachment 6 provides a summary of the regulatory commitments made in this submittal. Attachment 7 contains the results of the similarity analysis performed between the ITT Barton 386A differential pressure transmitter and the ITT Barton 764 transmitter.

The proposed amendment is similar to that submitted by the Catawba Nuclear Station on May 25, 2001. Current McGuire Protection Channel equipment configuration and assignment of response time allocation values are provided in Attachment 3, Tables 1 and 2.

Implementation of this amendment will impact the McGuire Updated Final Safety Analysis Report (UFSAR). The required UFSAR changes will be submitted to the NRC in accordance with 10CFR50.71(e).

In accordance with Duke administrative procedures and Quality Assurance Program Topical Report requirements, this proposed amendment has previously been reviewed and approved by the McGuire Plant Operations Review Committee and the Duke Corporate Nuclear Safety Review Board.

Pursuant to 10CFR50.91, a copy of this proposed amendment is being sent to the appropriate state official.

Inquiries on this matter should be directed to J. A. Effinger at (704) 382-8688.

Very truly yours,

H. B. Barron

AFFIDAVIT

H. B. Barron, being duly sworn, states that he is Vice President of Duke Energy Corporation; that he is authorized on the part of said corporation to sign and file with the Nuclear Regulatory Commission these amendments to the McGuire Nuclear Station Facility Operating Licenses Nos. NPF-9 and NPF-17 and associated Technical Specifications; and that all statements and matters set forth within this submittal dated March 26, 2002 are true and correct to the best of his knowledge.

H B Barron

H. B. Barron, Vice President

Subscribed and sworn to me: March 25, 2002
Date

Deborah G. Thrap, Notary Public
Deborah G. Thrap

My commission expires: 4/6/2007

SEAL

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ATTACHMENT 1

McGUIRE UNITS 1 AND 2 TECHNICAL SPECIFICATIONS
AND
TECHNICAL SPECIFICATION BASES

MARKED COPY

1.1 Definitions (continued)

ENGINEERED SAFETY FEATURE (ESF) RESPONSE TIME

The ESF RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured.

INSERT

LEAKAGE

LEAKAGE shall be:

a. Identified LEAKAGE

1. LEAKAGE, such as that from pump seals or valve packing (except reactor coolant pump (RCP) seal water injection or leakoff), that is captured and conducted to collection systems or a sump or collecting tank;

2. LEAKAGE into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be pressure boundary LEAKAGE; or

3. Reactor Coolant System (RCS) LEAKAGE through a steam generator (SG) to the Secondary System;

b. Unidentified LEAKAGE

All LEAKAGE (except RCP seal water injection or leakoff) that is not identified LEAKAGE;

c. Pressure Boundary LEAKAGE

LEAKAGE (except SG LEAKAGE) through a nonisolable fault in an RCS component body, pipe wall, or vessel wall.

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1.1 Definitions (continued)

QUADRANT POWER TILT RATIO (QPTR)	QPTR shall be the ratio of the maximum upper excore detector calibrated output to the average of the upper excore detector calibrated outputs, or the ratio of the maximum lower excore detector calibrated output to the average of the lower excore detector calibrated outputs, whichever is greater.
RATED THERMAL POWER (RTP)	RTP shall be a total reactor core heat transfer rate to the reactor coolant of 3411 MWt.
REACTOR TRIP SYSTEM (RTS) RESPONSE TIME	The RTS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its RTS trip setpoint at the channel sensor until loss of stationary gripper coil voltage. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. INSERT
SHUTDOWN MARGIN (SDM)	SDM shall be the instantaneous amount of reactivity by which the reactor is subcritical or would be subcritical from its present condition assuming: a. All rod cluster control assemblies (RCCAs) are fully inserted except for the single RCCA of highest reactivity worth, which is assumed to be fully withdrawn. With any RCCA not capable of being fully inserted, the reactivity worth of the RCCA must be accounted for in the determination of SDM; and b. In MODES 1 and 2, the fuel and moderator temperatures are changed to the nominal zero power design level.
SLAVE RELAY TEST	A SLAVE RELAY TEST shall consist of energizing each slave relay and verifying the OPERABILITY of each slave relay. The SLAVE RELAY TEST shall include, as a minimum, a continuity check of associated testable actuation devices.
STAGGERED TEST BASIS	A STAGGERED TEST BASIS shall consist of the testing of one of the systems, subsystems, channels, or other designated components during the interval specified by the Surveillance Frequency, so that all systems, subsystems, channels, or other designated components are tested during *n* Surveillance Frequency intervals, where *n* is the total number of systems, subsystems, channels, or other designated components in the associated function.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.16 and SR 3.3.1.17

SR 3.3.1.16 and SR 3.3.1.17 verify that the individual channel/train actuation response times are less than or equal to the maximum values assumed in the accident analysis. Response time testing acceptance criteria are included in the UFSAR (Ref. 1). Individual component response times are not modeled in the analyses.

The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the trip setpoint value at the sensor to the point at which the equipment reaches the required functional state (i.e., control and shutdown rods fully inserted in the reactor core).

For channels that include dynamic transfer Functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer Function set to one, with the resulting measured response time compared to the appropriate UFSAR response time. Alternately, the response time test can be performed with the time constants set to their nominal value, provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be measured by a series of overlapping tests such that the entire response time is measured.

INSERT

As appropriate, each channel's response must be verified every 18 months on a STAGGERED TEST BASIS. Testing of the final actuation devices is included in the testing. Testing of the RTS RTDs is performed on an 18 month frequency. Response times cannot be determined during unit operation because equipment operation is required to measure response times. Experience has shown that these components usually pass this surveillance when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.3.1.16 is modified by a Note stating that neutron detectors are excluded from RTS RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response. The response time of the neutron flux signal portion of the channel shall be measured from detector output or input of the first electronic component in the channel.

BASES

REFERENCES

1. UFSAR, Chapter 7.
2. UFSAR, Chapter 6.
3. UFSAR, Chapter 15.
4. IEEE-279-1971.
5. 10 CFR 50.49.
6. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).
7. WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990.

INSERT

BASES

SURVEILLANCE REQUIREMENTS (continued)

calibration interval in the determination of the magnitude of equipment drift in the setpoint methodology.

This SR is modified by a Note stating that this test should include verification that the time constants are adjusted to the prescribed values where applicable. The applicable time constants are shown in Table 3.3.2-1.

SR 3.3.2.9

This SR ensures the individual channel ESF RESPONSE TIMES are less than or equal to the maximum values assumed in the accident analysis. Response Time testing acceptance criteria are included in the UFSAR (Ref. 2). Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the Trip Setpoint value at the sensor, to the point at which the equipment in both trains reaches the required functional state (e.g., pumps at rated discharge pressure, valves in full open or closed position).

For channels that include dynamic transfer functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer functions set to one with the resulting measured response time compared to the appropriate UFSAR response time. Alternately, the response time test can be performed with the time constants set to their nominal value provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be measured by a series of overlapping tests such that the entire response time is measured.

INSERT

ESF RESPONSE TIME tests are conducted on an 18 month STAGGERED TEST BASIS. Testing of the final actuation devices, which make up the bulk of the response time, is included in the testing of each channel. The final actuation device in one train is tested with each channel. Therefore, staggered testing results in response time verification of these devices every 18 months. The 18 month Frequency is consistent with the typical refueling cycle and is based on unit operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.

This SR is modified by a Note that clarifies that the turbine driven AFW pump is tested within 24 hours after reaching 900 psig in the SGs.

BASES

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1. UFSAR, Chapter 6.
2. UFSAR, Chapter 7.
3. UFSAR, Chapter 15.
4. IEEE-279-1971.
5. 10 CFR 50.49.
6. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).
7. WCAP-10271-P-A, Supplement 1 and Supplement 2, Rev. 1, May 1986 and June 1990.

INSERT

INSERTS FOR ATTACHMENT 1

Insert for Page 1.1-3 of McGuire Units 1 and 2 TS

In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.

Insert for Page 1.1-5 of McGuire Units 1 and 2 TS

In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.

Insert for Page B 3.3.1-48 of McGuire Units 1 and 2 TS

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g., vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements" provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be either demonstrated by test, or their equivalency to those listed in WCAP-13632-P-A, Revision 2. Any demonstration of equivalency must have been determined to be acceptable by NRC staff review.

WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests" provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time. The allocations for sensor, signal conditioning, and actuation logic response times must be verified prior to placing the component in operational service and re-verified following maintenance that may adversely affect response time. In general, electrical repair work does not impact response time provided the parts used for repair are of the same type and value. Specific components identified in the WCAP may be replaced without verification testing. One example where response time could be affected is replacing the sensing assembly of a transmitter.

Insert for Page B 3.3.1-49 of McGuire Units 1 and 2 TS

8. WCAP-13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements" Sep., 1995.

9. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests" Oct., 1998.

Insert for Page B 3.3.2-41 of McGuire Units 1 and 2 TS

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g. vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements" provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be either demonstrated by test, or their equivalency to those listed in WCAP-13632-P-A, Revision 2. Any demonstration of equivalency must have been determined to be acceptable by NRC staff review.

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Insert for Page B 3.3.2-42 of McGuire Units 1 and 2 TS

8. WCAP-13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements" Sep., 1995.

9. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests" Oct., 1998.

ATTACHMENT 2

McGUIRE UNITS 1 AND 2 TECHNICAL SPECIFICATIONS
AND
TECHNICAL SPECIFICATION BASES

REPRINTED VERSION

Remove Page	Insert Page
1.1-3	1.1-3
1.1-4	1.1-5
B3.3.1-48	B3.3.1-48
B3.3.1-49	B3.3.1-49
	B3.3.1-50
B3.3.2-41	B3.3.2-41
B3.3.2-42	B3.3.2-42
	B3.3.2-43

1.1 Definitions (continued)

ENGINEERED SAFETY FEATURE (ESF) RESPONSE TIME	The ESF RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.
LEAKAGE	LEAKAGE shall be:

a. Identified LEAKAGE

1. LEAKAGE, such as that from pump seals or valve packing (except reactor coolant pump (RCP) seal water injection or leakoff), that is captured and conducted to collection systems or a sump or collecting tank;

2. LEAKAGE into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be pressure boundary LEAKAGE; or

3. Reactor Coolant System (RCS) LEAKAGE through a steam generator (SG) to the Secondary System;

b. Unidentified LEAKAGE

All LEAKAGE (except RCP seal water injection or leakoff) that is not identified LEAKAGE;

c. Pressure Boundary LEAKAGE

LEAKAGE (except SG LEAKAGE) through a nonisolable fault in an RCS component body, pipe wall, or vessel wall.

(continued)

1.1 Definitions (continued)

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REACTOR TRIP SYSTEM (RTS) RESPONSE TIME	The RTS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its RTS trip setpoint at the channel sensor until loss of stationary gripper coil voltage. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC.
SHUTDOWN MARGIN (SDM)	SDM shall be the instantaneous amount of reactivity by which the reactor is subcritical or would be subcritical from its present condition assuming: a. All rod cluster control assemblies (RCCAs) are fully inserted except for the single RCCA of highest reactivity worth, which is assumed to be fully withdrawn. With any RCCA not capable of being fully inserted, the reactivity worth of the RCCA must be accounted for in the determination of SDM; and b. In MODES 1 and 2, the fuel and moderator temperatures are changed to the nominal zero power design level.
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SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.16 and SR 3.3.1.17

SR 3.3.1.16 and SR 3.3.1.17 verify that the individual channel/train actuation response times are less than or equal to the maximum values assumed in the accident analysis. Response time testing acceptance criteria are included in the UFSAR (Ref. 1). Individual component response times are not modeled in the analyses.

The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the trip setpoint value at the sensor to the point at which the equipment reaches the required functional state (i.e., control and shutdown rods fully inserted in the reactor core).

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Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g., vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-13632-P-A, Revision 2, “Elimination of Pressure Sensor Response Time Testing Requirements” provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be either demonstrated by test, or their equivalency to those listed in WCAP-13632-P-A, Revision 2. Any demonstration of equivalency must have been determined to be acceptable by NRC staff review.

WCAP-14036-P-A, Revision 1, “Elimination of Periodic Protection Channel Response Time Tests' provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time. The allocations for sensor, signal conditioning, and actuation logic response times must be verified prior to placing the component in

BASES

operational service and re-verified following maintenance that may adversely affect response time. In general, electrical repair work does not impact response time provided the parts used for repair are of the same type and value. Specific components identified in the WCAP may be replaced without verification testing. One example where response time could be affected is replacing the sensing assembly of a transmitter.

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SR 3.3.1.16 is modified by a Note stating that neutron detectors are excluded from RTS RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response. The response time of the neutron flux signal portion of the channel shall be measured from detector output or input of the first electronic component in the channel.

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1. UFSAR, Chapter 7.
2. UFSAR, Chapter 6.
3. UFSAR, Chapter 15.
4. IEEE-279-1971.
5. 10 CFR 50.49.
6. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).
7. WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990.
8. WCAP 13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements" Sep., 1995.
9. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests" Oct., 1998.

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SURVEILLANCE REQUIREMENTS (continued)

calibration interval in the determination of the magnitude of equipment drift in the setpoint methodology.

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SR 3.3.2.9

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For channels that include dynamic transfer functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer functions set to one with the resulting measured response time compared to the appropriate UFSAR response time. Alternately, the response time test can be performed with the time constants set to their nominal value provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be measured by a series of overlapping tests such that the entire response time is measured.

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g., vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements" provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be either demonstrated by test or their equivalency to those listed in WCAP-13632-P-A, Revision 2. Any demonstration of equivalency must have been determined to be acceptable by NRC staff review.

WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests' provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time. The allocations for sensor, signal conditioning, and actuation logic response times must be verified prior to placing the component in operational service and re-verified following maintenance that may adversely affect response time. In general, electrical repair work does not impact response time provided the parts used for repair are of the same type and value. Specific components identified in the WCAP may be replaced without verification testing. One example where response time could be affected is replacing the sensing assembly of a transmitter.

ESF RESPONSE TIME tests are conducted on an 18 month STAGGERED TEST BASIS. Testing of the final actuation devices, which make up the bulk of the response time, is included in the testing of each channel. The final actuation device in one train is tested with each channel. Therefore, staggered testing results in response time verification of these devices every 18 months. The 18 month Frequency is consistent with the typical refueling cycle and is based on unit operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.

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5. 10 CFR 50.49.
6. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).
7. WCAP-10271-P-A, Supplement 1 and Supplement 2, Rev. 1, May 1986 and June 1990.
8. WCAP 13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements" Sep., 1995.
9. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests" Oct., 1998.

ATTACHMENT 3

DESCRIPTION OF PROPOSED CHANGES AND TECHNICAL JUSTIFICATION

DESCRIPTION OF PROPOSED CHANGES AND TECHNICAL JUSTIFICATON

Proposed Changes

The current McGuire Technical Specifications (TS) require measurement of response times of reactor protection and engineered safety features instrumentation channels. The proposed change would eliminate the requirement to actually measure the response times. Instead, the response times would be verified by summing allocated times for sensors, the process protection system, the nuclear instrumentation system, and the logic system. These allocated values will be added to the measured times for the actuated devices and compared to the overall analysis limits. The proposed change requires revising the TS definition for "Engineered Safety Features (ESF) Response Time" and "Reactor Trip System (RTS) Response Time" to provide for verification of response time for selected components provided that the components and the methodology for verification have been previously reviewed and approved by the NRC. The TS requirements for response time verification will continue to be implemented by RTS and ESF Surveillance Requirements. The associated Bases for these Surveillance Requirements are revised to clarify that allocations for pressure and differential pressure sensor response times may be derived from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g., vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests" provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time. The allocations for sensor, signal conditioning and actuation logic response times must be verified prior to placing the component into operational service and re-verified following maintenance that may adversely affect the response time.

The Reactor Protection System (RPS) and Engineered Safety Features Actuation System (ESFAS) for McGuire Units 1 & 2 consist of the following:

a) Westinghouse 7300 Process Protection and Control System

b) Westinghouse Solid State Protection System (SSPS)

c) Westinghouse Nuclear Instrumentation System (NIS)

d) Reactor Coolant Pump Monitoring Instrumentation

e) Turbine Generator and Feedwater Instrumentation

Enclosed Tables 1 & 2 depict current McGuire Protection Channel equipment configuration and assignment of response time allocation values.

<u>Basis for Proposed Change for Sensors</u>

WCAP-13632-P-A, Revision 2 contains the technical basis and methodology for eliminating response time testing (RTT) requirements on sensors identified in the WCAP. The technical basis and methodology were documented as acceptable by letter dated September 5, 1995 from Bruce A. Boger (NRC) to Roger A. Newton (WOG). The NRC safety evaluation for WCAP-13632-P-A, Revision 2 requires confirmation by the licensee that the generic analysis in the WCAP is applicable to their plant.

DUKE has reviewed the plant data for McGuire Units 1 and 2. With the exception of the specific sensor type noted below, the basis for eliminating periodic RTT for each sensor is discussed in WCAP-13632-P-A, Revision 2 and/or referenced EPRI Report NP-7243, Revision 1, "Investigation of Response Time Testing Requirements." These reports provide justification that any sensor failure that significantly degrades response time will be detectable during surveillance testing such as calibration and channel checks.

There is one sensor type utilized at McGuire which was not included in the WCAP/EPRI study. This is the ITT Barton 386A differential pressure transmitter (used in containment pressure applications at McGuire). Attachment 7 to this amendment submittal contains the results of a similarity analysis which concludes that the ITT Barton 386A and the ITT Barton 764 transmitters are essentially the same transmitter, having the same response time range, with the only difference being the temperature compensation design.

In addition, in the Safety Evaluation Report included in WCAP-13632-P-A, Revision 2, the NRC required licensees to take the following actions:

(a) **Perform a hydraulic RTT prior to installation of a new transmitter/switch or following refurbishment of the transmitter/switch (e.g., sensor cell or variable damping components) to determine an initial sensor-specific response time value.**

McGuire Response

The applicable plant surveillance and maintenance procedures will include revisions which stipulate that pressure sensor response times must be verified by performance of an appropriate response time test prior to placing a sensor in operational service and reverified following maintenance that may adversely affect sensor response time. Required procedure changes will be completed prior to implementation of the verification option for that application.

(b) **For transmitters and switches that use capillary tubes, perform a RTT after initial installation and after any maintenance or modification activity that could damage the capillary tubes.**

McGuire Response

Currently, McGuire does not have any sensors which utilize capillary tubing. Should McGuire install pressure sensors incorporating capillary tubing at some point in the future, administrative controls would be established requiring response time testing after initial installation and after any maintenance or modification activity that could damage the capillary system. These administrative controls will be established prior to the installation of a pressure sensor utilizing a capillary system.

(c) **If variable damping is used, implement a method to assure that the potentiometer is at the required setting and cannot be inadvertently changed or perform hydraulic RTT of the sensor following each calibration.**

McGuire Response

McGuire does not currently have any sensors that utilize variable damping. Should McGuire install these devices at some point in the future, administrative controls would be established requiring the performance of hydraulic response time testing following each calibration or verification that the potentiometer was at the required setting and could not be inadvertently changed on pressure sensors utilizing variable damping. These administrative controls will be established prior to the installation of a pressure sensor utilizing variable damping.

(d) **Perform periodic drift monitoring of all Model 1151, 1152, 1153, and 1154 Rosemount pressure and differential pressure transmitters, for which RTT elimination is proposed, in accordance with the guidance contained in Rosemount Technical Bulletin No. 4 and continue to remain in full compliance with any prior commitments to Bulletin 90-01, Supplement 1, "Loss of Fill-Oil in Transmitters Manufactured by Rosemount". As an alternative to performing periodic drift monitoring of Rosemount transmitters, licensees may complete the following actions: (1) ensure that operators and technicians are aware of the Rosemount transmitter loss of fill-oil issue and make provisions to ensure that technicians monitor for sensor response time degradation during the performance of calibrations and functional tests of these transmitters, and (2) review and revise surveillance testing procedures, if necessary, to ensure that calibrations are being performed using equipment designed to provide a step function or fast ramp in the process variable and that calibrations and functional tests are being performed in a manner that allows simultaneous monitoring of both the input and output response of the transmitter under test, thus allowing, with reasonable assurance, the recognition of significant response time degradation.**

McGuire Response

McGuire's response to NRC Bulletin 90-01, Supplement 1 was reviewed and found acceptable by the NRC as documented in a letter dated December 16, 1994. All affected Rosemount transmitters at McGuire were either manufactured after July 11, 1989 or have periodic drift monitoring performed in accordance with Rosemount Technical Bulletin No. 4. Implementation of these proposed TS amendments will not change McGuire's response to this NRC Bulletin.

Basis for Proposed Change for Protection Channels

WCAP-14036-P-A, Revision 1, contains the technical basis and methodology for RTT requirements on protection channels identified in the WCAP. The basic justification for the elimination of periodic response time testing is based on a Failure Modes and Effects Analysis (FMEA) that: 1) determined that individual component degradation had no response time impact; or 2) identified components that may contribute to trip system response time degradation. Where potential response time impact was identified, testing was conducted to determine the magnitude of the response time degradation, or a bounding response time limit for the system or component was determined. As a result of the FMEA, the only components which were tested were the Westinghouse 7100 and 7300 Process Protection System circuit boards and modules. For the remainder of the hardware types shown in segments 2 and 3 of Figure 1 of the WCAP (e.g., NIS, Eagle 21, SSPS and relay logic), bounding response time allocations were determined. In these cases the bounding response time allocation is derived from design response time specifications for the component.

For the 7100 and 7300 process protection system circuit boards and modules, the FMEA was performed by having a circuit designer review the circuits and identify those components that may increase the response time if they degrade from their nominal value. The time response of dynamic function (i.e., lead-lag, etc.) cards is verified during periodic calibration testing and, therefore, these cards were not included in the program. Where it was necessary to provide a response time limit with component degradation, the conclusions of the FMEA were quantified by testing card and module response times with degraded components.

The FMEA does the following:

- Identifies response time sensitive components on the cards and modules via circuit analysis;

- Evaluates the impact on the response time if a component fails or degrades;

- Identifies detectability of degraded component via calibration; and

- Identifies components that impact calibration but not response time.

The analysis identified capacitors and resistors as the dominant response time sensitive components. Other tested components included diodes, zener diodes, inductors, and potentiometers. Increased capacitance tends to lead to increased response time. Manufacturers of sensitive capacitors on the printed circuit cards identified the failure mechanism and the maximum change in capacitance which could be reached before the capacitor failed. One manufacturer stated that the capacitance will not increase beyond 25% of the nominal value. All of the responses of the manufacturers provided gross estimates that capacitors identified in the 7300 circuits do not have a failure mechanism that will double the nominal capacitance. Based on this information, a conservative increase of 50% in capacitance was used to determine the maximum change in response time for capacitor degradation. Resistors were assumed to degrade to as much as 200% of the nominal resistance, which is a conservative increase based on engineering judgment.

Actual testing was used to verify and further quantify the FMEA results. The test procedures were used to verify and/or determine actual response time of the card or module with a degraded capacitor or resistor. Components of different values were substituted to simulate various degrees of degradation. The procedures required calibration checks on the card and module after each component change to determine if the calibration could or could not detect the degraded component. If the post-component change calibration inaccuracy exceeded 0.5% of span, then the degradation was considered detectable.

An input step change was used to obtain step response traces. The response time was defined as the time to reach 63% of the final output. This time is equal to the time constant of a dynamic system with a characteristic first order lag. For the 7300 cards, a slightly more conservative limit of 67% was used. In summary, the tests:

- Measured the response time of calibrated production modules and provided response time base-line data;

- Verified the analysis by measuring response times and obtaining calibration data for the card or module when the component(s) identified by analysis as having an impact on response time were degraded;

- Verified that similar results would be obtained if testing was done at a temperature that more closely modeled the rack environment; and

- Measured the response time of a simulated protection channel from input to output with components degraded.

Sections 4.2 - 4.5 of the WCAP present the results of the FMEA and testing with degraded components. Testing verified that the FMEA was conservative and provided a baseline response time value for each card and module tested. Testing components with simulated degradations was deemed necessary to precisely quantify the increase in response time, because the Westinghouse 7100 and 7300 process protection system FMEAs show that components can degrade and impact response time without a corresponding calibration or functional test failure. Because the degradation would be undetectable by routine calibration testing, bounding response times with a degraded component were determined. In cases where more than one component impacted the response time, the individual response time degradation increments were summed to estimate the total response time degradation for the card. The bounding response time is justified because of its small magnitude when compared to the total response time limit for the protection channel and because the simulated degradations were grossly exaggerated.

Sections 4.6 - 4.9 of the WCAP present the results of the FMEA for the NIS, EAGLE 21, SSPS and relay logic protection system. These systems did not require testing with degraded components. In some cases, the FMEA did not identify any response time sensitive components that are subject to degradation, and in other cases the effects of component degradation are accounted for in the overall response time allocation for the system.

In Section 8, the methodology to integrate the component response time results into the determination of the limit for protection channels is presented. This information is then combined with the results of the actuated component periodic response time tests to ensure that the Technical Specification response time limits are verified.

The Failure Modes and Effects Analysis (FEMA) contained in WCAP-14036-P-A, Revision 1, is applicable to the equipment installed at McGuire Units 1 and 2. The analysis is valid for the installed versions of boards and relays.

Reactor Protection System (RPS)/Engineered Safety Features Actuation System (ESFAS) Response Time Verification via Allocation Methodology WCAP-13632-P-A, Rev 2, and WCAP-14036-P-A, Rev 1

Table 1 - Reactor Trip (Note 14)

Function	Sensor Notes 2 & 3	Sensor Time	7300 / NIS String Note 4	7300 Time Note 11	SSPS Relays Note 5	SSPS Time Note 5	Rx Trip Time Note 6	Total Time	Req'd Time
Pzr Press - Low	ITT Barton 763	0.5 s	NLP + NAL	0.1 s	Input	0.02 s	0.3 s	0.92 s	2.0 s
Pzr Press - High	ITT Barton 763	0.5 s	NLP + NAL	0.1 s	Input	0.02 s	0.3 s	0.92 s	2.0 s
S/G Level - Low Low	ITT Barton 764	0.5 s	NLP + NAL	0.1 s	Input	0.02 s	0.3 s	0.92 s	3.039 s
RCS Flow - Low	ITT Barton 764	0.5 s	NLP + NAL	0.1 s	Input	0.02 s	0.3 s	0.92 s	1.0 s
OPDT (Vary Tavg)	RDF 21232	Note 1	NRA + NSA + NSA + NSA + NSA + NAL	0.4 s	Input	0.02 s	0.3 s	0.72 s	1.5 s
OPDT (Vary Delta T)	RDF 21232	Note 1	NRA + NSA + NSA + NAL	0.4 s	Input	0.02 s	0.3 s	0.72 s	1.937 s
OPDT (Vary Flux)	Detectors Exempt	Note 1	NIS (1ms) + NSA + NCH + NSA + NAL	0.401 s Note 12	Input	0.02 s	0.3 s	0.721 s	1.5 s
OTDT (Vary Tavg)	RDF 21232	Note 1	NRA + NSA + NSA + NSA + NAL	0.4 s	Input	0.02 s	0.3 s	0.72 s	1.65 s
OTDT (Vary Delta T)	RDF 21232	Note 1	NRA + NSA + NSA + NAL	0.4 s	Input	0.02 s	0.3 s	0.72 s	1.937 s
OTDT (Vary Press)	ITT Barton 763	0.5 s	NLP + NSA + NSA + NAL	0.4 s	Input	0.02 s	0.3 s	1.22 s	1.5 s

RPS Functions Acronyms

Pzr - Pressurizer	RCS - Reactor Coolant System	OPDT - Overpower Δ Temperature
SI - Safety Injection	S/G - Steam Generator	RCP - Reactor Coolant Pump
OTDT - Overtemperature Δ Temperature	ESFAS- Engineered Safety Features Actuation System	NIS - Nuclear Instrumentation System

Table 1 - Reactor Trip (cont.) Note 14

Function	Sensor Notes 2 & 3	Sensor Time	7300 / NIS String Note 4	7300 Time Note 11	SSPS Relays Note 5	SSPS Time Note 5	Rx Trip Time Note 6	Total Time	Req'd Time
OTDT (Vary Flux)	Detectors Exempt	Note 1	NIS (1ms) + NSA + NCH + NSA + NAL	0.401 s Note 12	Input	0.02 s	0.3 s	0.721 s	1.5 s
RCP Undervoltage	RIS 90303-100 and RIS90634-100	Note 1	N/A	N/A	Input	0.02 s	0.3 s	1.37 s Note 7	1.5 s
RCP Underfrequency	RIS 90634-100A	Note 1	N/A	N/A	Input	0.02 s	0.3 s	0.57 s Note 8	0.6 s
NIS Level - Low	Detectors Exempt	Note 1	NIS FMEA (Note 9)	0.065 s	Input	0.02 s	0.3 s	0.385 s	0.5 s
NIS Level - High	Detectors Exempt	Note 1	NIS FMEA (Note 9)	0.065 s	Input	0.02 s	0.3 s	0.385 s	0.5 s
Containment Pressure ESFAS (SI) Input to Reactor Trip	ITT Barton 386A	0.5 s	NLP + NAL	0.1 s	Input	0.02 s	0.3 s	0.92 s	2.0 s
Pressurizer Pressure ESFAS (SI) Input to Reactor Trip	ITT Barton 763	0.5 s	NLP + NAL	0.1 s	Input	0.02 s	0.3 s	0.92 s	2.0 s

RPS Functions Acronyms

Pzr - Pressurizer	RCS - Reactor Coolant System	OPDT - Overpower Δ Temperature
SI - Safety Injection	S/G - Steam Generator	RCP - Reactor Coolant Pump
OTDT - Overtemperature Δ Temperature	ESFAS- Engineered Safety Features Actuation System	NIS - Nuclear Instrumentation System

Table 2 - Engineered Safety Features (Note 14)

Function	Sensor Notes 2 & 3	Sensor Time	7300 / NIS String Note 4	7300 Time Note 11	SSPS Relays Note 5	SSPS Time Note 5	Total Time	Req'd Note 13
Containment Press - High (SI)	ITT Barton 386A	0.5 s	NLP + NAL	0.1 s	Input + Master + Slave +Slave	0.124 s	0.724 s	1.0 s
Containment Press - High High (CS & SLI)	ITT Barton 386A	0.5 s	NLP + NAL	0.1 s	Input + Master + Slave	0.088 s	0.688 s	0.75 s
Steam Pressure – Low (SLI)	Rosemount 1153GD9	0.5 s	NLP + NAL	0.1 s	Input + Master + Slave	0.088 s	0.688 s	0.75 s
Steam Pressure - Neg Rate High (SLI)	Rosemount 1153GD9	0.5 s	NLP + NAL	0.1 s	Input + Master + Slave	0.088 s	0.688 s	0.75 s
Pzr Pressure - Low (SI)	ITT Barton 763	0.5 s	NLP + NAL	0.1 s	Input + Master + Slave + Slave	0.124 s	0.724 s	1.0 s
RWST Level – Low (Note 10)	Note 10	Note 10	Note 10	Note 10	Note 10	Note 10	Note 10	Note 10
S/G Level - Low Low (AFW)	ITT Barton 764	0.5 s	NLP + NAL	0.1 s	Input + Master + Slave	0.088 s	0.688 s	2.0 s
S/G Level - High High (TT & FWI)	ITT Barton 764	0.5 s	NLP + NAL	0.1 s	Input + Master + Slave	0.088 s	0.688 s	2.0 s
AFW – Station Blackout, Trip of all Main Feedwater Pumps, or AFW Pump Suction Transfer (Note 10)	Note 10	Note 10	Note 10	Note 10	Note 10	Note 10	Note 10	Note 10

Engineered Safety Features Actuation System (ESFAS) Function Acronyms

SI - Safety Injection	FWI - Feedwater Isolation	CS - Containment Spray
TT - Turbine Trip	SLI - Steamline Isolation	AFW - Auxiliary Feedwater

Table 1 and 2 Notes

1. Sensors for these functions were not evaluated in WCAP-13632-P-A, Revision 2. Therefore, allocated sensor response times are not used and sensors will continue to be tested as required. NIS detectors are exempt from RTT per Technical Specifications.

2. Allocated sensor response times for the ITT Barton (model 763 - Pressurizer Pressure, model 764 - Steam Generator Level) and Rosemount (model 1153GD9 Steam Pressure) pressure sensors specified in Tables 1 and 2 are based on historical records (Method 1) of acceptable RTT obtained from the McGuire response time testing program. The historical response time test data for these sensors is documented in various test reports from Analysis & Measurement Services (AMS) produced from on-site In-Situ testing performed via noise analysis method. The test reports span a time period from July 1990 thru January 2002. These test results are not included but are available for NRC inspection upon request.

3. Allocated sensor response times for the ITT Barton (model 386A - Containment Pressure) pressure sensors specified in Tables 1 and 2 are based on historical records (Method 1) of acceptable RTT obtained from the McGuire response time testing program. The historical response time test data for these sensors is documented in McGuire plant test procedures performed via step input method. The test data span a time period from July 1990 through January 2002. These test results are not included but are available for NRC inspection upon request.

4. 7300 cards installed at McGuire were evaluated in Section 4.5 of WCAP-14036-P-A, Revision 1 (card types NLP, NSA, NAL, NCH, and NRA). The allocated response times for 7300 are derived from Table 8-1 of the WCAP. All NLL type time domain cards will have their time domain characteristics verified within calibration procedures. This is consistent with discussion in Section 4.0 of WCAP-14036-P-A, Revision 1.

5. Relays evaluated in Section 4.8 of WCAP-14036-P-A, Revision 1 and used in the McGuire SSPS are as follows:

   - Input and Master Relays: Clare C. P. and Company GP1 Series.
   - Slave Relays: Westinghouse Type AR and/or Potter &

Brumfield MDR series (not currently used at McGuire).

The following allocated response times for the SSPS relays are in accordance with Section 4.8 of WCAP-14036-P-A, Revision 1; logic circuit response time was determined to be insignificant.

- Reactor Trip Functions: 20 msec (input relay).
- ESFAS Functions:

  26 msec + 26 msec + 36 msec = 88 msec (input + master + slave); **OR**

  26 msec + 26 msec + 36 msec + 36 msec = 124 msec (input + master + 2 slaves in series).

6. Time includes: Reactor Trip breaker time ≤ 150 ms and Stationary Gripper Release Time ≤ 150 ms.

7. Time includes: Undervoltage module delay time ≤ 0.8 sec and Westinghouse assumed EMF Delay Time 250 ms.

8. Time includes: Underfrequency module delay time ≤ 0.25 sec.

9. The Power Range NIS cards installed at McGuire were evaluated in Section 4.6 of WCAP-14036-P-A, Revision 1 (Detector Current Monitor, Summing and Level Amplifier, Level Trip Bistable, and Isolation Amplifier).

10. These ESFAS functions are not part of the SSPS and were not covered under the WCAPS. Therefore, response time testing will continue as required for these functions.

11. The allocated response times are derived from Table 8-1 of the WCAP.

12. Includes allowance for both NIS and 7300.

13. This is the portion of the required time that is allocated to the sensor and electronics. The remainder of the required time is allocated to the final device (valve, pump, etc.).

14. These tables include the equipment currently installed at McGuire. The calculation demonstrates that the sum of the allocated response times for the equipment installed at McGuire is less than the required time. As long as the equipment models used are included in the WCAP or the applicability study and the sum of the allocated times remains less than the required time, the WCAP methodology is supported.

ATTACHMENT 4

NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

As required by 10CFR50.91(a)(1), this analysis is provided to demonstrate that the proposed license amendment does not involve a significant hazard.

Conformance of the proposed amendment to the standards for a determination of no significant hazards, as defined in 10CFR50.92, is shown in the following:

1) Does the proposed license amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

   No. The proposed amendment to the Technical Specifications does not result in the alteration of the design, material, or construction standards that were applicable prior to the change. The same reactor trip system (RTS) and engineered safety features actuation system (ESFAS) instrumentation is used, and the time response allocations/modeling assumptions in UFSAR Chapter 15 analysis remain unchanged. Only the methodology of time response verification is changed. The proposed change will not result in the modification of any system interface that would increase the likelihood of an accident since these events are independent of the proposed change. The proposed amendment will not change, degrade, or prevent actions, or alter any assumptions previously made in evaluating the radiological consequences of an accident described in the UFSAR. Therefore, the proposed amendment does not result in the increase in the probability or consequences of an accident previously evaluated.

2) Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   No. This change does not alter the performance of the reactor protection system (RPS) or ESFAS systems. All RPS and ESFAS channels will still have response time verified by test before placing the channel in operational service and after any maintenance that could affect response time. Changing the method of periodically verifying instrument response for certain RPS and ESFAS channels (assuring equipment operability) from time response testing to calibration and channel checks will not create any new accident initiators or scenarios. Periodic surveillance of these instruments will detect significant degradation in the channel characteristic. Implementation of the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3) Does the proposed change involve a significant reduction in margin of safety?

   No. This change does not affect the total system response time assumed in the safety analysis. The periodic system response time verification method is modified to allow for the use of actual test or engineering data. The method of verification still provides assurance that the total system response is within that defined in the safety analysis, since calibration tests will detect any degradation which might significantly affect channel response time. Based on the above, it is concluded that the proposed license amendment request does not result in a reduction in margin with respect to plant safety.

Conclusion

Based on the preceding analysis, it is concluded that elimination of periodic Process Protection, Nuclear Instrumentation, Logic Systems, and sensor response time testing is acceptable and the proposed license amendment does not involve a Significant Hazards Consideration Finding as defined in 10CFR50.92.

ATTACHMENT 5

ENVIRONMENTAL ANALYSIS

ENVIRONMENTAL ANALYSIS

The proposed amendment has been reviewed against the criteria of 10CFR51.22 for environmental considerations. The proposed amendment does not involve a significant hazards consideration, increase the types and amounts of effluents that may be released offsite, or result in the increase of individual or cumulative occupational radiation exposures. Therefore, the proposed amendment meets the criteria provided by 10CFR51.22(c)(9) for categorical exclusion from the requirement for an Environmental Impact Statement.

ATTACHMENT 6

LIST OF REGULATORY COMMITMENTS

LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by Duke in this document. Any other statements in this submittal are provided for informational purposes and are not considered to be regulatory commitments. Please direct questions regarding these commitments to J. A. Effinger at (704) 382-8688.

REGULATORY COMMITMENTS	Due Date/Event
McGuire will revise applicable plant documents to stipulate that pressure sensor response times must be verified by the performance of an appropriate response time test prior to placing a sensor in operational service and reverified following maintenance that may adversely affect sensor response time.	Procedure(s) will be revised prior to implementation of the verification option for that application.
McGuire will establish appropriate administrative controls to require response time testing after initial installation and after any maintenance or modification activity that could damage an instrument's capillary system.	Prior to installing a pressure sensor utilizing a capillary system.
McGuire will establish administrative controls to require the performance of hydraulic response time testing following each calibration, or the verification that the potentiometer was at the required setting and could not be inadvertently changed on pressure sensors utilizing variable damping.	Prior to installing a pressure sensor utilizing variable damping.

ATTACHMENT 7

SIMILARITY ANALYSIS FOR ITT BARTON 386A SENSOR

A. PROBLEM: WCAP-13632 "Elimination of Pressure Sensor Response Time Testing Requirements" does not identify ITT Model 386A as one of the instruments that does not require response time testing, however it lists ITT Barton Model 764.

B: RELATION TO QA CONDITION: The ITT Barton Model 386A and Model 764 are QA Condition 1.

C. DESIGN METHOD: This calculation will analyze the difference between ITT Model 386A and Model 764 for design and operation, and their effect on the Instrument Response Time value.

D. APPLICABLE CODES AND STANDARDS: 10CFR50.49, "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants".

E. OTHER DESIGN CRITERIA: None applicable to this calculation.

F. RELATED FSAR CRITERIA: Catawba & McGuire FSAR, chapter 7, " Instrumentation and Control"

G. REFERENCES:

1. EPRI NP-7243, "Investigation of Response Time Testing Requirements".
2. Catawba & McGuire Technical Specification 4.3.1 "Reactor Trip System Instrumentation" and 4.3.2 " Engineered Safety Features Actuation System Instrumentation"
3. WCAP -13632 Rev. 2 "Elimination of Pressure Sensor Response Time Testing Requirements"
4. Technical Manual CNM-1210.04-0221-001 " DP Electronic Transmitter Model 386A"
5. Technical Manual CNM-1210.04-0255-001 " DP Electronic Transmitter Model 764"
6. Technical Manual MCM-1210.04-0092-001 " DP Electronic Transmitter Model 386A"
7. Technical Manual MCM-1210.04-0155-001 " DP Electronic Transmitter Model 764"
8. ITT Barton Letter to Mr. Brad Davis dated March 29, 1983 (Attachment 2)

H. ASSUMPTIONS: NONE

I. CALCULATION:

ITT Barton Technical Manual No. 804-4 and 88C4 for differential pressure electronic transmitters Model 386A and Model 764, respectively, describe the design and theory of operation of these transmitters as follow:

These differential pressure transmitters consist of the Differential Pressure Unit (DPU), electronic signal processing circuit, and the transmitter housing.

Differential Pressure Unit (DPU) (Attachment 1)

The mechanical actuating device for the electronic transmitter is a dual bellows assembly enclosed by a set of two pressure housings. The dual bellows assembly consist of two internally-connected bellows, a center plate, over-range valves, a temperature compensator, a strain gauge assembly and range spring assembly. The internal volume of the bellows and center plate is completely filled with a non-corrosive, low freezing point liquid and sealed.

The differential pressure range of the dual bellows type DPU is determined by the force required to move the bellows through their normal range of travel. In operation, the two bellows(which are connected by a valve shaft) move in proportion to the difference in pressure applied across the Bellows Unit Assembly. The linear motion of the bellows is picked up by the tip of the silicon strain gauge beam, which is actuated directly by the valve shaft connecting the two bellows.

If the bellows are subjected to a pressure greater than the differential pressure range of the DPU , The bellows will move through their normal range of travel, plus a small additional amount of over-travel, until the valve on the shaft seals against its valve seat. As the valve closes on the seat, it traps the fill fluid in the bellows, protecting the unit from damage or shift in calibration.

Electronic Signal Processing Circuit (Attachment 1)

The DPU senses the difference in pressure applied across the bellows unit assembly. The pressure causes a linear motion of the bellows which is mechanically transmitted to the strain gauge by the strain gauge beam. Motion of the end of the strain gauge beam tension to one and compression on the other. The gauge in tension increases in resistance, while the one under compression decreases in resistance. The two gauges are connected to form two active arms of a bridge circuit. The bridge output signal is conditioned and converted to a (4-20 or 10-50 mA) output signal by the electronic circuit of the electronic transmitter.

This circuit is basically a loop current regulating device, where the loop current is controlled by mechanical force or motion over the calibrated differential pressure range of the differential pressure unit. Within the circuit, the transmitter power supply and the load line connect in series the current from the power supply enters the transmitter, passes through the reverse polarity diode, the a divides into two separate paths. The main current flows through the current amplifier and

I. CALCULATION (Continued):

returns to the loop. The remainder of the current passes through the electronic regulator where it again divides to take two separate paths: one to the strain gauge bridge network, the other to the signal amplifier. The bridge output signal is amplified by the signal amplifier. The output voltage of the signal amplifier is the input for the current amplifier circuit which converts this voltage to current. The amount of current is precisely regulated with a feedback network to make it proportional to the bridge current. After passing through these respective stages, the total current flows through the load and back to the power supply.

According to the manufacturer, the only difference between the ITT Barton Model 386A and Model 764 differential pressure Electronic transmitter are in manufacturing methodology. The Model 386A is temperature compensated for continuous operation up to +150 F. The Model 764 is temperature compensated for continuous operation up to +320 F. There are no material differences between the two models. (Reference 8, Attachment 2)

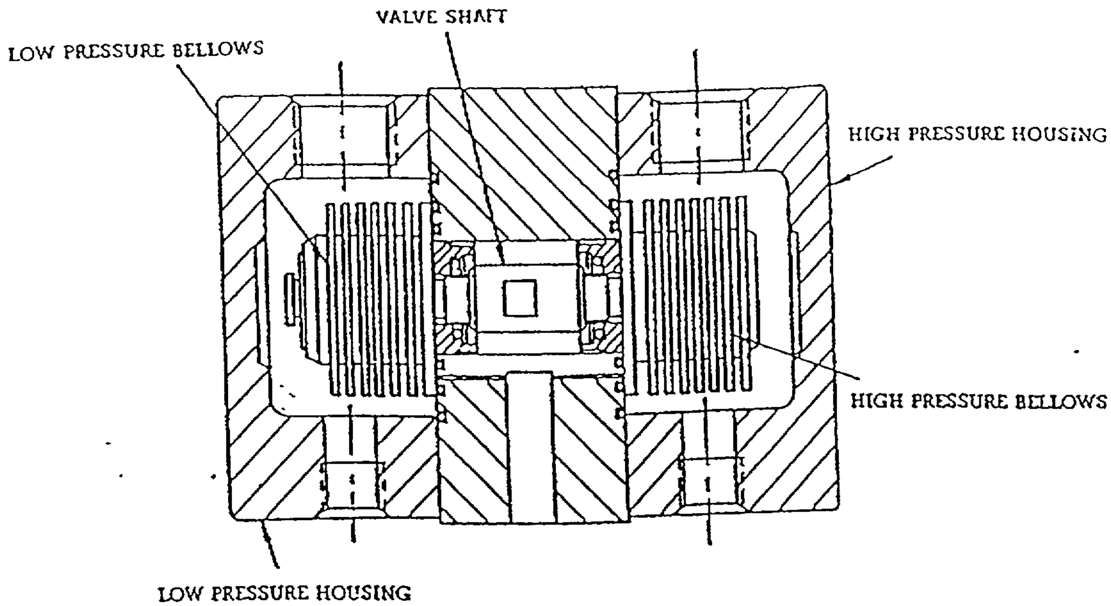
The ITT Barton Model 386A is used at McGuire in Containment Pressure and Refueling Water Storage Tank Level applications. This model is also used at Catawba in the Containment Pressure application.

Instrument Response Time is the elapsed time for the instrument to indicate a change to the measured process variable. The response time value of an instrument depends on the design of sensor (bellows) and electronic circuitry of the instrument.

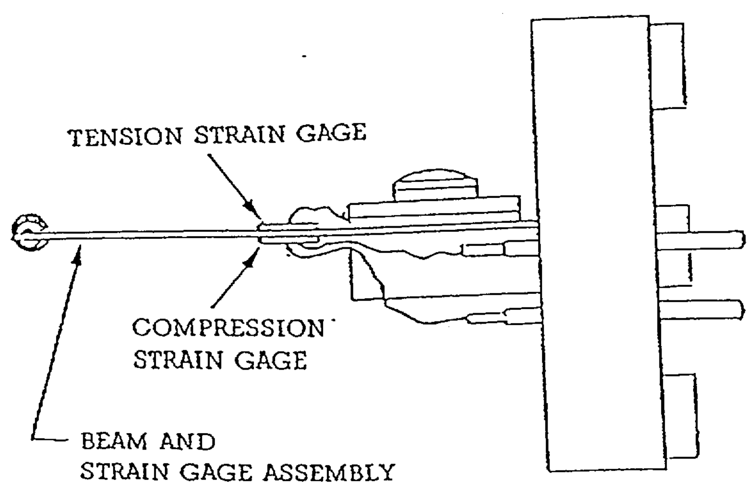
The response time value for ITT Model 386A and Model 764 transmitters is the same per ITT technical manuals stated as "less than 180 mSec. for 10% to 90% of step function."

J. CONCLUSION:

Per this analysis, ITT Barton Model 386A and ITT Barton 764 transmitters are essentially the same transmitter having the same response time range and with the only difference being temperature compensation design.

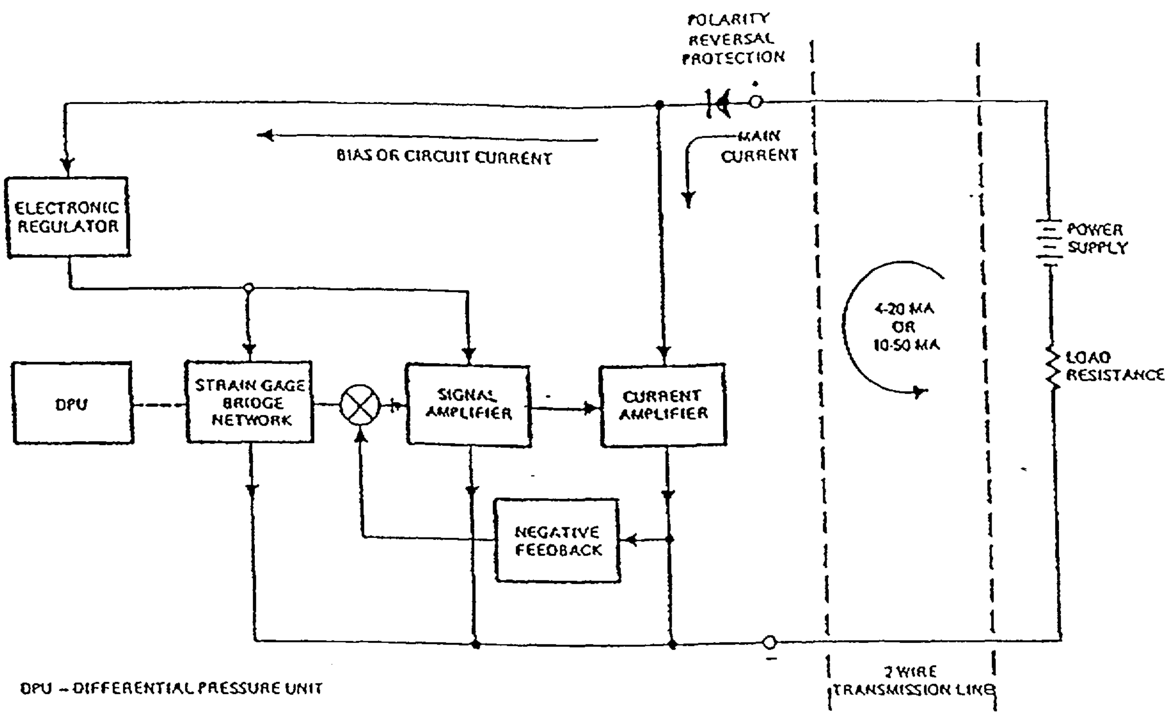


Cutaway View, Differential Pressure Unit



Strain Gage Assembly

Differential Pressure Unit DPU for Model 386A and 764.



Electronic Processing Circuit Block Diagram for Model 386A and 764

ITT

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March 29, 1983

Duke Power Company
Nuclear Maintenance
1236 Wachovia Center
Box 33189
Charlotte, North Carolina 28242

Attention: Mr. Brad Davis

Regarding: Model 386A and Model 764 Differences

Gentlemen:

The only differences between the ITT Barton Model 386A and the Model 764 Differential Pressure Electronic Transmitter are in manufacturing methodology. The Model 386A is temperature compensated for continuous operation up to +150°F. The Model 764 is temperature compensated for continuous operation up to +320°F. There are no material differences between the two models. The same parts and materials are used in the construction of both.

If you have any questions regarding this letter or require additional informantion, please contact me.

Sincerely,

John P. Boyon
Nuclear Market Manager

cc: D. Davis/FFP
E. Romo

smh