ATTACHMENT I to JPN-92-030

PROPOSED TECHNICAL SPECIFICATION CHANGES
INSTRUMENT CHANNEL RESPONSE TIME TESTING

(JPTS-92-010)

New York Power Authority

JAMES A. FITZPATRICK NUCLEAR POWER PLANT
Docket No. 50-333

TECHNICAL SPECIFICATIONS

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Amendment No. 22, 120, 134.

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1.0 (cont'd)

C. Cold Condition - Reactor coolant temperature $\leq 212°F$.

D. Hot Standby Condition - Hot Standby condition means operation with coolant temperature >212°F, the Mode Switch in Start-up/Hot Standby and reactor pressure < 1,005 psig.

E. Immediate - Immediate means that the required action will be initiated as soon as practicable considering the safe operation of the unit and the importance of the required action.

F. Instrumentation

1. Functional Test - A functional test is the manual operation or initiation of a system, subsystem, or component to verify that it functions within design tolerances (e.g., the manual start of a core spray pump to verify that it runs and that it pumps the required volume of water).

2. Instrument Channel Calibration - An instrument channel calibration means the adjustment of an instrument signal output so that it corresponds, within acceptable range, and accuracy, to a known value(s) of the parameter which the instrument monitors. Calibration shall encompass the entire instrument channel including actuation, alarm or trip.

3. Instrument Channel - An instrument channel means an arrangement of a sensor and auxiliary equipment required to generate and transmit to a trip system a single trip signal related to the plant parameter monitored by that instrument channel.

4. Instrument Check - An instrument check is a qualitative determination of acceptable operability by observation of instrument behavior during operation. This determination shall include, where possible, comparison of the instrument with other independent instruments measuring the same variable.

5. Instrument Channel Functional Test - An instrument channel functional test means the injection of a simulated signal into the instrument primary sensor where possible to verify the proper instrument channel response, alarm and/or initiating action.

6. Primary Containment Isolation Actuation Instrumentation Response Time for Main Steam Line isolation is the time interval which begins when the monitored parameter exceeds the isolation actuation set point at the channel sensor and ends when the Main Steam Isolation Valve solenoids are de-energized (16A-K14, K16, K51, & K52 pilot solenoid relay contacts open). The response time may be measured in one continuous step or in overlapping segments, with verification that all components are tested.

7. Logic System Function Test - A logic system functional test means a test of relays and contacts of a logic circuit from sensor to activated device to ensure components are operable per design intent. Where practicable, action will go to completion: i.e., pumps will be started and valves operated.

8. Protective Action - An action initiated by the Protection System when limiting safety system setting is reached. A protective action can be at a channel or system level.

1.0 (cont'd)

9. Protective Function - A system protective action which results from the protective action of the channels monitoring a particular plant condition.

10. Reactor Protection System Response Time is the time interval which begins when the monitored parameter exceeds the reactor protection trip set point at the channel sensor and ends when the scram pilot valve solenoids are de-energized (05A-K14 scram contactors open). The response time may be measured in one continuous step or in overlapping segments, with verification that all components are tested.

11. Simulated Automatic Actuation - Simulated automatic actuation means applying a simulated signal to the sensor to actuate the circuit in question.

12. Trip System - A trip system means an arrangement of instrument channel trip signals and auxiliary equipment required to initiate action to accomplish a protective function. A trip system may require one or more instrument channel trip signals related to one or more plant parameters in order to initiate trip system action. Initiation of protective action may require the tripping of a single trip system or the coincident of two trip systems.

13. Sensor - A sensor is that part of a channel used to detect variations in a monitored variable and to provide a suitable signal to logic.

G. Limiting Conditions for Operation (LCO)

The limiting conditions for operation specify the minimum acceptable levels of system performance necessary to assure safe start-up and operation of the facility. When these conditions are met, the plant can be operated safely and abnormal situations can be safely controlled.

H. Limiting Safety System Setting (LSSS)

The limiting safety system settings are settings on instrumentation which initiate the automatic protective action at a level such that the safety limits will not be exceeded. The region between the safety limit and these settings represent margin with normal operation lying below these settings. The margin has been established so that with proper operation of the instrumentation safety limits will never be exceeded.

I. Modes of Operation (Operational Mode)

Mode - The reactor mode is established by the Mode Selection Switch. The modes include shutdown, refuel, start-up/hot standby, and run which are defined as follows:

3.1 LIMITING CONDITIONS FOR OPERATION

3.1 REACTOR PROTECTION SYSTEM

Applicability:

Applies to the instrumentation and associated devices which initiate the reactor scram.

Objective:

To assure the operability of the Reactor Protection System.

Specification:

A. The setpoints, minimum number of trip systems, and minimum number of instrument channels that must be operable for each position of the reactor mode switch, shall be as shown in Table 3.1-1. The reactor protection system instrumentation response time shall be within the limits in Table 3.1-2.

B. Minimum Critical Power Ratio (MCPR)

During reactor power operation, the MCPR operating limit shall not be less than that shown in the Core Operating Limits Report.

1. During Reactor power operation with core flow less than 100% of rated, the MCPR operating limit shall be multiplied by the appropriate K_f as specified in the Core Operating Limits Report.

4.1 SURVEILLANCE REQUIREMENTS

4.1 REACTOR PROTECTION SYSTEM

Applicability:

Applies to the surveillance of the instrumentation and associated devices which initiate reactor scram.

Objective:

To specify the type of frequency of surveillance to be applied to the protection instrumentation.

Specification:

A. Instrumentation systems shall be functionally tested and calibrated as indicated in Tables 4.1-1 and 4.1-2 respectively.

The response time for each reactor protection system trip function listed in Table 3.1-2 shall be demonstrated to be within the limits in the table during each 18 month test interval. Each test shall include at least one channel in each trip system. All channels in both trip systems shall be tested within two test intervals.

B. Maximum Fraction of Limiting Power Density (MFLPD)

The MFLPD shall be determined daily during reactor power operation at $\geq$25% rated thermal power and the APRM high flux scram and Rod Block trip settings adjusted if necessary as specified in the Core Operating Limits Report.

4.1 BASES (cont'd)

The bi-stable trip circuit which is a part of the Group (B) devices can sustain unsafe failures which are revealed only on test. Therefore, it is necessary to test them periodically.

A study was conducted of the instrumentation channels included in the Group (B) devices to calculate their unsafe failure rates. The non-ATTS (Analog Transmitter Trip System) analog devices (sensors and amplifiers) are predicted to have an unsafe failure rate of less than 20×10^{-6} failures/hr. The non-ATTS bi-stable trip circuits are predicted to have unsafe failure rate of less than 2×10^{-6} failures/hr. The ATTS analog devices (sensors), bi-stable devices (master and slave trip units) and power supplies have been evaluated for reliability by Mean Time Between Failure analysis or state-of-the-art qualification type testing meeting the requirements of IEEE 323-1974. Considering the 2 hour monitoring interval for analog devices as assumed above, the instrument checks and functional tests as well as the analyses and/or qualification type testing of the devices, the design reliability goal for system reliability of 0.9999 will be attained with ample margin.

The bi-stable devices are monitored during plant operation to record their failure history and establish a test interval using the curve of Figure 4.1-1. There are numerous identical bi-stable devices used throughout the Plant's instrumentation system. Therefore, significant data on the failure rates for the bi-stable devices should be accumulated rapidly.

The frequency of calibration of the APRM flow biasing network has been established as each refueling outage. The flow biasing network is functionally tested at least once/month and, in addition, cross calibration checks of the flow input to the flow biasing network can be made during the functional test by direct meter reading. There are several instruments which must be calibrated and it will take several days to perform the calibration of the entire network. While the calibration is being performed, a zero flow signal will be sent to half of the APRM's resulting in a half scram and rod block condition. Thus, if the calibration were performed during operation, flux shaping would not be possible. Based on experience at other generating stations, drift of instruments, such as those in the flow biasing network, is not significant and therefore, to avoid spurious scrams, a calibration frequency of each refueling outage is established.

The measurement of response time within the specified intervals provides assurance that the Reactor Protection System trip functions are completed within the time limits assumed in the transient and accident analyses.

The Reactor Protection System trip functions in Table 3.1-2 are those fuctions for which the transient and accident analyses described in Chapter 14 of the FSAR take credit for the response time of instrument channels.

4.1 BASES (cont'd)

In terms of the transient analysis, the Standard Technical Specifications define individual trip function response time as "the time interval from when the monitored parameter exceeds its trip setpoint at the channel sensor until de-energization of the scram pilot valve solenoids." The individual sensor response time defined as "operating time" in General Electric (GE) design specification data sheet 22A3083AJ, note (8), is "the maximum allowable time from when the variable being measured just exceeds the trip setpoint to opening of the trip channel sensor contact during a transient." A transient is defined in note (4) of the same data sheet as "the maximum expected rate of change of the variable for the accident or the abnormal operating condition which is postulated in the safety analysis report.

The individual sensor response time may be measured by simulating a step change of the particular parameter. This method provides a conservative value for the sensor response time, and confirms that the instrument has retained its specified electromechanical characteristics. When sensor response time is measured independently, it is necessary to also measure the remaining portion of the response time in the logic train up to the time at which the scram pilot valve solenoids de-energize. The channel response time must include all component delays in the response chain to the ATTS output relay plus the 50 ms design allowance for RPS logic system response time. A response time for the RPS logic relays in excess of 50 ms is acceptable provided the overall response time does not exceed the response time limits of Table 3.1-2 which includes allowances for sensors, relays, and switches as follows:

High Reactor Pressure sensor	500 ms
High Drywell Pressure sensor	550 ms
Low Reactor Water Level sensor	1000 ms
Main Steam Isolation Valve Closure and Turbine Stop Valve Closure switches	10 ms
Turbine Control Valve Fast Closure from the first movement of the main turbine control valves until actuation of pressure switches which detect the loss of hydraulic control oil pressure.	30 ms

The 10 ms limit for the MSIV and TSV position switch response time is defined by GE design specification data sheet 22A3083AJ. It requires that after MSIV or TSV moves to the set point corresponding to 10% closure from full open, the position switch contacts should open in less than or equal to 10 ms. When the correct set point is verified by surveillance testing for the position switch, the response time requirement is considered to be satisfied. The maximum permissible TCV fast closure channel, logic, and scram contactor response time is 70 ms rather than the sum of TCV fast closure logic (30 ms) and the trip logic and scram contactor response time (50 ms). This provides a 10 ms margin to allow for uncertainty in the test method.

"The maximum permissible APRM channel, logic, and scram contactor response time is 90 ms rather than the sum of the APRM channel response time (60 ms) and the trip logic and scram contactor response time (50 ms)..." (GE design specification data sheet 22A3083AJ), note (12). This measurement is applicable to both the APRM fixed high neutron flux and the flow referenced simulated thermal power channels and requires measuring the time delay through the LPRM cards. The latter case does not include the time constant of approximately six seconds which is calibrated separately. The basis for excluding the neutron detectors from response time testing is provided by NRC Regulatory Guide 1.118, Revision 2, section C.5.

4.1 BASES (cont'd)

The 18 month response time testing interval is based on NRC NUREG-0123, Revision 3, "Standard Technical Specifications," surveillance requirement 4.3.1.3.

Group (C) devices are active only during a given portion of the operational cycle. For example, the IRM is active during start-up and inactive during full power operation. Thus the only test that is meaningful is the one performed just prior to shutdown or start-up; i.e., the tests that are performed just prior to use of the instrument.

Calibration frequency of the instrument channel is divided into two groups. These are as follows:

1. Passive type indicating devices that can be compared with like units on a continuous basis.
2. Vacuum tube or semiconductor devices and detectors that drift or lose sensitivity.

Experience with passive type instruments in generating stations and substations indicates that the specified calibrations are adequate. For those devices which employ amplifiers, etc., drift specifications call for drift to be less than 0.4 percent/month; i.e., in the period of a month a maximum drift of 0.4 percent could occur, thus providing for adequate margin.

For the APRM System, drift of electronic apparatus is not the only consideration in determining a calibration frequency. Change in power distribution and loss of chamber sensitivity dictate a calibration every 7 days.

Calibration on this frequency assures plant operation at or below thermal limits.

A comparison of Tables 4.1-1 and 4.1-2 indicates that two instrument channels have not been included in the latter table. These are: mode switch in shutdown and manual scram. All of the devices or sensors associated with these scram functions are simple on-off switches and, hence, calibration during operation is not applicable.

B. The MFLPD is checked once per day to determine if the APRM scram requires adjustment. Only a small number of control rods are moved daily and thus the MFLPD is not expected to change significantly and thus a daily check of the MFLPD is adequate.

The sensitivity of LPRM detectors decreases with exposure to neutron flux at a slow and approximately constant rate. This is compensated for in the APRM system by calibrating twice a week using heat balance data and by calibrating individual LPRM's every 1000 effective full power hours, using TIP traverse data.

TABLE 3.1-2

REACTOR PROTECTION SYSTEM INSTRUMENTATION RESPONSE TIMES

	TRIP FUNCTION	REACTOR TRIP SYSTEM RESPONSE TIME (Seconds)	
1)	Reactor Vessel Pressure - High (02-3PT-55A, B, C, D)	≤ 0.550	
2)	Drywell Pressure - High (05PT-12A, B, C, D)	≤ 0.600	
3)	Reactor Water Level - Low (L3) (02-3LT-101A, B, C, D)	≤ 1.050	
[illegible]	Main Steam Isolation Valve Closure (29PNS-80A2, B2, C2. D2) (29PNS-86A2, B2, C2, D2)	≤ 0.060	
5)	Turbine Stop Valve Closure (94PNS-101, 102, 103, 104)	≤ 0.[illegible]0	
6)	Turbine Control Valve Fast Closure (94PS-200A, B, C, D)	≤ 0.070	
7)	APRM Fixed (120%) High Neutron Flux	≤ 0.090	(2)
8)	APRM Flow Referenced Simulated Thermal Power	≤ 0.090	(1) (2)

Notes for Table 3.1-2:

1. Trip system response time does not include the simulated thermal power time constant of approximately six seconds which is calibrated separately.
2. Trip system response time is the measured time interval from [illegible] signal input to the first electronic component in the channel after the LPRM detector until the scram pilot valve solenoids de-en[illegible] [illegible]05A-K14 scram contactors open).

TABLE 4.1-2

REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENT CALIBRATION
MINIMUM CALIBRATION FREQUENCIES FOR REACTOR PROTECTION INSTRUMENT CHANNELS

Instrument Channel	Group (1)	Calibration	Minimum Frequency (2)
IRM High Flux	C	Comparison to APRM on Controlled Shutdowns	Maximum frequency once/week
APRM High Flux Output Signal	B	Heat Balance	Daily
Flow Bias Signal	B	Internal Power and Flow Test with Standard Pressure Source	Every refueling outage
LPRM Signal	B	TIP System Traverse	Every 1000 effective full power hours
High Reactor Pressure	B	Standard Pressure Source	Note (6)
High Drywell Pressure	B	Standard Pressure Source	Note (6)
Reactor Low Water Level	B	Standard Pressure Source	Note (6)
High Water Level in Scram Discharge Instrument Volume	A	Water Column, Note (5)	Once/operating cycle, Note (5)
High Water Level in Scram Discharge Instrument Volume	B	Standard Pressure Source	Every 3 months
Main Steam Line Isolation Valve Closure	A	Note (4)	Note (4)
Main Steam Line High Radiation	B	Standard Current Source (3)	Every 3 months
Turbine First Stage Pressure Permissive	B	Standard Pressure Source	Note (6)

Amendment No. ~~42~~, [illegible], ~~62~~, ~~75~~, ~~88~~, ~~136~~,

TABLE 4.1-2 (Cont'd)

REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENT CALIBRATION
MINIMUM CALIBRATION FREQUENCIES FOR REACTOR PROTECTION INSTRUMENT CHANNELS

Instrument Channel	Group (1)	Calibration	Minimum Frequency (2)
Turbine Control Valve Fast Closure Oil Pressure Trip	A	Standard Pressure Source	Once/operating cycle
Turbine Stop Valve Closure	A	Note (4)	Note (4)

NOTES FOR TABLE 4.1-2

1. A description of three groups is included in the Bases of this Specification.
2. Calibration test is not required on the part of the system that is not required to be operable, or is tripped, but is required prior to return to service.
3. The current source provides an instrument channel alignment. Calibration using a radiation source shall be performed each refueling outage.
4. Actuation of these switches by normal means will be performed during the refueling outages.
5. Calibration shall be performed utilizing a water column or similar device to provide assurance that damage to a float or other portions of the float assembly will be detected.
6. Sensor calibration once per operating cycle. Master/slave trip unit calibration once per 6 months.

3.2 LIMITING CONDITIONS FOR OPERATION

3.2 INSTRUMENTATION

Applicability:

Applies to the plant instrumentation which either (1) initiates and controls a protective function, or (2) provides information to aid the operator in monitoring and assessing plant status during normal and accident conditions.

Objective:

To assure the operability of the aforementioned instrumentation.

Specifications:

A. Primary Containment Isolation Functions

When primary containment integrity is required, the limiting conditions of operation for the instrumentation that initiates primary containment isolation are given in Table 3.2-1.

When primary containment integrity is required, the primary containment isolation actuation instrumentation response time for MSIV closure shall be within the limits in Table 3.2-9.

4.2 SURVEILLANCE REQUIREMENTS

4.2 INSTRUMENTATION

Applicability:

Applies to the surveillance requirement of the instrumentation which either (1) initiates and controls protective function, or (2) provides information to aid the operator in monitoring and assessing plant status during normal and accident conditions.

Objective:

To specify the type and frequency of surveillance to be applied to the aforementioned instrumentation.

Specifications:

A. Primary Containment Isolation Functions

Instrumentation shall be functionally tested and calibrated as indicated in Table 4.2-1.

System logic shall be functionally tested as indicated in Table 4.2-1.

The response time of each primary containment isolation actuation instrumentation isolation trip function listed in Table 3.2-9 shall be demonstrated to be within the limits in the table during each 18 month test interval. Each test shall include at least one channel in each trip system. All channels in both trip systems shall be tested within two test intervals.

3.2 (cont'd)

B. Core and Containment Cooling Systems - Initiation and Control

The limiting conditions for operation for the instrumentation that initiates or controls the Core and Containment Cooling Systems are given in Table 3.2-2. This instrumentation must be operable when the system(s) it initiates or controls are required to be operable as specified in Specification 3.5.

C. Control Rod Block Actuation

1. The limiting conditions of operation for the instrumentation that initiates control rod block are given in Table 3.2-3.
2. The minimum number of operable instrument channels specified in Table 3.2-3 for the rod block monitor may be reduced by one in one of the trip systems for maintenance and/or testing, provided that this condition does not last longer than 24 hours in any 30 day period.

D. Radiation Monitoring Systems - Isolation and Initiation Functions

Refer to the Radiological Effluent Technical Specifications (Appendix B).

4.2 (cont'd)

B. Core and Containment Cooling Systems - Initiation and Control

Instrumentation shall be functionally tested, calibrated, and checked as indicated in Table 4.2-2.

System logic shall be functionally tested as indicated in Table 4.2-2.

C. Control Rod Block Actuation

Instrumentation shall be functionally tested, calibrated, and checked as indicated in Table 4.2-3.

System logic shall be functionally tested as indicated in Table 4.2-3.

D. Radiation Monitoring Systems - Isolation and Initiation Functions

Refer to the Radiological Effluent Technical Specifications (Appendix B).

4.2 BASES

The instrumentation listed in Tables 4.2-1 through 4.2-8 will be functionally tested and calibrated at regularly scheduled intervals. The same design reliability goal as the Reactor Protection System is generally applied. Sensors, trip devices and power supplies are tested, calibrated and checked at the same frequency as comparable devices in the Reactor Protection System.

The response times for MSIV isolation in Table 3.2-9 include the primary sensor and all components of the logic which must function to de-energize the MSIV pilot valve solenoids. Electrolytic filter capacitors are installed on the input to the main steam line flow ATTS trip units. General Electric analysis (MDE-278-1285 December 1985) accounts for the delay caused by the capacitors and justifies the increase in response time to 2.5 seconds for the main steam line high flow actuation signal. With the exception of the MSIVs, response time testing is not required for any other primary containment isolation actuation instrumentation. The safety analyses results are not sensitive to individual sensor response times of the logic systems to which the sensors are connected for isolation actuation instrumentation.

Those instruments which, when tripped, result in a rod block have their contacts arranged in a 1 out of n logic, and all are capable of being bypassed. For such a tripping arrangement with bypass capability provided, there is an optimum test interval that should be maintained in order to maximize the reliability of a given channel (7). This takes account of the fact that testing degrades reliability and the optimum interval between tests is approximately given by:

$$i = \sqrt{\frac{2t}{r}}$$

Where:

- i = the optimum interval between tests.
- t = the time the trip contacts are disabled from performing their function while the test is in progress.
- r = the expected failure rate of the relays.

To test the trip relays requires that the channel be bypassed, the test made, and the system returned to its initial state. It is assumed this task requires an estimated 30 minutes to complete in a thorough and workmanlike manner and that the relays have a failure rate of 10^{-6} failures per hour. Using this data and the above operation, the optimum test interval is:

$$i = \sqrt{\frac{2(0.5)}{10^{-6}}} = 1x\,10^{3}\ hr.$$

$$= 40 \text{ days}$$

For additional margin a test interval of once/month will be used initially.

The sensors and electronic apparatus have not been included here as these are analog devices with readouts in the control room and the sensors and electronic apparatus can be checked by comparison with other like instruments. The checks which are made on a daily basis are adequate to assure operability of the sensors and electronic apparatus, and the test interval given above provides for optimum testing of the relay circuits.

TABLE 3.2-9

PRIMARY CONTAINMENT ISOLATION SYSTEM ACTUATION INSTRUMENTATION RESPONSE TIMES

	TRIP FUNCTION	RESPONSE TIME (Seconds)
1)	MSIV Closure - Reactor Low Water Level (L1) (02-3LT-57A, B and 02-3LT-58A, B)	$\leq$ 1.0
2)	MSIV Closure - Low Steam Line Pressure (02PT-134A, B, C, D)	$\leq$ 1.0
3)	MSIV Closure - High Steam Line Flow (02DPT-116A-D, 117A-D, 118A-D, 119A-D)	$\leq$ 2.5

Note for Table 3.2-9:

The measurement of the response time interval begins when the monitored parameter exceeds the isolation actuation set point at the channel sensor and ends when the Main Steam Isolation Valve pilot solenoid relay contacts open. The pilot solenoid relay contacts to be used for determination of the end point of the response time measurement are:

For the inboard MSIV pilot solenoid relays:	16A-K14	(ac solenoids)
	16A-K51	(dc solenoids)
For the Outboard MSIV pilot solenoid relays:	16A-K16	(ac solenoids)
	16A-K52	(dc solenoids)

ATTACHMENT II to JPN-92-030

SAFETY EVALUATION FOR PROPOSED TECHNICAL SPECIFICATION CHANGES INSTRUMENT CHANNEL RESPONSE TIME TESTING

(JPTS-92-010)

New York Power Authority

JAMES A. FITZPATRICK NUCLEAR POWER PLANT
Docket No. 50-333

Safety Evaluation for Proposed Changes to Technical Specifications
RESPONSE TIME TESTING (JPTS-92-010)

I. DESCRIPTION OF THE PROPOSED CHANGES

The proposed changes will add response time testing (RTT) requirements for the instrument channels for eleven trip functions to the definition, limiting conditions for operation, and surveillance requirements sections. Existing reactor protection system (RPS) relay logic response time testing requirements will be eliminated for those trip functions which are not included in the RTT requirements of the Standard Technical Specifications (STS) (Reference 1), and for which response time is not considered in the accident and transient analyses described in the FSAR (Reference 11). To be consistent with reference 1, RTT requirements will be limited to those trip functions for which the instrument channel response time is significant (when compared to the total system response time) and for which credit for response time is taken in the transient and accident analyses described in the FSAR. The response time limits will be increased from the previous 50 ms limit to accommodate the response time of the additional sensors, analog transmitter trip system (ATTS) components, and other components installed in the instrument channels by (MOD-F1-82-053), and those components which were already existing in instrument channels and which will now, by the new definitions, be included in response time testing. The frequency of individual channel response time testing will be decreased from the existing requirements to reduce personnel radiation exposure during testing and to be consistent with reference 1.

Page i, Table of Contents, 3.2.B Core and Containment Cooling Systems - Initiation and Control

Replace the page number "49" with the page number "50". Section 3.2.B will be moved from page 49 to page 50 to provide space on page 49 for the additional response time surveillance requirements of 4.2.A.

Page v, List of Tables, 3.1-2 and 3.2-9

Add provision for two new tables:

"3.1-2 Reactor Protection System Instrumentation Response Times 43a"

"3.2-9 Primary Containment Isolation System Actuation Instrumentation Response Times 77e"

Page 2, Definitions, 1.0.F.6.

Change the number of the existing definition "6." to "7." and insert a new definition:

"6. Primary Containment Isolation Actuation Instrumentation Response Time for Main Steam Line isolation is the time interval which begins when the monitored parameter exceeds the isolation actuation set point at the channel sensor and ends when the Main Steam Isolation Valve solenoids are de-energized (16A-K14, K16, K51 & K52 pilot solenoid relay contacts open). The response time may be measured in one continuous step or in overlapping segments, with verification that all components are tested."

Safety Evaluation for Proposed Changes to Technical Specifications
RESPONSE TIME TESTING (JPTS-92-010)

Page 3, Definitions, 1.0.F. 7, 8, 9, 10, and 11

Change the number of the existing definition "7. Protective Action" to "8." and move the definition to the preceding page.

Change the number of the existing definition "8. Protective Function" to "9."

Insert a new definition:

"10. Reactor Protection System Response Time is the time interval which begins when the monitored parameter exceeds the reactor protection trip set point at the channel sensor and ends when the scram pilot valve solenoids are de-energized (05A-K14 scram contactors open). The response time may be measured in one continuous step or in overlapping segments, with verification that all components are tested."

Advance by two, the numbers of the existing definitions "9. Simulated Automatic Actuation", "10. Trip System", and "11. Sensor" to the numbers 11, 12, and 13, respectively, to reflect the insertion of the two new definitions preceding these sections.

Page 30f, Specifications 3.1.A

3.1.A Retain the first sentence.

Delete the existing second sentence:

"The design system response time from the opening of the sensor contact to and including the opening of the trip actuator contacts shall not exceed 50 ms."

Add the following new sentence:

"The reactor protection system instrumentation response time shall be within the limits in Table 3.1-2."

Page 30f, Specification 4.1.A

4.1.A Retain the first sentence.

Add the following paragraph:

"The response time for each reactor protection system trip function listed in Table 3.1-2 shall be demonstrated to be within the limits in the table during each 18 month test interval. Each test shall include at least one channel in each trip system. All channels in both trip system shall be tested within two test intervals."

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Page 38, 4.1 Bases

Transfer the last paragraph in the right column beginning "Group (C) devices are . . ." and ending " . . . tests that" from page 38 to page 40. Page 40 was previously blank.

Insert the following two new paragraphs at the end of the right column on page 38.

> " The measurement of response time within the specified intervals provides assurance that the reactor protection system trip functions are completed within the time limit assumed in the transient and accident analyses.
>
> The Reactor Protection System trip functions in Table 3.1-2 are those functions for which the transient and accident analyses described in Chapter 14 of the FSAR take credit for the response time of instrument channels. "

Page 39, 4.1 Bases

Transfer all of the existing text on page 39 to page 40 following the two paragraphs previously transferred from page 38. Page 40 was previously blank.

Insert the new text which appears on page 39 provided in Attachment I to this application for amendment. Page 39 will now consist entirely of new text.

Page 40, 4.1 Bases

Page 40 was previously blank.

Insert, beginning in the top left column, the following new paragraph:

> " The 18 month response time testing interval is based on NRC NUREG-0123 Revision 3 "Standard Technical Specifications", surveillance requirement 4.3.1.3.

Following new text above, insert the paragraph transferred from the bottom right column of the old page 38 which begins "Group (C) devices are.." Following this paragraph, insert all of the text which was previously located on page 39.

In the paragraph which begins "Group (C) devices are.." change the word "*to*" in the third sentence which reads:

"Thus the only test that is meaningful *to* the one performed just prior to shutdown . . ."

to the word "*is*" so that the sentence will now read:

"Thus the only test that is meaningful *is* the one performed just prior to shutdown . . ."

Page 43a, Table 3.1-2, Reactor Protection System Instrumentation Response Times

Create a new page 43a and insert the new table identified above and provided in Attachment I to this application for amendment. This new table identifies the reactor trip system response time limits for seven trip functions.

Page 46, Table 4.1.2, Reactor Protection System Instrument Calibration

The existing reference note numbers, (4) and above, have been deleted, or decreased by one, to reflect the deletion of note 4 on the following page 47, and the renumbering of the remaining notes.

On the column heading line, delete "(4)" after the column heading "Calibration."

In the "Calibration" column, change "Note (6)" to "Note (5)" and "Note (5)" to "Note (4)."

In the "Minimum Frequency" column, change the four occurrences of "Note (7)" to "Note (6)"; change "Note (6)" to "Note (5)"; and change "Note (5)" to "Note (4)."

Page 47, Table 4.1.2 (Continued)

In the "NOTES FOR TABLE 4.1-2", delete the existing note 4. in its entirety.

"4. Response time is not a part of the routine instrument channel test but will be checked once per operating cycle."

Decrease the number of the following notes by one. Accordingly, the existing notes 5, 6, and 7, should be changed to notes 4,5, and 6 respectively.

In the table column heading line, delete the notation "(4)" after the word "Calibration."
In the "Calibration" column, change "Note (5)" to "Note (4)."
In the "Minimum Frequency" column, change "Note (5)" to "Note (4)."

Page 49, Section 3.2.A, Primary Containment Isolation Functions

Add the following new sentence:

"When primary containment integrity is required, the primary containment isolation actuation instrumentation response time for MSIV closure shall be within the limits in Table 3.2-9."

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Page 49, Section 4.2.A Primary Containment Isolation Functions

Retain the first two sentences. Add the following paragraph:

> "The response time of each primary containment isolation actuation instrumentation isolation trip function listed in Table 3.2-9 shall be demonstrated to be within the limits in the table during each 18 month test interval. Each test shall include at least one channel in each trip system. All channels in both trip system shall be tested within two test intervals."

Page 49, Sections 3.2.B. & 4.2.B Core and Containment Cooling Systems - Initiation and Control

Delete sections 3.2.B and 4.2.B from the page 49 and move them to the top of the following page 50. The relocation of these sections provides space for the expanded section 4.2.A.

Page 50, Sections 3.2.B and 4.2.B

Insert at the top of the page sections 3.2.B and 4.2.B which should be transferred from the preceding page 49.

Page 61, 4.2 Bases

Following the first paragraph which ends with the words ". . . in the Reactor Protection System.", insert the following new paragraph:

> "The response times for MSIV isolation in Table 3.2-9 include the primary sensor and all components of the logic which must function to de-energize the MSIV pilot valve solenoids. Electrolytic filter capacitors are installed on the input of the main steam line flow ATTS trip units. General Electric analysis (MDE-278-1285 December 1985)) accounts for the delay caused by the filter capacitors and justifies the increase in response time to 2.5 seconds for the main steam line high flow actuation signal. With the exception of the MSIV's, response time testing is not required for any other primary containment isolation actuation instrumentation. The safety analyses results are not sensitive to individual sensor response time of the logic systems to which the sensors are connected for isolation actuation instrumentation."

Page 77e, Table 3.2-9, Isolation Actuation Instrumentation Response Times

Create a new page 77e and insert the new Table 3.2-9 provided in Attachment I to this application for amendment. This table provides the response time limits from input of a trip signal to a sensor through and including the de-energizing of the pilot valve solenoids for the Main Steam Isolation Valves (MSIV) for signals from low reactor water level, low steam line pressure and high steam line flow.

II. PURPOSE OF THE PROPOSED CHANGES

An evaluation (Reference 2) identified those reactor protection system (RPS) and primary containment isolation system (PCIS) trip functions for which the instrument channel response time is considered in the transient and accident analyses described in the FSAR (Reference 11). The proposed changes will expand the number of components in an instrument channel, whose response time is to be included in total channel response time, to be consistent with the response time assumptions in reference 11. The number of trip functions to be tested will be decreased to be consistent with Standard Technical Specifications (Reference 1) and reference 11. The frequency of channel RTT will be decreased to reduce personnel radiation exposure during testing and to be consistent with reference 1.

III. SAFETY IMPLICATIONS OF THE PROPOSED CHANGES

A. Background

The General Electric Company prepared a licensing topical report (Reference 3) describing the ATTS. The NRC reviewed and accepted this report as a basis for ATTS in June 1978 (Reference 4). The Authority installed the ATTS at the James A FitzPatrick Nuclear Power Plant during 1985 (MOD-F1-82-053). The Authority submitted a proposed change to the Technical Specifications (JPTS-85-04)(Reference 5) to support operation with the ATTS and used Reference 3 as the basis for the change. The proposed amendment changed the surveillance and calibration requirements to accommodate the ATTS. However, the proposed amendment did not change requirements for RTT to reflect the methods described in the licensing topical report nor the Standard Technical Specifications. The NRC issued Amendment 89 to the Technical Specifications (Reference 6) based in part on Authority compliance with the licensing topical report.

The existing technical specification limiting condition for operation 3.1.A. states: "*The design system response time from the opening of the sensor contact to and including the opening of the trip actuator contacts shall not exceed 50 ms.*" The Authority continued to measure response time through the RPS logic to meet the technical specification requirement. The testing method did not include the response time of the ATTS components (sensor, trip unit, and relay) as described in the General Electric ATTS licensing topical report (Reference 3).

In April 1992, General Electric (DRG-A00-03658-1) evaluated the entire scope of response time testing requirements for both ATTS and other instrument channels, based on the transient and accident analyses described in the FSAR. The evaluation identified the specific instrument channels for which there is a basis to require RTT. The evaluation was reviewed by the Authority in accordance with Engineering Design Control Manual (DCM) procedure 11 (Reference 2). The DCM-11 review provided the basis for excluding specific channels from RTT testing.

B. Increased Assurance of Safety

The proposed changes to the Technical Specifications will improve the ability to detect instrumentation response time deficiencies. Accordingly, the proposed changes will provide increased assurance of plant safety. The proposed changes are based on References 1, 2, and 3. References 1 and 3 have been previously reviewed and accepted by the NRC.

C. Increased Number of Channel Components Subject to Response Time Testing

The reactor protection system and main steam line isolation actuation instrumentation RTT will include all components in the channel, beginning with the sensor and including the ATTS components and RPS logic relays, through and including opening of the contactors which de-energize the scram pilot valve solenoids, or the MSIV actuation solenoids as applicable. Increasing the number of channel components subject to the response time testing will provide increased assurance of safety.

D. Increased Time Allowance for Channel Response Time

The original 50 ms RTT limit included only the time from opening of the sensor contacts through the RPS logic channel relays to opening of the scram contactors. In accordance with References 1 and 3, the response time of all components in the channel will be included, and in particular, the sensor and ATTS component response times. Accordingly, the proposed response times will be increased to include the original 50 ms for the RPS logic relays and an additional time interval for the sensor, ATTS, and other components in the channel. The response time of the neutron monitoring sensors will not be included in channel response time measurements because they are excluded by NRC Regulatory Guide 1.118 (Reference 7). The bases for the increase in response time limits is provided in the proposed changes to Bases sections 4.1.A and 4.2.A of the Technical Specifications.

E. Reduction in Channel Testing Frequency

Previously all channels of each trip function were tested on an 18 month interval. The proposed change will require that one channel of each trip function be tested in each trip system during an 18 month interval and that all channels of each trip function be tested within two test intervals. This reduction in channel testing frequency is based on Standard Technical Specifications (Reference 1), surveillance requirement 4.3.1.3.

F. Reduction in Number of Trip Functions Subject to RTT

Prior to installation of the ATTS response time testing was conducted to insure that the 50 ms limit was maintained for the trip functions in the RPS logic channels. The addition of the ATTS components, and requirements to include sensor response time as part of the overall channel response time, will increase significantly the time required to perform the tests and increase the associated radiation exposure to personnel. However, instrument channel response time is only appropriate for those trip functions for which the response time is used as a significant input to the transient and accident analyses described in the FSAR. This limited application of RTT is consistent with the Standard Technical Specifications.

The General Electric licensing topical report (Reference 3) describes response time testing methods to be applied to instrument channels containing ATTS components. The General Electric RTT basis document (DRG-A00-03658-1) states that the methods described in Reference 3, pages A-1 and A-2, were intended for application to those channels where the trip function is identified in the Technical Specifications as requiring RTT. When it is determined that RTT is not applicable to a particular trip function there is no requirement to perform RTT on the ATTS components and logic for that trip function. This is consistent with Standard Technical Specifications. The requirements for those ATTS components will be the normal calibration and functional test surveillance which are currently performed.

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1. Reactor Protection System

The results of the transient and accident analyses described in Chapter 14 of the FSAR are potentially sensitive to response time for the eight trip functions listed in the proposed Technical Specification Table 3.1-2 "Reactor Protection System Instrumentation Response Times." Therefore, restricting RTT to the parameters in the proposed Table 3.1-2. is justified and consistent with Standard Technical Specifications. The high drywell pressure trip function will also be tested.

2. Primary Containment Isolation Actuation

With the exception of the MSIVs, RTT is not required for any of the isolation systems and associated isolation actuation instrumentation. The safety analyses are not sensitive to individual sensor response times of the logic systems to which the sensors are connected for isolation actuation instrumentation.

This position is supported by the following analyses which examine the basis for primary containment isolation response time with respect to the loss of coolant accident (LOCA), and high energy line break (HELB).

a. LOCA Considerations

PCIS initiation following a LOCA is provided to minimize offsite dose effects and to minimize loss of inventory from the reactor pressure vessel.

Because of the conservative assumptions used in the dose calculations, consideration of the response times of the isolation actuation instrumentation for the containment isolation valves will not alter the results of the analyses.

RTT of MSIV isolation instrumentation will be performed based on considerations of main steam line breaks outside containment. It should be noted rapid MSIV isolation is conservatively assumed in the containment pressurization analyses in order to maximize drywell pressure which, in turn, maximizes the assumed containment leakage rate (Reference 12).

Review of the analytical models used for the LOCA analyses, (Reference 13), indicates MSIV isolation is not specifically considered because the worst-case postulated (steam line) break location would be inboard of the MSIVs (page I-186 of Reference 13). Review of the plant specific inputs to the most recent LOCA analyses, (References 8, 9, and 14), confirms MSIV isolation time is not an input to the analyses.

b. High Energy Line Break (HELB) Considerations

The HELB analyses for JAF assume that break isolation is initiated by temperature sensors in the HPCI, RCIC, RWCU, and main steam line (MSL) break protection logic. The HPCI, RCIC, and MSL circuits employ RTDs and the RWCU circuits utilize thermocouples. In addition, as noted in Section 4.3.2 of Reference 34, a 2.5 second "instrument delay time" was assumed for each HELB. As mentioned in GE document DRG A00-03658-1, sections 1 and 3.2.1, RTT has historically **not** been required for HELB isolation instrumentation. For example, for HPCI, RCIC, and RWCU isolation temperature detectors for Hope Creek and Perry (both STS BWR plants) are exempt from RTT. The nature of RTDs and thermocouples do not lend themselves to in-situ RTT. This is consistent with the Standard Technical Specifications.

3. Emergency Core Cooling System (ECCS)

Measurement of individual instrument response times for the ECCS is not required because the ECCS initiation sensors do not represent a significant portion of the particular system overall response time.

3.1 Core Spray (CS)

When the CS is initiated, the pump will be started within a time which includes the start-up time of the emergency diesel generator (EDG) and time for motor acceleration to full speed. The initiating instrument response time (drywell pressure) is insignificant when compared to the pump and EDG start times. Opening of the injection valve does not occur until the reactor vessel pressure decreases to 450 psig and the injection valve opening permissive signal is received. The time necessary to reach the pressure permissive is variable depending on a specific LOCA blowdown rate. The measurable response times for CS are taken from Reference 8 and given below. Those response times provide a basis for acceptance criteria for existing surveillance tests. The maximum assumed system related response times are extended in the most recent SAFER/GESTR-LOCA analysis (Reference 9) as shown below in parentheses.

Maximum Allowable Time Delay from Initiating Signal to Pump at Rated Speed (including diesel generator start-up)	≤ 27 seconds (≤ 30 seconds)
Injection Valve Stroke Time	≤ 10 seconds (≤ 15 seconds)

Response time surveillance for the CS will consist of showing compliance with these times during the specified surveillance interval.

3.2 Low Pressure Coolant Injection (LPCI) System

The same principles apply to the LPCI system as described above for CS. An overall system response time is again dependent on the specific LOCA condition. In this case, while the same reactor vessel permissive pressure applies to the LPCI injection valve (450 psig), an additional reactor pressure permissive of less than 285 psig must be met to allow closure of the reactor recirculation pump discharge valve. The measurable response times for LPCI are also taken from Reference 8 and are given below. It follows that measurement of these times at the prescribed surveillance intervals will again provide the correct RTT for the LPCI system. The maximum assumed system related response times are extended in the most recent SAFER/GESTR-LOCA analysis (Reference 9) as shown below in parentheses.

Maximum Allowable Time Delay from Initiating Signal to Pump at Rated Speed (including diesel generator start-up)	≤ 22 seconds (≤ 35 seconds)
Injection Valve Stroke Time	≤ 27 seconds (≤ 35 seconds)
Recirculation Discharge Valve Stroke Time	≤ 33 seconds (≤ 37 seconds)

3.3 High Pressure Coolant Injection (HPCI) System

Unlike the two low pressure systems the HPCI system is not dependent on a reactor low pressure permissive signal to open the injection valve. Consequently it is only necessary to measure the time from initiation to achievement of ated discharge flow delivered at the design pressure as t routine surveillance for RTT. The system response time assumed in the Reference 8 analysis is given below. The maximum assumed system response times are extended in the most recent SAFER/GESTR LOCA analysis (Reference 9) as shown below in parentheses. Furthermore, credit is not taken for HPCI operation for worst case LOCA mitigation in References 8 and 9. Instrument channel response time is insignificant when compared to the allowed delay for start-up of the HPCI system. Accordingly it is not necessary to perform response time testing on the HPCI initiation instrumentation.

Maximum Allowable Time Delay from Initiating Signal to Rated Flow Available	$\leq$ 30 seconds ($\leq$ 60 seconds)

3.4 Automatic De-pressurization System (ADS) and Reactor Core Isolation Cooling (RCIC)

RTT is not applicable to the ADS or to the RCIC system. This is consistent with other existing BWR Technical Specifications and the Standard Technical Specifications. The transient and accident analyses described in the FSAR do not take credit for instrument channel response time because instrument response time is not significant when compared to the overall response time of these systems.

Instrumentation providing reactor pressure vessel water level 1 and level 3 inputs into the ADS logic can be exempted from RTT because it is in series with a nominal two minute timer. In addition, the level 3 input is merely a confirmatory input to prevent logic initiation in the event of a postulated failure of the instrument providing the level 1 input.

The ADS timers are verified by Technical Specifications to operate within a 120 ± 5 second band (Reference 32). Reference 18 assumed a 125 second time delay, whereas Reference 20 considered a delay time of 140 seconds (along with a significant reduction in ECCS flow as well as longer LPCI and CS initiation times). The plant-specific analyses have shown a 15 second increase in ADS delay to have no significant effect on peak clad temperature (PCT). By comparison, the response time of the ADS instrumentation channel is not significant and therefore response time testing is not required.

Credit is not taken for RCIC for LOCA mitigation in References 8, 9 and 14. RCIC is also not credited for transient mitigation which relies solely on the RPS. Accordingly, RTT of instrumentation which initiates RCIC is not required.

G. Response Time Testing Methodology

The Authority will perform RTT for the ATTS sensors (Rosemount Transmitters) by verifying the transmitter time constant in accordance with the method described in main body of Reference 1, section 3.3.2 "Response Time." This method, which verifies the transmitter time constant, is different from the method described in EPRI report NP-267 "Sensor Response Time Verification" which is referenced on the last page (A-35/A-36) of the appendix of Reference 3.

Reference 1, includes the following as part of NRC request 032.19 on pages A-34 in the appendix:

> *". . . Also , describe specific tests (i.e., calibration, response time, seal integrity, etc) performed as part of the surveillance test."*

Reference 3, provides the following response on Pages A-34 and A-35/A-36:

> *"The following tests are performed on each transmitter when it is removed from service for calibration:*
>
> *(1) zero and span are set;*
>
> *(2) linearity of output current to input pressure is measured;*
>
> *(3) high and low gross failure trip points on the master trip unit are set;*
>
> *(4) transmitter seal integrity is observed when the transmitter is pressurized for adjustments of zero and span; and*
>
> ***(5) response time verification will be conducted according to the procedures of EPRI report NP-267, "Sensor Response Time Verification."***

The first four items of the response are part of standard procedures for instrument calibration. They have always been performed on all instrumentation of this type. Although item 3 is performed at the same frequency as the calibration, it is not performed as an integral part of the calibration.

Item 5 for response time verification differs from the time constant method described in the main body of Reference 3 in section 3.3.2. The Authority has chosen to verify response time testing using the step change time constant method described section 3.3.2 because, when compared to the EPRI method referenced in item 5, the time constant verification method provides for easy setup, data collection, uses minimal test equipment, and is easier to conduct. It therefore significantly reduces the time technicians must remain in the reactor building and the corresponding personnel radiation exposure required to determine sensor response time. The reductions in time and radiation exposure resulting from the proposed time constant verification method, are supported by the actual field experience during testing conducted with the proposed methodology. Informal conversations with other facilities using the EPRI method indicate that the EPRI method requires significantly more technician time, results in correspondingly greater personnel radiation exposure and that it is difficult to accurately reproduce test data due to the complexity of the equipment setup.

The method developed by the Authority to verify that the response time of ATTS instruments is within the proposed Technical Specification limits, as described in Attachment III, is technically valid, reproducible and inherently conservative. This method has been reviewed by the instrument vendor (Rosemount). The vendor stated in Reference 10:

> *"The overall methodology, procedure and accompanying descriptions follow the same descriptions and methodology Rosemount would utilize to determine response times of pressure transmitters."* and *"...the methodology and procedures outlined in your transmittal are concluded as valid and correct in determining the time constants of Rosemount pressure transmitters."*

IV. SIGNIFICANT HAZARDS CONSIDERATION

Operation in accordance with the proposed amendment will not involve a significant hazards consideration as defined in 10CFR 50.92 because it will not:

1. involve a significant increase in the probability or consequences of an accident previously evaluated;

   The probability and consequences of previously evaluated accidents were based upon the RPS instrument channel and MSIV isolation actuation instrumentation meeting specified reliability and response time standards. The inclusion of the complete channel in the measurement of response time increases assurance that instrument response time will be maintained within the limits assumed in the transient and accident analyses and will not increase the probability of occurrence of previously evaluated accidents.

2. create the possibility of a new or different kind of accident from any accident previously evaluated;

   During the performance of both sensor calibration and RTT, the process instrument lines are isolated from the actual system. Because the actual process system is isolated from the test signals, and because the isolation method is unchanged from existing procedures, the new test method will not create the possibility of a new or different kind of accident.

3. or involve a significant reduction in a margin of safety.

   Testing of instrumentation which was not previously subject to response time testing will not decrease the margin of safety. The response time limits for trip functions were increased to allow for inclusion all components in the instrumentation channel, including the ATTS components. However, the response time limits remains less than those assumed in the transient and accident analyses described in the FSAR.

V. IMPLEMENTATION OF THE PROPOSED CHANGES

Implementation of the proposed changes will not affect the fire protection programs. The proposed changes will not impact the environment.

The new requirements to measure the response time of instrumentation will result in increased radiation exposure to personnel. The adoption of the time constant method proposed by the Authority will result in significantly lower personnel radiation exposure than would otherwise result from adoption of the methodology proposed by EPRI NP-267. The proposed increased time between required channel tests will also reduce potential personnel radiation exposure.

VI. CONCLUSION

These changes, as proposed, do not constitute an unreviewed safety question as defined in 10CFR 50.59 because they will not:

a. increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report;

b. create the possibility for an accident or malfunction of a different type than any evaluated previously in the safety analysis report;

c. reduce the margin of safety as defined in the basis for any technical specification.

VII. REFERENCES

1. NRC NUREG-0123, Revision 3, "Standard Technical Specifications for General Electric Boiling Water Rectors BWR/5)," issued Fall, 1980.

2. NYPA DCM-11 review (Transmittal S92-27432-1A) (JTS-92-0478 dated June 15, 1992) of General Electric Nuclear Energy Regulatory and Analysis Services document DRG A00-03658-1 "Basis for Sensor Response Time Testing (RTT) at the James A. FitzPatrick Nuclear Power Plant."

3. General Electric Company Licensing Topical Report NEDO-21617-A, dated December 1978, "Analog Transmitter/Trip Unit System for Engineered Safeguard Sensor Trip Inputs."

4. NRC letter, O. D. Parr to G.G. Sherwood (General Electric), dated June 27, 1978 (MFN-279-78). Review of General Electric Topical Report NEDO-21617, "Analog Transmitter/Trip Unit System for Engineered Safeguard Sensor Trip Input."

5. NYPA letter to the NRC, J.P. Bayne to D.B. Vassallo, (JPN-85-22) dated March 21, 1985, "Proposed Changes to the Technical Specifications Regarding Analog Transmitter Trip System (ATTS) (JPTS-85-04)."

6. NRC letter, H.I. Ableson to J.P. Bayne (NYPA), dated May 5, 1985.

7. NRC Regulatory Guide 1.118, Revision 2, June 1978, Section C.5. "Periodic Testing of Electric Power and Protection Systems."

8. General Electric NEDC-31317P dated October 1986, "James A. FitzPatrick Nuclear Power Plant, SAFER/GESTR-LOCA Analysis."

9. General Electric NEDC-31317P, Revision 1, dated November 1991, "James A. FitzPatrick Nuclear Power Plant SAFER/GESTR-LOCA Analysis."

10. Rosemount letter to NYPA, T.J. Layer to J. Lazarus, dated May 29, 1992.

11. James A. FitzPatrick Nuclear Power Plant, updated Final Safety Analysis Report, Chapter 14.

12. Updated FSAR Section 14.6.1.3.3, "Primary Containment Response - Initial Conditions and Assumptions", Assumption "C", Volume 9, Page 14.6-12.

13. NEDO-20566A, "Analytical Model for Loss-of-Coolant Analysis in Accordance with 10 CFR 50, Appendix K - Volume 1", General Electric Co., September 1986.

14. MDE-83-0786, "Sensitivity of the James A. FitzPatrick Nuclear Power Plant Safety Systems Performance to Fundamental System Parameters", July 1986 (Refer to Table 3).

15. JAFNPP Technical Specification Table 3.2-2, Item 14.